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Using Children's Literature in Math and Science

This issue offers suggestions for selecting and using children's literature in your classroom. Numerous resources selected from ENC's collection include teacher resource materials and children's books for science and math.

Welcome to the electronic version of the *ENC Focus* issue on the topic Using Children's Literature in Math and Science.

This page provides access to the full text of all articles in the print version of the magazine. Some articles have been enhanced for this electronic version.

This electronic version has other benefits. Live links are provided for all web sites mentioned. [Focus on the Collection](#) links to complete catalog records of resources selected from ENC's vast collection.

You will also find theme articles from this issue in the Topic area [Across the Curriculum](#), in the section [Literature in the Math and Science Classroom](#). That area will grow as new content is added and links are made to related resources in other areas of ENC Online.

Focus On Using Children's Literature in Math and Science

This issue recognizes connections between math and science and children's literature. For example, a good deal of children's literature is "literature of fact;" that is, several stories teach children about scientific or mathematic ideas. Another connection is how fictional literature might influence kids' thinking about the issues of math and science.

[Children's Literature Across the Curriculum](#)
by Janet Hickman

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Focus On The Collection

ENC content experts have chosen materials from the ENC Collection related to this topic.

Materials are featured in the following categories:

- [Teacher Resource Materials for Using Children's Literature: Mathematics](#)
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Children's Literature Across the Curriculum

by Janet Hickman

*Associate Professor of Children's Literature
College of Education
The Ohio State University*

Not very long ago it might have seemed odd to be talking about literature and science and math in the same breath. I used to ask classroom teachers taking my graduate course in Children's Literature Across the Curriculum to read an article about that issue written by a former editor of *Scientific American*, Dennis Flanagan.^[1] He wrote about the scientific culture and the literary culture, how for so long they were in some kind of apparent war with one another, and how that division is a false one. To make his point, Flanagan quoted Nabokov: "There is no science without fancy, and no art without facts."

I think one of the really encouraging things now is to see how many educators realize that literature and science have everything to contribute to each other. There are a couple of ways to look at this in terms of children's literature.

One is that within the body of work designated as children's literature, there is a good bit that really is science literature, or as John McPhee phrases it, "the literature of fact." Some of it is not strictly nonfiction, but it is, in its function, informational. I think that getting to know that body of material is one of the most important things that teachers can do.

The other way to think of the connection between children's literature and mathematics and science is to consider how fictional literature might influence kids' thinking about the issues that are involved in the scientific enterprises. A prime example is the writing of Jean Craighead George.^[2] A naturalist by training, she tells gripping stories that are centered in ecological mysteries and in issues that have to do with relations of humans to the natural world. And all of her stories are supported with a sound knowledge base.

In our graduate course on informational children's books, one of our goals is to get teachers better acquainted with the wealth of books they have to choose from. Typically, they comment, "I never knew that informational books were so interesting; I never knew that they were so appealing; I never knew that there was this much available." Tradition-ally, teachers have relied on textbooks for content material. On the other hand, some people who are true lovers of children's literature often don't consider informational books a part of that literature and so they haven't taken the opportunity to read very many of them.

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Literature and Mathematics

There is considerable tension, I think, in regard to tying literature to math because the abstract facets of mathematics make it particularly difficult to write about in the terms of a children's book. Certainly, mathematics is not an area about which very much is written in the fictional realm, although *Carry on Mr. Bowditch*, the 1956 Newbery Medal winner by Jean Lee Latham, tells the story of an uneducated seaman who mastered the mathematics used to compute a sailing ship's navigation.

Fortunately, there are a number of nonfiction or quasi-nonfiction books about mathematical concepts. Especially at the primary level, there are counting books, books about number concepts, and books that require mathematically based thinking. For older children, there are a few biographies about people who have made contributions in mathematics.

I have seen some encouraging changes in the relationship between children's literature and mathematics. Ten years ago, I could not find a professional book that presented a mathematical take on children's books, but now there are several major educational publishers who have been paying some attention to the topic. This is a sign of stretching, of beginning to see the connections.

Using Children's Books in Mathematics and Science Class

I tell the teachers taking my class that any good book that fits a content area should be usable in multiple ways. If it is a good book, it ought to trigger different kinds of ideas that might be classroom friendly.

Another rule of thumb for the use of children's literature is that generally two books are better than one. Encouraging students to make comparisons between books helps them understand the content of each separate book better. Such comparisons give students the opportunity to sharpen their critical judgments. It seems to me that comparing two science books about similar topics is a kind of science activity in itself.

Occasionally, the format or content of a book will inspire a teaching idea or a lesson approach. This is because every writer of an informational book has to develop an organizing principle for that book, as well as a hook for getting the child-reader's attention. Oftentimes, as a teacher, you can capitalize on this.

Some children's authors make wonderful connections among subject areas in their books. Since curricular integration is one of the guiding principles of most elementary school instruction (and it seems to me that this principle is moving up through the grades), taking advantage of the way books present their material in an embedded context can be very useful in the classroom.

Selecting the Best

Certain criteria for excellence, such as clarity and good organization, apply to any informational book. With a bit of thought and practice, classroom teachers can quickly become adept at judging these attributes.

However, if a primary criterion is accuracy and authenticity in a book that is to be used for instructional support, then the selector's lack of expertise is problematic. I think that many elementary school teachers have some concerns in the area of book selection because very few of them are

experts in mathematics or science. One of the first things I recommend to teachers is to look for evidence in the book that the content has been checked by some expert in the field.

I also encourage teachers who do not feel qualified to judge a book's accuracy and authenticity to look at the review journals, several of which are mentioned in this issue of Focus. But as we all know, that's really very hard when you have taken a classroom of kids to the library and you are standing with them trying to help them choose books. In such situations, I suggest that teachers look for simple things like publication dates and who reviewed the manuscript, which is usually in the fine print in the front--or sometimes in the back--of the book.

One thing I emphasize is use of the *Horn Book Guide*, simply because it deals with more titles than the review journals--it covers everything that the publishers chose to provide for review in a particular year. Also, the Guide lists books by series, and sometimes that is useful for teachers.

Of course, there are other book-selection criteria that are important for teachers. A book could be up-to-date, totally clear, well organized, and accurate but might really bomb in the classroom, and so teachers also need to look for elements of reader appeal.

One aspect of reader appeal is age appropriateness, but that is a hard call to make with informational books. Teachers need to be aware that a child's interest or desire to know about a topic frequently overrides the other markers for age appropriateness. Young children can go to a book that is apparently very difficult, but whatever information they can get from the pictures or from an adult reading them the captions may be very meaningful to them. On the other hand, older students may pick up a book that may seem too simple just because it is the only one available on a topic of importance for them.

In book selection, the important thing for teachers is to be able to look at a book and decide how it measures up in comparison with others of its kind. Teachers who want to learn to judge science books and apply selection criteria really ought to look at a lot of science books.

One teacher in the Children's Literature Across the Curriculum course went a bit further with the regular assignment on comparing books. She decided she had learned so much that she would ask her sixth graders to do the same. And so they went to their school library, picked sets of books about the same topic, and wrote recommendations to the librarian about which ones should be weeded. Then the class described the kinds of books that they would like to acquire. I think the point here is that teachers can learn to make judgments about book quality and then extend that knowledge to children to help them make those same kinds of judgments. What better way to develop students' critical thinking abilities?

Notes:

[1] Flanagan, Dennis, (1974). To each generation its own rabbits. *Wilson Library Bulletin*, 49 (2), 152-156.

[2] Books by Jean Craighead George include Newbery Medal winner *Julie of the Wolves* (Harper & Row, 1972) and Newbery Honor winner, *My Side of the Mountain* (Dutton, 1959).

Janet Hickman writes books for children and young adults, including the Boston Globe-Horn Book Honor winner, Jericho (Greenwillow, 1994). She is also co-author, along with Charlotte Huck, Susan Hepler, and Barbara Z. Kiefer, of the comprehensive text Children's Literature in the Elementary School (Sixth Edition, Brown & Benchmark, 1997).

[See Hickman's Suggested Professional Readings.](#)

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Selecting Children's Literature

by Karen A. Plummer
ENC Catalog Coordinator

How can you learn about children's books? Where do you start? You could go to the local book store and browse through their offerings, glancing through the books themselves and reading dust jackets. In the best of all possible worlds, this would be wonderful; but, unfortunately, it's not practical. Who has that kind of time to spare? What book store has such a comprehensive selection of children's books that you wouldn't miss crucial titles?

So we turn from the primary source (the books themselves) to secondary selection aids, such as bibliographies, award-winner lists, "best of" lists, and so on. These sources are helpful for finding basic citations to works, sometimes organized by subject with annotations that provide a summary of the work. While these sources are useful, they don't always provide enough information for making choices. The principal selection aid used in libraries and media centers is the book review. Book reviews normally discuss a book's subject, style, quality, and suitability for a particular audience. Reviews may also provide publisher name, publication date (or proposed date), and price.

What is important when selecting the most useful review source for your situation? William A. Katz identifies six key points for evaluating review sources:

- Scope:** How many reviews are published per issue and what categories are covered (nonfiction/fiction, adult/young adult/children's titles, subjects, print/nonprint)?
- Timeliness:** What kind of a gap is there between publication of a title and the time it may be reviewed (pre-publication, or weeks, months, years after publication)?
- Reviewers:** Is a reviewer identified for each review? Do the reviewers have the appropriate qualifications for evaluating the books objectively? If reviewers are not identified, do you trust the reputation of the publication enough to consider its recommendations?

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Recommendations: Does the review source balance favorable and unfavorable reviews? Does it only review what it considers the "best" in the field?

Comparison: Do the reviews compare the title under consideration with other similar resources in the same field?

Format: Does the review include information about the format of the book; pointing out indexes, appendices, bibliographies, and the importance of illustrations to the text? [\[1\]](#)

Specific Review Resources for Children's Literature:

1. *Appraisal: Children's Science Books*. (Cambridge, MA: Children's Science Book Review Committee, 1967--).

Reviews are by science and children's literature experts from Harvard and New England Libraries. Children's science titles are rated for audience age and difficulty.

2. *Booklist*. (Chicago, IL: American Library Association, 1905--).

In-house staff with library, publishing, and subject specialization backgrounds review all subject areas and all age ranges, generally four to six weeks after titles are published. Booklist covers only those titles it recommends, but does include some critical review of those titles.

3. *Bulletin of the Center for Children's Books*. (Chicago, IL: University of Chicago Press, 1947--).

Reviews cover K-12 titles in all subject areas, with a focus on the elementary grades. Includes recommended and non-recommended titles.

4. *Horn Book*. (Boston, MA: Horn Book, 1924--).

Reviews preK-12 titles in all subjects, grouped by age interest. Considered to be one of the top selection aids for children's literature. Also includes general articles on children's books.

5. *In Review: Canadian Books for Children*. (Toronto, Ontario, Canada: Provincial Library Service, 1967--).

Critical reviews with definite recommendations for or against purchase. Focus is on titles published in Canada.

6. *School Library Journal*. (New York, NY: R.R. Bowker, 1954--).

Reviews 2,500+ K-12 titles annually on all topics. Titles are usually

reviewed one to two months after publication.

7. *Science Books and Films*. (Washington, DC: American Association for the Advancement of Science, 1965--).

Critical reviews of science print and nonprint for all age levels (child through adult), focusing on titles likely to appeal to the public, not just experts/professionals in the field.

8. *VOYA (Voice of Youth Advocates)*. (New Brunswick, NJ: Dorothy Broderick and Mary K. Chelton, 10 Landing Lane, 1978--).

Focusing specifically on young adults, VOYA reviews print and nonprint titles.

Additional titles with reviews and/or articles focusing on mathematics, science, and connections to literature include:

1. *Mathematics Teaching in the Middle School* (Reston, VA: National Council of Teachers of Mathematics).

2. *Science & Children* (Arlington, VA: National Science Teachers Association).

3. *Science Scope* (Arlington, VA: National Science Teachers Association).

4. *Teaching Children Mathematics* (Reston, VA: National Council of Teachers of Mathematics).

David K. Brown has provided a great service for anyone selecting children's literature materials with his Web site, *The Children's Literature Web Guide: Internet Resources Related to Books for Children and Young Adults* (<http://www.ucalgary.ca/%7Edkbrown/>). This site includes a number of sections such as "Journals and Book Reviews" (including pointers to review sources online, such as *Booklist* and the *Bulletin of the Center for Children's Books*); "Resources for Teachers" and quick reference tools such as lists of children's book award winners and the *Doucette Index to K-12 Teaching Ideas for Literature: An Index to Books and Websites with Teaching Suggestions* (searchable by children's literature titles and authors/illustrators to retrieve citations or pointers to supporting non-fiction items).

References

[1] Katz, W. A. (1980). *Collection Development: The Selection of Materials for Libraries*. New York: Holt, Rinehart and Winston.

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The Orbis Pictus Award for Outstanding Nonfiction for Children

Recognizing that "the world of children's literature contains a variety of genres, all of which have appeal to the diverse interests of children, as well as potential for classroom teaching," the National Council of Teachers of English (NCTE) established the Orbis Pictus Award for promoting and recognizing excellence in nonfiction books for children. The name, Orbis Pictus, commemorates the work of Johannes Amos Comenius, *Orbis Pictus--The World in Pictures* (1657), considered to be the first book planned specifically for children.



The award is presented for books published in the previous year: i.e., the 2001 award honors books published in 2000. The entire list of winners from the award's inception in 1990 is provided here. For more information, visit the NCTE Web site (<http://www.ncte.org>).

The books that ENC has in its collection have ENC numbers after them that will link you to the ENC record which includes ordering information.

2001

***Hurry Freedom: African Americans in Gold Rush California* by Jerry Stanley (Crown Publishing)**

Honor Books:

America's Champion Swimmer: Gertrude Ederle by David A. Adler, illustrated by Terry Widener (Gulliver Books)

The Amazing Life of Benjamin Franklin by James Cross Giblin, illustrated by Michael Dooling (Scholastic)

Michelangelo by Diane Stanley (HarperCollins Juvenile Books)

Wild and Swampy: Exploring with Jim Arnosky by Jim Arnosky (HarperCollins Juvenile Books)

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Osceola: Memories of a Sharecropper's Daughter by Osceola Mays and Alan Govenar, illustrated by Shane W. Evans (Jump at the Sun)

2000

***Through My Eyes* by Ruby Bridges (Scholastic Press)**

Honor Books:

At Her Majesty's Request: An African Princess in Victorian England by Walter Dean Myers (Scholastic Press)

Clara Schumann: Piano Virtuoso by Susanna Reich (Clarion Books)

Mapping the World by Sylvia A. Johnson (Atheneum)

The Snake Scientist by Sy Montgomery and illustrated by Nic Bishop (Houghton Mifflin)

The Top of the World: Climbing Mount Everest by Steve Jenkins (Houghton Mifflin)

1999

***Shipwreck at the Bottom of the World: The Extraordinary True Story of Shackleton and the Endurance* by Jennifer Armstrong (Crown)**

Honor Books:

Black Whiteness: Admiral Byrd Alone in the Antarctic by Robert Burleigh, illustrated by Walter Lyon Krudop (Atheneum)

Fossil Fued: The Rivalry of the First American Dinosaur Hunters by Thom Holmes (Messner)

Hottest, Coldest, Highest, Deepest by Steve Jenkins (Houghton)

No Pretty Pictures: A Child of War by Anita Lobel (Greenwillow)

1998

***An Extraordinary Life: The Story of a Monarch Butterfly* by Laurence Pringle, *Paintings* by Bob Marstall (Orchard Books)**

Honor Books:

A Drop of Water: A Book of Science and Wonder by Walter Wick (Scholastic) ([ENC-010721](#))

A Tree is Growing by Arthur Dorros, illustrated by S.D. Schindler (Scholastic) ([ENC-010812](#))

Charles A. Lindbergh: A Human Hero by James Cross Giblin (Clarion)

Kennedy Assassinated! The World Mourns: A Reporter's Story by Wilborn Hampton (Candlewick)

Digger: The Tragic Fate of the California Indians from the Missions to the Gold Rush by Jerry Stanley (Crown)

1997

***Leonardo da Vinci* by Diane Stanley (Morrow) ([ENC-016367](#))**

Honor Books:

Full Steam Ahead: The Race to Build a Transcontinental Railroad by Rhoda Blumberg (National Geographic)

The Life and Death of Crazy Horse by Russell Freedman (Holiday House)

One World, Many Religions by Mary Pope Osborne (Random House)

1996

***The Great Fire* by Jim Murphy (Scholastic)**

Honor Books:

Dolphin Man: Exploring the World of Dolphins by Laurence Pringle (Simon & Schuster)

Rosie the Riveter: Women Working on the Home Front in World War II by Penny Colman (Random House)

1995

***Safari Beneath the Sea: The Wonder of the North Pacific Coast* by Diane Swanson (Little, Brown) ([ENC-007483](#))**

Honor Books:

Wildlife Rescue: The Work of Dr. Kathleen Ramsay by Jennifer Owings Dewey (Boyd's Mills) ([ENC-016079](#))

Kids at Work: Lewis Hine and the Crusade Against Child Labor by Russell Freedman (Clarion)

Christmas in the Big House, Christmas in the Quarters by Patricia McKissack & Frederick McKissack (Scholastic)

1994

***Across America on an Emigrant Train* by Jim Murphy (Clarion)**

Honor Books:

To the Top of the World: Adventures with Arctic Wolves by Jim Brandenburg (Simon & Schuster)

Making Sense: Animal Perception and Communication by Bruce Brooks (Farrar, Straus & Giroux)

1993

***Children of the Dust Bowl: The True Story of the School at Weedpatch Camp* by Jerry Stanley (Random House)**

Honor Books:

Talking with Artists by Pat Cummings (Simon & Schuster)

Come Back, Salmon by Molly Cone (Little, Brown) ([ENC-007495](#))

1992

***Flight: The Journey of Charles Lindbergh* by Robert Burleigh and Mike Wimmer (Putnam)**

Honor Books:

Now is Your Time! The African American Struggle for Freedom by Walter Dean Myers (HarperCollins)

Prairie Vision: The Life and Time of Solomon Butcher by Pam Conrad (HarperCollins)

1991

***Franklin Delano Roosevelt* by Russell Freedman (Clarion)**

Honor Books:

Arctic Memories by Normee Ekoomiak (Henry Holt)

Seeing the Earth from Space by Patricia Lauber (Grolier)

1990

***The Great Little Madison* by Jean Fritz (Putnam)**

Honor Books:

The Great American Gold Rush by Rhoda Blumberg (Simon & Schuster)

The News About Dinosaurs by Patricia Lauber (Simon & Schuster)

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Teacher Resource Materials for Using Children's Literature: Mathematics

1. Growing with mathematics kindergarten sampler

**Date:** 1992 **Grade:** K **Cost:** \$325.00 - \$899.00**ENC#:** 009853

A language-based K to 5 curriculum program, GROWING WITH MATHEMATICS contains multicultural and interdisciplinary activities designed with a focus on communication in the math classroom. This Kindergarten program integrates reading and writing with sorting objects, comparing size and shape, ordering events, and recognizing numerals.

<http://www.enc.org/resources/records/0,1240,009853,00.shtm>

(For more details, see [ENC Record](#).)

2. Math and literature (grades 4 to 6)

**Date:** 1995 **Grade(s):** 4 - 6 **Cost:** Out of Print**ENC#:** 007864

This third book in the MATH AND LITERATURE series is designed for teachers of grades 4 to 6. A recurring theme in the series is that works of children's literature can be effective vehicles for motivating students to think and reason mathematically.

<http://www.enc.org/resources/records/0,1240,007864,00.shtm>

(For more details, see [ENC Record](#).)

3. Afterwards : folk and fairy tales with mathematical ever afters, Grades 3-4

**Date:** 1997 **Grade(s):** 3 - 4 **Cost:** \$13.95**ENC#:** 009720

This workbook, for grades 3 and 4, contains nine multicultural collections of fairy tales and folk tales, along with related math activities that involve thinking skills. The tales allow children to visit every continent.

<http://www.enc.org/resources/records/0,1240,009720,00.shtm>

(For more details, see [ENC Record](#).)

4. Integrating mathematics and literature in the elementary classroom

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Date: 1993 **Grade(s):** 4 - 5 **Cost:** \$7.00

ENC#: 009843

This article describes how GULLIVER'S TRAVELS has been integrated into a fourth grade math classroom. Throughout each

mathematics unit, students actively measure, compare sizes, determine areas, and work with scale, ratio, and proportion as they explore places, characters, and events described in the book.

<http://www.enc.org/resources/records/0,1240,009843,00.shtm>

(For more details, see [ENC Record.](#))

5. How to use children's literature to teach mathematics



Date: 1992 **Grade(s):** K - 6 **Cost:** \$17.95

ENC#: 002285

This illustrated book explains how to use children's tales like STONE SOUP (not included) to help students in grades K to 6 grasp math concepts such as graphing and measuring. The book contains brief summaries of several stories and suggestions for hands-on activities which connect each story with mathematics.

<http://www.enc.org/resources/records/0,1240,002285,00.shtm>

(For more details, see [ENC Record.](#))

6. Literature and algebraic reasoning



Date: 1997 **Grade(s):** K - 4 **Cost:** \$6.00

ENC#: 009846

This article describes how the books, THE DOORBELL RANG by Pat Hutchins and ONE HUNDRED HUNGRY ANTS by Elinor Pinczes, were used in a grade 1 and a grade 4 classroom, respectively, to develop students' algebraic reasoning. In both cases, the authors discuss how the concepts were introduced through the literature, how the lessons played out in the classroom, and how the children responded.

<http://www.enc.org/resources/records/0,1240,009846,00.shtm>

(For more details, see [ENC Record.](#))

7. Exploring algebraic patterns through literature



Date: 1997 **Grade(s):** 5 - 8 **Cost:** Out of Print

ENC#: 009854

This article describes three literature-based activities that were used in grades 6 and 7. In these activities, ANNO'S MAGIC SEEDS by Mitsumasa Anno was used as a vehicle to introduce patterns and then explore, describe, and extend those patterns, creating algebraic experiences in an interesting and nonthreatening manner.

<http://www.enc.org/resources/records/0,1240,009854,00.shtm>

(For more details, see [ENC Record.](#))

8. My travels with Gulliver



Date: 1991 **Grade(s):** 4 - 8 **Cost:** Out of Print

ENC#: 006488

This classroom module is part of the Journeys in Mathematics series that has three main goals: for every student to develop an understanding of mathematics; for every student to develop problem solving skills; and for the

class to become a community of mathematics learners. Each module provides a series of learning activities for three to six weeks of classes.

<http://www.enc.org/resources/records/0,1240,006488,00.shtm>
(For more details, see [ENC Record.](#))

9. **Math through children's literature : making the NCTM standards come alive**

Date: 1993 **Grade(s):** K - 6 **Cost:** \$23.50

ENC#: 002775



This book is intended for use in grades K to 6 and is designed to recognize and apply the idea that children learn through active involvement, and uses familiar stories to address mathematical ideas. This book utilizes the National Council of Teachers of Mathematics (NCTM) Standards as a base for the mathematics activities and features children's literature that is widely available.

<http://www.enc.org/resources/records/0,1240,002775,00.shtm>
(For more details, see [ENC Record.](#))

10. **Using rates and scales**

Date: 1998 **Grade(s):** 5 - 6 **Cost:** \$21.95

ENC#: 009714



This resource book, part of the MATHZONES series for grades 5 and 6, provides activities and projects that help students to understand how numbers work as a system. This series presents project-based learning activities that help students to make sense of mathematics through hands-on experiences with manipulatives, through literature-based problem solving, and through keeping journals on their work.

<http://www.enc.org/resources/records/0,1240,009714,00.shtm>
(For more details, see [ENC Record.](#))

11. **It's the story that counts : more children's books for mathematical learning, K to 6**

Date: 1995 **Grade(s):** K - 6 **Cost:** \$25.50

ENC#: 006422



This book is meant for educators and policy makers of grades K to 6. The purpose of the book is to show how children's literature can play a powerful role in restoring story to the teaching and learning of mathematics.

<http://www.enc.org/resources/records/0,1240,006422,00.shtm>
(For more details, see [ENC Record.](#))

12. **Raps & rhymes in maths**

Date: 1991 **Grade(s):** Pre-K - 2 **Cost:** \$16.50

ENC#: 006928



This book for K to grade 2 is a collection of traditional and modern rhymes, riddles, and stories with mathematical themes. The material in the book is intended to provide a break from formal activities, form the introduction or conclusion of a math lesson, or provide a source of enjoyment as children rap, dramatize, or vocalize the rhyme, riddle, or story.

<http://www.enc.org/resources/records/0,1240,006928,00.shtm>

(For more details, see [ENC Record](#).)

13. **Books you can count on : linking mathematics and literature**

Date: 1991 **Grade(s):** K - 6 **Cost:** \$17.50



ENC#: 007753

This book for teachers of grades K to 6 provides a wide range of ideas for teaching mathematics through literature. The book includes a mathematical overview, background information, notes on classroom organization, and techniques for assessment and evaluation.

<http://www.enc.org/resources/records/0,1240,007753,00.shtm>

(For more details, see [ENC Record](#).)

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Teacher Resource Materials for Using Children's Literature: Science

1. Habitats and ecosystems



Date: 1996 **Grade(s):** 2 - 5 **Cost:** \$36.90 - \$179.00

ENC#: 009527

The materials in this kit, designed for students in grades 2 to 5 and part of the RANGER RICK SCIENCE SPECTACULAR series, describe five major ecosystems of the world and the amazing ways that plants and animals survive in them. The kit, developed in cooperation with the National Wildlife Federation, includes big books and student books containing color photographs and text that cover the five ecosystems and the teaching guides that go with each book. <http://www.enc.org/resources/records/0,1240,009527,00.shtm> (For more details, see [ENC Record](#).)

2. Systems



Date: 1997 **Grade(s):** Pre-

K - 2 **Cost:** \$49.95 - \$245.00 **ENC#:** 009528

The materials in this kit, designed for students in grades preK to 2 and part of the NEWBRIDGE EARLY SCIENCE PROGRAM, describe the systems of the human body to the ecosystems of a pond, allowing children to discover the ways parts of a whole work together. The kit includes big books and student books with photographs and simple to understand text that cover each of five topics, discussion cards, and teaching guides that go with each book. <http://www.enc.org/resources/records/0,1240,009528,00.shtm> (For more details, see [ENC Record](#).)

3. Tide pools and coral reefs



Date: 1993 **Grade(s):** 2 - 4 **Cost:** \$9.95 - \$278.60

ENC#: 007276

This series, designed by teachers for grade 2 to 4, consists of whole language thematic units with integrated hands-on activities involving children in reading, writing, listening, observing, practicing poetry, acting, and doing. Each book in the series includes summaries of two

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children's books with related lesson plans and related activities; across the curriculum activities in language arts (including daily writing suggestions), math, science, social studies, art, music, and life skills (physical education, cooking, and others); suggestions and patterns for bulletin boards and unit management plans; group projects to foster cooperative learning; a culminating activity which requires students to synthesize their learning; and a bibliography.

<http://www.enc.org/resources/records/0,1240,007276,00.shtm>

(For more details, see [ENC Record](#).)

4. Early childhood units for science



Date: 1993 **Grade(s):** Pre-K - 1 **Cost:** \$9.95 - \$127.50

ENC#: 007286

This reproducible activity book, designed for grades preK to 1, focuses on a whole language approach to learning science. The book is designed to assist children in their learning about their world aided by literature and original poetry.

<http://www.enc.org/resources/records/0,1240,007286,00.shtm>

(For more details, see [ENC Record](#).)

5. Connecting science & literature



Date: 1991 **Grade(s):** 2 - 4 **Cost:** \$12.95 - \$103.60

ENC#: 007670

This reproducible activity book, developed by teachers for grades 2 to 4, is part of a series that integrates children's literature with science, mathematics, and other topics. This book provides strategies and activities for integrating early elementary science curriculum with more than 40 related children's literature selections.

<http://www.enc.org/resources/records/0,1240,007670,00.shtm>

(For more details, see [ENC Record](#).)

6. Inventions



Date: 1993 **Grade(s):** 4 - 6 **Cost:** \$9.95 - \$228.85

ENC#: 007711

This series, designed by teachers for grades 4 to 6, consists of whole language thematic units with integrated hands-on activities involving children in reading, writing, listening, observing, practicing poetry, acting, and doing. Each book in the series includes summaries of two to four children's books with related lesson plans and related activities; across the curriculum activities in language arts (including daily writing suggestions), math, science, social studies, art, music, and life skills (physical education, cooking, and others); suggestions and patterns for bulletin boards and unit management plans; group projects to foster cooperative learning; a culminating activity which requires students to synthesize their learning; and a bibliography.

<http://www.enc.org/resources/records/0,1240,007711,00.shtm>

(For more details, see [ENC Record](#).)

7. Story stretchers : activities to expand children's favorite books



Date: 1989 **Grade(s):** Pre-

K - K Cost: \$19.95 **ENC#:** 008547

This book, written for grades preK and K, contains 450 teaching ideas that are based upon research in language development and

emerging literacy to help young children become good readers. The book connects 90 well known childrens books to learning centers in nature, science, mathematics, art, music, movement, cooking, and circle time.

<http://www.enc.org/resources/records/0,1240,008547,00.shtm>

(For more details, see [ENC Record.](#))

8. **The Sierra Club book of weatherwisdom**



Date: 1995 **Grade(s):** 4 - 6 **Cost:** \$15.95

ENC#: 007703

This book, published by the Sierra Club for grades 4 to 6, shows young readers how to predict the weather by paying close attention to weather signs, such as wind, clouds, and animals' behavior. The author uses dramatic stories, pencil illustrations, and hands-on activities, as well as conversational informative text, to explain how the earth's rotation and its orbit around the sun are linked to the seasons and climate; how atmospheric pressure is measured and what it can tell us; and how storms develop.

<http://www.enc.org/resources/records/0,1240,007703,00.shtm>

(For more details, see [ENC Record.](#))

9. **Keepers of life : discovering plants through Native American stories and Earth activities for children**



Date: 1994 **Grade(s):** K - 9 **Cost:** \$9.95

ENC#: 008194

This book and accompanying teachers guide, written for grades K to 9, is the third in the KEEPERS OF LIFE SERIES, which is based on Native American life and contains the two earlier titles KEEPERS OF THE EARTH and KEEPERS OF THE ANIMALS. This book encourages students to be field botanists as well as ecologists.

<http://www.enc.org/resources/records/0,1240,008194,00.shtm>

(For more details, see [ENC Record.](#))

10. **Water lab : teacher's guide**



Date: 1996 **Grade(s):** 4 - 6 **Cost:** \$22.99

ENC#: 004645

This series of books is part of a science and reading motivation program designed to supplement existing science curricula for the upper elementary grades and to integrate science and technology with reading through a series of laboratory investigations. Each laboratory explores topics in the natural and physical sciences, and also focuses on a genre of childrens literature.

<http://www.enc.org/resources/records/0,1240,004645,00.shtm>

(For more details, see [ENC Record.](#))

11. **Cultivating a child's imagination through gardening**



Date: 1996 **Grade(s):** K - 6 **Cost:** \$24.00

**ENC#:** 008702

This book, written for grades K to 6, is organized around a theme of gardening and uses childrens literature to introduce students to multicultural literature, ecology, and the impact of plants on the environment, world economics, and politics. The book contains 45 lesson plans, each of which focuses on a specific book about gardening and offers a variety of activities designed to enhance creativity and build literacy skills.

<http://www.enc.org/resources/records/0,1240,008702,00.shtm>

(For more details, see [ENC Record](#).)

12. Exploring the world of animals : linking fiction to nonfiction

Date: 1997 **Grade(s):** K - 5 **Cost:** \$24.50

**ENC#:** 008975

This book, part of the LITERATURE BRIDGES TO SCIENCE series, is designed for students in grades K to 5 and focuses on animals as pets, on the farm, in the woods, and in the wild. The series uses several fictional works to introduce a science topic to students, letting the power of the story create a desire to learn more about the subject.

<http://www.enc.org/resources/records/0,1240,008975,00.shtm>

(For more details, see [ENC Record](#).)

13. Raccoons and ripe corn

Date: 1991 **Grade(s):** Pre-

K - 3 **Cost:** \$29.95 - \$699.00 **ENC#:** 006436



This videotape, developed for grades 1 to 4, is part of the SCIENCE COMES ALIVE series by READING RAINBOW. READING RAINBOW is an educational series designed to encourage and motivate young children to read good books and visit their local libraries.

<http://www.enc.org/resources/records/0,1240,006436,00.shtm>

(For more details, see [ENC Record](#).)

14. Bugs

Date: 1991 **Grade(s):** K - 2 **Cost:** \$250.00 - \$1500.00

ENC#: 003011

The Scholastic BANNERS program focuses on personal, social, and natural world themes that are appropriate to grades K to 2. Students are encouraged to explore each theme through literature (classic and contemporary), music, poems, fingerplay, and integrated science, math, creative arts, social studies, geography, and language arts activities.

<http://www.enc.org/resources/records/0,1240,003011,00.shtm>

(For more details, see [ENC Record](#).)

15. Deep blue sea

Date: 1993 **Grade(s):** 3 - 5 **Cost:** \$275.00 - \$1100.00

ENC#: 003014

This part of the Scholastic BANNERS program, developed for grades 3 to 5, focuses on students as thinkers and researchers capable of formulating and answering questions, engages them in themes relevant to their lives, and exposes them to varied literature. In addition to activities in social studies, language arts, science, and math,

students explore the humanities including music, art, creative arts, and movement.

<http://www.enc.org/resources/records/0,1240,003014,00.shtm>

(For more details, see [ENC Record](#).)

16. **Once upon a GEMS guide : connecting young peoples literature to Great Explorations in Math and Science**

Date: 1994 **Grade(s):** Pre-K - 10 **Cost:** Out of Print

ENC#: 004805



This handbook is part of Great Explorations in Math and Science (GEMS), a series of thematic units for grades preK to 10 that help students master mathematics and science content and process skills. This book, one of a series for educators, is a resource that indexes literature selections and is organized three different ways: by specific GEMS guides (i.e., individual teacher's guides), by mathematics strands, or by science themes found throughout the series.

<http://www.enc.org/resources/records/0,1240,004805,00.shtm>

(For more details, see [ENC Record](#).)

17. **Science, Math, Integrated Language Experiences (S.M.I.L.E.)**

Date: 1997 **Grade(s):** K - 6 **Cost:** Free **ENC#:** 009696



This program, designed for students in grades K to 6, is an integrated curriculum for teaching science and mathematics along with literature and other subjects such as geography and art. The book consists of 12 modules covering topics such as flight, color, and insects.

<http://www.enc.org/resources/records/0,1240,009696,00.shtm>

(For more details, see [ENC Record](#).)

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Children's Literature Books for Mathematics

1. Circles and spheres

**Date:** 1994 **Grade(s):** 1 - 3 **Cost:** Out of Print**ENC#:** 003941

This book describes and defines terms, such as radius or diameter, associated with a circle and the relationship of circles to a sphere. Applications of circles and spheres are described as well as pictorially illustrated to items found in the home, such as food, bubbles, and other objects.

<http://www.enc.org/resources/records/0,1240,003941,00.shtm>
(For more details, see [ENC Record](#).)

2. Spirals

**Date:** 1995 **Grade(s):** 1 - 4 **Cost:** Out of Print**ENC#:** 008747

This book, intended for use in elementary mathematics classrooms, defines, discusses, and illustrates different types of spirals. It contains colorful photographs of spirals as they appear in architecture, nature, and other real world settings.

<http://www.enc.org/resources/records/0,1240,008747,00.shtm>
(For more details, see [ENC Record](#).)

3. Puzzles

**Date:** 1996 **Grade(s):** 1 - 4 **Cost:** Out of Print**ENC#:** 008925

This book is one in a series of six created for young children in the early stages of their mathematical development. Books in this series contain activities, puzzles, and games designed for an adult and a child to enjoy together.

<http://www.enc.org/resources/records/0,1240,008925,00.shtm>
(For more details, see [ENC Record](#).)

4. Time

**Date:** 1996 **Grade(s):** 1 - 4 **Cost:** Out of Print**ENC#:** 009033

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This book on time is one in the TAKE OFF WITH . . .
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(For more details, see [ENC Record.](#))

5. Counting on Frank

Date: 1991 **Grade(s):** 4 - 7 **Cost:** \$24.67

ENC#: 009006



This book, for grade 4 and up, presents all sorts of wacky counting and size comparison facts as Henry and his dog, Frank, explore the world from a unique mathematical perspective. The interesting facts are intended to encourage children to think about how math influences their lives.

<http://www.enc.org/resources/records/0,1240,009006,00.shtm>

(For more details, see [ENC Record.](#))

6. Pasta math

Date: 1997 **Grade(s):** K - 3 **Cost:** \$12.95

ENC#: 009704



This teacher's guide, part of the MATH ADVENTURES series for grades K to 3, provides blackline masters, activities, and manipulative ideas that can be used to reinforce and extend the mathematical concepts explored in the illustrated children's book, ALICE IN PASTALAND. This resource has been designed to engage multiple intelligences, including verbal/linguistic, logical/mathematical, and visual/spacial.

<http://www.enc.org/resources/records/0,1240,009704,00.shtm>

(For more details, see [ENC Record.](#))

7. Round table geometry

Date: 1996 **Grade(s):** 3 - 5 **Cost:** \$12.95

ENC#: 009781



This teacher's guide, part of the MATH ADVENTURES series for grades 1 to 5, can be used to reinforce the geometric concepts presented in the illustrated children's book, SIR CUMFERENCE AND THE FIRST ROUND TABLE. This guide includes ideas for promoting connections between literature and mathematics, activities for manipulating and measuring shapes, and problem solving investigations.

<http://www.enc.org/resources/records/0,1240,009781,00.shtm>

(For more details, see [ENC Record.](#))

8. Sir Cumference and the first round table : a math adventure

Date: 1997 **Grade(s):** 1 - 5 **Cost:** \$6.95 - \$16.95

ENC#: 009844



This illustrated children's book, for grades 1 to 5, emphasizes problem solving, shape, and mathematical vocabulary. King Arthur, fearing that his neighbors, the Circumscibers, might be preparing to make war, calls upon his most trusted knights to develop a plan of action.

<http://www.enc.org/resources/records/0,1240,009844,00.shtm>

(For more details, see [ENC Record.](#))

9. Alice in Pastaland : a math adventure

Date: 1997 **Grade(s):** K - 3 **Cost:** \$6.95

ENC#: 009845





This illustrated children's book, intended for use in grades K through 3, is a retelling of Lewis Carroll's THE ADVENTURES OF ALICE IN WONDERLAND with an emphasis on number concepts, basic operations, measurement, and problem solving. As in the original tale, Alice shrinks in size, enters a strange new world, and encounters a variety of characters.
<http://www.enc.org/resources/records/0,1240,009845,00.shtm>
 (For more details, see [ENC Record](#).)

10. Numbers



Date: 1996 **Grade(s):** 3 - 4 **Cost:** \$29.93

ENC#: 008400

Part of the Math Live series created for grades 3 and 4, this book presents the concept of numbers from several angles. The series is designed to help intermediate readers develop reasoning and mathematics skills.
<http://www.enc.org/resources/records/0,1240,008400,00.shtm>
 (For more details, see [ENC Record](#).)

11. Patterns



Date: 1996 **Grade(s):** K - 2 **Cost:** \$17.25 - \$103.50

ENC#: 008401

Part of the Math Live series created for grades 3 and 4, this book presents the concept of patterns from several perspectives. The series is designed to help intermediate readers develop reasoning and mathematics skills.
<http://www.enc.org/resources/records/0,1240,008401,00.shtm>
 (For more details, see [ENC Record](#).)

12. $2 \times 2 = \text{Boo!}$: a set of spooky multiplication stories



Date: 1995 **Grade(s):** 2 - 5 **Cost:** \$17.95

ENC#: 009474

This book uses Halloween characters to colorfully illustrate multiplication facts for numbers zero to five. The first chapter features witches who multiply by zero to make spiders and other creepy crawlies vanish.
<http://www.enc.org/resources/records/0,1240,009474,00.shtm>
 (For more details, see [ENC Record](#).)

13. Fraction action



Date: 1994 **Grade(s):** 3 - 6 **Cost:** \$17.95

ENC#: 009782

This book uses animal characters and colorful illustrations to teach facts about the fractions one-half through one-sixth. Each chapter uses a story format as it explores serious subject matter.
<http://www.enc.org/resources/records/0,1240,009782,00.shtm>
 (For more details, see [ENC Record](#).)

14. The greedy triangle



Date: 1994 **Grade(s):** K - 5 **Cost:** \$15.95

ENC#: 009717

This book, part of the Marilyn BURNS BRAINY DAY BOOK SERIES, invites children in grades K to 5 to wonder about what happens to shapes as they get

more sides and more angles. Books in this series invite children into the world of mathematics with stories that introduce specific math concepts along with colorful illustrations.

<http://www.enc.org/resources/records/0,1240,009717,00.shtm>
(For more details, see [ENC Record](#).)

15. **The king's commissioners**



Date: 1994 **Grade(s):** 2 - 3 **Cost:** \$15.95

ENC#: 009718

This book, part of the MARILYN BURNS BRAINY DAY BOOK SERIES, demonstrates the number system to children in grades K to 5 by introducing the concept of counting by grouping. Books in this series invite children into the world of mathematics with stories that introduce specific math concepts.

<http://www.enc.org/resources/records/0,1240,009718,00.shtm>
(For more details, see [ENC Record](#).)

16. **Counting on Frank : a math adventure game**



Date: 1994 **Grade(s):** 3 - 8 **Cost:** Out of Print

ENC#: 008723

This CD-ROM, designed for grades 3 to 8, is intended to improve students' problem solving and logical reasoning skills by involving them in mathematics adventure games. The games, produced by Electronic Games for Education in Math and Science (E-GEMS), are based on Rod Clement's book, COUNTING ON FRANK.

<http://www.enc.org/resources/records/0,1240,008723,00.shtm>
(For more details, see [ENC Record](#).)

17. **How big is a foot?**



Date: 1991 **Grade(s):** K - 2 **Cost:** \$10.79

ENC#: 009855

This fictitious children's book tells how and why the exact length of a foot was established. The story tells of a king who orders an apprentice carpenter to make a bed six feet by three feet.

<http://www.enc.org/resources/records/0,1240,009855,00.shtm>
(For more details, see [ENC Record](#).)

18. **How the second grade got \$8,205.50 to visit the Statue of Liberty**



Date: 1992 **Grade(s):** K - 3 **Cost:** \$15.95

ENC#: 009702

This illustrated children's book, intended for use in grades K to 3, details the trials and triumphs of a group of second graders attempting to raise money for a trip to the Statue of Liberty. Written in the style of a treasurer's report, this book addresses basic money concepts such as profit and expenses.

<http://www.enc.org/resources/records/0,1240,009702,00.shtm>
(For more details, see [ENC Record](#).)

19. **Two of everything**



Date: 1993 **Grade(s):** K - 3 **Cost:** \$15.95

ENC#: 009838



This illustrated children's book, intended for use in grades K to 3, is a retelling of a comic but wise Chinese folktale. The mathematical concept of doubling is embedded in this story.

<http://www.enc.org/resources/records/0,1240,009838,00.shtm>
(For more details, see [ENC Record](#).)

20. **Anno's mysterious multiplying jar**

Date: 1983 **Grade(s):** 3 - 8 **Cost:** \$19.99



ENC#: 007472

This book is for children in grades preK to 3. The book demonstrates the concept of factorials by using colorful pictures, such as rolling landscapes and castles, and a mysterious jar, with some water, which becomes a sea.

<http://www.enc.org/resources/records/0,1240,007472,00.shtm>
(For more details, see [ENC Record](#).)

21. **Math curse**

Date: 1995 **Grade(s):** 4 - 8 **Cost:** \$16.99



ENC#: 009867

Haunted by the math curse, a student sees every life activity framed as a mathematical problem, from determining the number of flakes in a bowl of cereal to estimating how many M&Ms it would take to measure the length of the Mississippi. (Author/LDR)

<http://www.enc.org/resources/records/0,1240,009867,00.shtm>
(For more details, see [ENC Record](#).)

22. **Anno's math games II**

Date: 1989 **Grade(s):** 2 - 5 **Cost:** Out of Print



ENC#: 009868

Through its graphical drawings, this book introduces young children to elementary numerical and spatial concepts. From comparing similarities between two pictures to exploring how dots make pictures and various ways of measuring, the questions encourage development of comparison, counting, and measurement skills.

<http://www.enc.org/resources/records/0,1240,009868,00.shtm>
(For more details, see [ENC Record](#).)

23. **Anno's math games III**

Date: 1991 **Grade(s):** 3 - 6 **Cost:** Out of Print



ENC#: 009869

This book provides illustrative drawings to introduce young children to mathematical concepts of topology, triangles, and transformations. For example, Kriss and Kross develop a magic liquid that stretches or shrinks whatever it touches.

<http://www.enc.org/resources/records/0,1240,009869,00.shtm>
(For more details, see [ENC Record](#).)

24. **Somewhere in the world right now**

Date: 1995 **Grade(s):** K - 4 **Cost:** \$16.00



ENC#: 007789

This book for children uses illustrations and a simple

story to explain the different time zones on Earth and to help readers learn about geography. In the book some events that are happening right now include: A baker is baking bread in London, a baby kangaroo is napping in Australia, and a young girl is feeding her horses in California.

<http://www.enc.org/resources/records/0,1240,007789,00.shtm>
(For more details, see [ENC Record](#).)

25. **The story of money**



Date: 1994 **Grade(s):** 1 - 4 **Cost:** Out of Print

ENC#: 001294

This illustrated book traces the historical evolution of money. Topics include bartering, the use of precious objects for money, the first coins, minting coins, countries without money, the evolution of paper money, modern banks, business and profit, taxes, distribution of wealth, and future uses of money.

<http://www.enc.org/resources/records/0,1240,001294,00.shtm>
(For more details, see [ENC Record](#).)

26. **Arithmetic**



Date: 1993 **Grade(s):** 1 - 3 **Cost:** Out of Print

ENC#: 006154

This children's picture book joins the text of Carl Sandburg's poem Arithmetic with anamorphic drawings by Ted Rand. An anamorphic drawing shows a distortion of the optical image.

<http://www.enc.org/resources/records/0,1240,006154,00.shtm>
(For more details, see [ENC Record](#).)

27. **Amazing & incredible counting stories! : a number of tall tales**



Date: 1995 **Grade(s):** Pre-K - 1 **Cost:** \$14.00

ENC#: 006261

This picture book, intended for younger readers, uses colorful illustrations and sensational, unlikely news events to demonstrate the concept of counting.

Readers will read about the 11 telephone trees found growing in the woods or the 4 jelly faucets that proved to be a big time saver, as well as a host of other incredible, numerical news events.

<http://www.enc.org/resources/records/0,1240,006261,00.shtm>
(For more details, see [ENC Record](#).)

28. **A number of animals**



Date: 1993 **Grade(s):** Pre-K - 1 **Cost:** \$19.95

ENC#: 006289

This picture book represents the numbers one through ten in symbol, word, and picture. The story focuses on the adventures of one lost chick while helping young students learn to count and recognize animals.

<http://www.enc.org/resources/records/0,1240,006289,00.shtm>
(For more details, see [ENC Record](#).)

29. **Fish eyes : a book you can count on**



Date: 1990 **Grade(s):** Pre-K - K **Cost:** \$14.95

ENC#: 006293



This children's counting picture book depicts the colorful fish that a child might see if she or he turned into a fish herself or himself. The narrator, a small black fish with a blue eye, counts the brightly colored fish as they swim in a navy blue background.

<http://www.enc.org/resources/records/0,1240,006293,00.shtm>

(For more details, see [ENC Record](#).)

30. **Big fat hen**



Date: 1994 **Grade(s):** Pre-K - K **Cost:** \$13.95

ENC#: 006336

This picture book gives younger readers an opportunity to practice counting skills. The book uses the childhood rhyme that starts out One, Two, Buckle My Shoe, as well as colorful, full page illustrations to demonstrate different numerical quantities.

<http://www.enc.org/resources/records/0,1240,006336,00.shtm>

(For more details, see [ENC Record](#).)

31. **One hundred hungry ants**



Date: 1993 **Grade(s):** K - 4 **Cost:** \$16.00

ENC#: 009847

This children's book uses marching verses and whimsical art to describe how a colony of one hundred ants marching towards a picnic were persuaded to divide into rows of two, four, five, and ten so that they could arrive more quickly than marching single file. Drawings clearly depict all one hundred ants in their several formations, illustrating the factors of 100 and the principles of division.

<http://www.enc.org/resources/records/0,1240,009847,00.shtm>

(For more details, see [ENC Record](#).)

32. **I spy two eyes : numbers in art**



Date: 1993 **Grade(s):** K - 3 **Cost:** \$19.00

ENC#: 001125

This is a counting book, containing works of art that relate to each number up to twenty. Nineteen paintings and a Japanese woodblock print created by a variety of artists dating from the fifteenth century to the present are included.

<http://www.enc.org/resources/records/0,1240,001125,00.shtm>

(For more details, see [ENC Record](#).)

33. **How much is a million?**



Date: 1985 **Grade(s):** 1 - 6 **Cost:** \$17.00

ENC#: 001299

This picture book is designed for grades 1 to 6 to help students conceptualize large numbers such as a million, a billion, and a trillion. The realm of large numbers is introduced in this story through examples in topics ranging from whales to interstellar travel.

<http://www.enc.org/resources/records/0,1240,001299,00.shtm>

(For more details, see [ENC Record](#).)

34. **Dinner at the Panda Palace**

**Date:** 1991 **Grade(s):** Pre-**K - 4 Cost:** \$6.99 **ENC#:** 006829

This children's counting book with entertaining illustrations describes in rhyme the animal customers who come to dine at

the Panda Palace. Among the guests are two carsick lions, three pigs running from a wolf, and six roof painting giraffes.

<http://www.enc.org/resources/records/0,1240,006829,00.shtm>

(For more details, see [ENC Record.](#))

35. Shapes, shapes, shapes**Date:** 1986 **Grade(s):** Pre-K - 3 **Cost:** \$16.99**ENC#:** 009848

This book is meant to serve as an imaginative and entertaining first lesson in basic geometry for young children. The first page shows and names various

shapes: a circle, a triangle, a star, an oval an others.

<http://www.enc.org/resources/records/0,1240,009848,00.shtm>

(For more details, see [ENC Record.](#))

36. Each orange had 8 slices : a counting book**Date:** 1992 **Grade(s):** 1 - 4 **Cost:** \$16.00**ENC#:** 009849

This children's book introduces beginning multiplication concepts and reinforces visual literacy. It also provides the opportunity for counting practice or an introduction

to fractions.

<http://www.enc.org/resources/records/0,1240,009849,00.shtm>

(For more details, see [ENC Record.](#))

37. The doorbell rang**Date:** 1986 **Grade(s):** K - 4 **Cost:** \$16.00**ENC#:** 009850

This illustrated children's book can be used to introduce the concept of fair division. The story begins with two children and a dozen cookies (six for each).

<http://www.enc.org/resources/records/0,1240,009850,00.shtm>

(For more details, see [ENC Record.](#))

38. More sideways arithmetic from Wayside School**Date:** 1994 **Grade(s):** 3 - 6 **Cost:** \$3.50**ENC#:** 009856

This book presents more than 50 brain teasers that can be solved using arithmetic operations and logic. The problems are intended to be rather puzzling at first, and sections supplying clues and hints are included at the back of the book.

<http://www.enc.org/resources/records/0,1240,009856,00.shtm>

(For more details, see [ENC Record.](#))

39. Creative puzzles of the world**Date:** 1995 **Grade(s):** K - 12 **Cost:** \$19.95**ENC#:** 006475

This book, designed for grades K to 12, is an introduction to the history, theory, and craftsmanship behind all types of puzzles. It contains over 1,000

puzzles that range in complexity from those that require only pencil and paper or a box of matches, to intricate constructions that require a few hours' work by a fairly skilled carpenter.

<http://www.enc.org/resources/records/0,1240,006475,00.shtm>
(For more details, see [ENC Record](#).)

40. **Geometry in architecture**



Date: 1984 **Grade(s):** 7 - Post-Sec. **Cost:** Out of Print
ENC#: 007847

This resource book reviews geometric concepts through the context of architecture and design, illustrating the relationships among symmetry, harmony, order, and architecture. Each chapter begins with a summary of familiar geometric principles, followed by the authors original observations and insights on the application of geometry to architecture.

<http://www.enc.org/resources/records/0,1240,007847,00.shtm>
(For more details, see [ENC Record](#).)

41. **Visions of symmetry : notebooks, periodic drawings, and related work of M.C. Escher**



Date: 1990 **Grade(s):** 7 - Post-Sec. **Cost:** \$24.95
ENC#: 007848

This book is a biographical account as well as a study of the work of M. C.

<http://www.enc.org/resources/records/0,1240,007848,00.shtm>
(For more details, see [ENC Record](#).)

42. **Symmetry : a unifying concept**



Date: 1994 **Grade(s):** 6 - Post-Sec. **Cost:** \$18.00
ENC#: 008076

This resource book explores the concept of symmetry through the use of visuals, including photographs, drawings, and paintings. Intentionally avoiding technical terms, the authors make the concepts accessible to a broad audience.

<http://www.enc.org/resources/records/0,1240,008076,00.shtm>
(For more details, see [ENC Record](#).)

43. **Operation magic tricks**



Date: 1995 **Grade(s):** 2 - 7 **Cost:** Out of Print
ENC#: 007249

This booklet, for elementary and middle school students, contains a collection of magic number tricks. As students are introduced to the number magic, they are led through a variety of mathematical computations and discoveries.

<http://www.enc.org/resources/records/0,1240,007249,00.shtm>
(For more details, see [ENC Record](#).)

44. **If you made a million**



Date: 1989 **Grade(s):** 1 - 4 **Cost:** \$18.95
ENC#: 001654

Using a story context, this children's picture book introduces the concept of million, develops money

concepts, and discusses bank accounts and interest. (AM)
<http://www.enc.org/resources/records/0,1240,001654,00.shtm>
(For more details, see [ENC Record](#).)

45. **Counting by kangaroos : a multiplication concept book**

Date: 1995 **Grade(s):** K - 4 **Cost:** \$15.95

ENC#: 003811



This book is intended for young readers to illustrate the concept of multiplication. The book employs rhyme schemes and Australian animals to demonstrate multiplication of the integers 1 to 10 by one, two, and three.

<http://www.enc.org/resources/records/0,1240,003811,00.shtm>
(For more details, see [ENC Record](#).)

46. **Aha! Insight**

Date: 1978 **Grade(s):** 7 - 12 **Cost:** \$14.95

ENC#: 006742



This collection of puzzles and brain twisters, developed for grades 7 to 12, is designed to lead to the sudden hunches or short solutions of problems that are called aha! reactions. The puzzles have been classified into six categories: Combinatorial aha! is the study of how things can be arranged.

<http://www.enc.org/resources/records/0,1240,006742,00.shtm>
(For more details, see [ENC Record](#).)

47. **The hands-on marvelous ball book**

Date: 1995 **Grade(s):** 4 - 8 **Cost:** \$16.95

ENC#: 003812



Written for young readers, this picture book contains rhymed verse, with the story line containing unexpected events along with illustrations while discussing how two and three dimensional shapes may be formed using a circle or a sphere. For example, a line from the book says, THE BALL DISAPPEARED, AND IN ITS PLACE WAS A PATTERN OF POINTS, FLOATING IN SPACE.

<http://www.enc.org/resources/records/0,1240,003812,00.shtm>
(For more details, see [ENC Record](#).)

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Literature Review Sources

1. Find it! science : the books you need at lightning speed

Date: 1995 **Grade(s):** K - 8 **Cost:** Out of Print**ENC#:** 007757

This CD-ROM based database, developed for grades K to 8, is designed to help both teachers and library media specialists generate student enthusiasm for science by linking science with writing and reading. The goals of the CD include developing students higher order thinking skills; promoting interaction between student, teacher, and library media specialist; providing information on award winning science books; and increasing circulation of science books.

http://www.enc.org/resources/records/0,1240,007757,00.shtm
(For more details, see [ENC Record](#).)

2. The wonderful world of mathematics : a critically annotated list of children's books in mathematics

Date: 1992 **Grade(s):** Pre-K - 6 **Cost:** Out of Print**ENC#:** 001442

This resource book contains a critically annotated list of children's books in mathematics for preschool through grade six. Each review includes the grade level along with descriptions of the book's content and accuracy, illustrations and their appropriateness, the author's writing style, and whether activities for the reader are included.

http://www.enc.org/resources/records/0,1240,001442,00.shtm
(For more details, see [ENC Record](#).)

3. Carol Hurst's children's literature site

ENC Digital Dozen Site**Date:** 1999 **Grade(s):** Pre-K - 8 **Cost:** Free**ENC#:** 004512**URL:** <http://www.carolhurst.com/>

This web site features reviews of books for kids and ideas about how to use the books in the classroom. There are collections of books and activities about particular subjects, curriculum areas and themes, and professional topics.

http://www.enc.org/resources/records/0,1240,004512,00.shtm
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4. **The children's literature web guide : Internet resources related to books for children and young adults**

Date: 1997 **Grade(s):** Pre-K - 12 **Cost:** Free

ENC#: 009774

URL: <http://www.ucalgary.ca/~dkbrown/index.html>



This World Wide Web (WWW) site was developed to gather and categorize the growing number of Internet resources relating to books for children and young adults. Much of the information presented on these pages is provided by literature lovers including parents and children, schools, and libraries, as well as commercial enterprises involved in the book world.

<http://www.enc.org/resources/records/0,1240,009774,00.shtm>
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Blending Disciplines

Classroom teachers share how they have incorporated other subjects into their math and science classrooms.

[Architecture: An Across-the-Curriculum Project Connects to the Community](#) *by Liesa Schroeder*

An art teacher in Missouri describes an award-winning project that helps elementary students look at their community with more awareness.

[Dovetailing Standards](#)

by Louise Stivers

A thematic unit allowed this teacher to meet three content area standards at once and foster students' creativity, too.

[Patterns Are...](#)

by Peggy Bush and students

In their writings, fourth graders tell their teacher and themselves what they know and how they respond to new math concepts.

[Wonder World Inspires Learning](#)

by Winnifred G. Bolinsky

Creating their own ideal vacation spot tied together the entire curriculum and led to yearlong learning and excitement for this class of fifth graders.

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Professional Development

Architecture: An Across-the-Curriculum Project Connects to the Community

Elementary students look at their community with more awareness when they focus on the "built environment."

by Liesa Schroeder, Art Specialist, Independence, Missouri



Our students are constantly bombarded by visual stimuli such as fast-paced images on television, computers, CDs, and video games. As an art educator, I try to find innovative ways to help students develop skills in sorting, analyzing, and communicating the meaning of these images. I am also interested in current research suggesting that, next to working cooperatively, visual presentation skills will be most needed in the workplace of the future (Association for Supervision and Curriculum Development, 1998).

A recent project in our school district addressed many of these concerns while allowing me to find ways to connect the fine arts to all areas of the school curriculum.

Making Use of the Built Environment

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The project my colleagues and I developed focuses on the local "built environment," the buildings, streets, and other constructions that students experience daily. Our first step was tapping in to teacher resource information from a national organization known as CUBE--The Center for Understanding the Built Environment (www.cubekc.org). This not-for-profit teacher resource center provides information on staff development, a web site of resources, teaching strategies, and curriculum consultation services.

Art and regular classroom teachers in grades three through six began with CUBE resources and then teamed up with local professionals including architects, engineers, city planners, and preservationists. The group decided that the interdisciplinary unit would be piloted at one elementary building in the school district and would involve 16 teachers and approximately 275 students. We hoped that the program would enable students to:

- Become actively engaged in their own learning by exploring, visualizing, and researching aspects of their own neighborhoods and communities.
- Become detectives as they worked to investigate and document architectural sites, situations, elements, and details through various techniques including digital photography.
- Apply their knowledge across the curriculum to include mathematics, science, reading, language arts, social studies, art, and electronic communication.
- Communicate their personalized discoveries through classroom assignments and student-generated photojournals preserved on CD-ROM.

As part of our planning, we devised measurable goals and outcomes aligned to art and core curriculum objectives. We also developed forms of assessment such as rubrics, scoring guides, surveys, and checklists to be used to monitor staff and student progress.

Planning for Success

Finding sources of funding outside of the school district was one of the keys to our success. The funding was used for staff development and technical training for staff and students, a resource library of architecture-related materials, digital cameras, software, imaging equipment, transportation to selected sites, and a professional photographer to photograph local sites. (The slides were professionally made so that we would have high-quality slide sets for instructional use district wide.)

The team of classroom teachers regularly met during the project and participated in sessions on the topic of built environment education. Other sessions helped the group develop technical skills in digital photography and in the use of imaging equipment.

Staff collaboration with architects and other professionals added authenticity. The experts helped teachers select local sites that matched core curriculum objectives and develop innovative teaching strategies. They also reviewed materials for a resource library and planned site-based visits.

Involving Students

The project began in art class, where the professional slide sets were used to build student knowledge of local architectural sites. Slides were examined carefully to familiarize students with various architectural elements, styles, details, and vocabulary. To reinforce this knowledge, students made perspective drawings, painted cityscapes, and constructed 3-D models.



At the same time, classroom teachers engaged students in activities that integrated architecture across the curriculum. Assignments included written reports, charts, graphs, schematic drawings, maps, timelines, and 3-D scaled models of houses, buildings, and the school neighborhood.

This work prepared students for classroom visits by the architects, engineers, city planners, and preservationists who were collaborating on the project. The experts shared information on job skills and career opportunities. They also interacted with students, explaining the many issues and challenges that impact our buildings and cities.

Out into the Real World

The classroom work was put into context as staff and students piloted walking tours to the selected architectural sites. Teachers created walking tour guidebooks for students to use on the site visits. The guidebooks targeted specific core curriculum objectives as well as problem-solving situations.

During the field trips, students worked in cooperative learning groups and used tools such as navigational compasses, magnets, rulers, and tape measures to gather, record, and organize information at each site. Students applied strategies in measurement and estimation as they calculated the length, height, area, perimeter, and the angles of structures.

Digital cameras were used to record elements of design. Students learned to zoom-in to record architectural details and building materials, as well as patterns, light and shade, and structural relationships. They considered ways to document time, continuity, and change by focusing on growth, erosion, and deterioration. They experimented with different angles and different points of view such as worm's-eye view and bird's-eye view.

The images were stored on disks, and students participated in photo-critique sessions upon returning to school. These sessions enabled students to sort, analyze, edit, organize, and select the best images. Written information was then added to these digital images, and the best images were then burned onto CDs by use of a CD-Recordable drive.

The resulting photojournals enabled students to create their own personalized record of their discovery of their own community and neighborhoods. The group as a whole was able to retrieve a vast collection of stored images and information.

As a follow-up, students shared their information through formal and informal discussions, multimedia presentations, Internet publishing, and other culminating activities.

Lasting Benefits

Both our staff and students benefited from participating in this innovative approach to curriculum construction and community-based education. Students were the real winners as they discovered their own city and neighborhoods. In addition, this program built new connections between students, staff, parents, administration, and community members.



By using the community as a visual textbook, this program not only served to reinforce art and core curriculum objectives, but also engaged students in a variety of learning styles that gave all students the opportunity to be successful participants. Students eagerly embraced the opportunity to work as mathematicians, scientists, historians, photographers, detectives, reporters, and artists. By presenting their discoveries and ideas, students were able to apply skills needed in the future workplace and develop a broader sense of the real world waiting beyond the classroom.

Reference

Association for Supervision and Curriculum Development, (Spring, 1998). Arts Education:

Curriculum Update, p. 1.

Liesa Schroeder teaches art at Santa Fe Trail Elementary School in Independence, Missouri. The project described in this article was honored by the SuccessLinks Program of the Missouri Department of Elementary and Secondary Education as one of the "Best Teaching Practices" in the state in 2000.

For more information contact: lschroeder@indep.k12.mo.us

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Professional Development

Dovetailing Standards

A thematic unit allowed this teacher to meet three content area standards at once and foster students' creativity, too.

by [Louise Stivers](#), *Buchanan Math, Science Magnet Center, Los Angeles, California*

When I received the 96-page publication containing the elementary school standards for my Los Angeles, California, school district, I was overwhelmed. How, I asked myself, can I digest this publication, implement the standards, teach my students, and still be recognized by my family at the end of the school year?



After painting his self-portrait, Billy felt sure his parents could easily find his desk on Back-to-School Night.

Once the mild anxiety attack subsided and I took a closer look at the standards for the second grade, I was not only relieved but excited. Here, at last, was a blueprint for the concepts and skills that I was expected to present to my students. It was also a means of assuring that our expectations for students in California would be equal to those for students in the rest of the nation.

Looking closely at the math and science standards, I saw that they dovetailed under thematic units. For example, both standards called for using and understanding bar graphs. These standards could be linked to a language arts standard calling for students to interpret information from diagrams, charts, and graphs. Standards from the three content areas reinforced each other:

Language Arts-

- Interpret information from diagrams, charts, and graphs.

Mathematics-

- Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations.

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- Measure the length of an object to the nearest inch and/or centimeter.

Science-

- Write or draw descriptions of a sequence of steps, events, and observations.
- Construct bar graphs to record data using appropriately labeled axes.
- Life: There is variation among individuals of one kind within a population.

-From the Interim Elementary Course of Study, Los Angeles Unified School District, Publication No. EC64

For this unit, I decided to have the children graph their different heights to demonstrate variation within a population.

To introduce the unit, we read the picture books *All the Colors of the Earth* by Sheila Hamanaka and *Verdi* by Jannel Cannon. From the math program used in our district, I chose a section on making classroom graphs of favorite foods. This activity gave the second graders a general overview of graphs. For some this activity was a review, but for others it was their first introduction to graphs. The students worked in pairs to collect and record data and compile a bar graph.



Second-grader Rosa made a measuring tape from a strip of one-inch grid paper. She glued the "tape" on the back of her life-size cutout.

To begin collecting the data for our unit, the children lay down on a large sheet of paper. A partner or a parent volunteer traced their full-length outline. Before the children cut out the outline or made measurements, each child painted his or her "portrait." After the paintings were cut out, each child measured his or her height in inches and recorded it on a 3x5 index card. The card was glued on the picture.

Working as teams, the students devised their own method of collecting the data on the class as a whole. Some immediately made a list of names and then recorded the heights. Others started with the heights and matched them to the names of students. Two groups needed help in organizing the data.

The teams presented their findings as bar graphs, using computer programs or grid paper. One team fashioned its graph from snap-on plastic cubes taped to paper.

To finish the unit, the children made one class graph with each child entering his or her own height on a bar graph. They also wrote entries in their journals, describing the steps taken to complete the task, observations they made along the way, and a suggestion for other information we could present in graph form.



Finally, we displayed the portraits and the graphs at Back-to-School Night. Parents were asked to locate their child's desk by recognizing the life-size cutout seated there.

***Louise Stivers** is a National Board Certified teacher at Buchanan Math, Science Magnet Center in Los Angeles, California. She is a member of the National Science Teachers Association and the California Science Teachers Association.*

Citation information

Dovetailing Standards. April 2001. *ENC Focus* 8(2) p.38-39.

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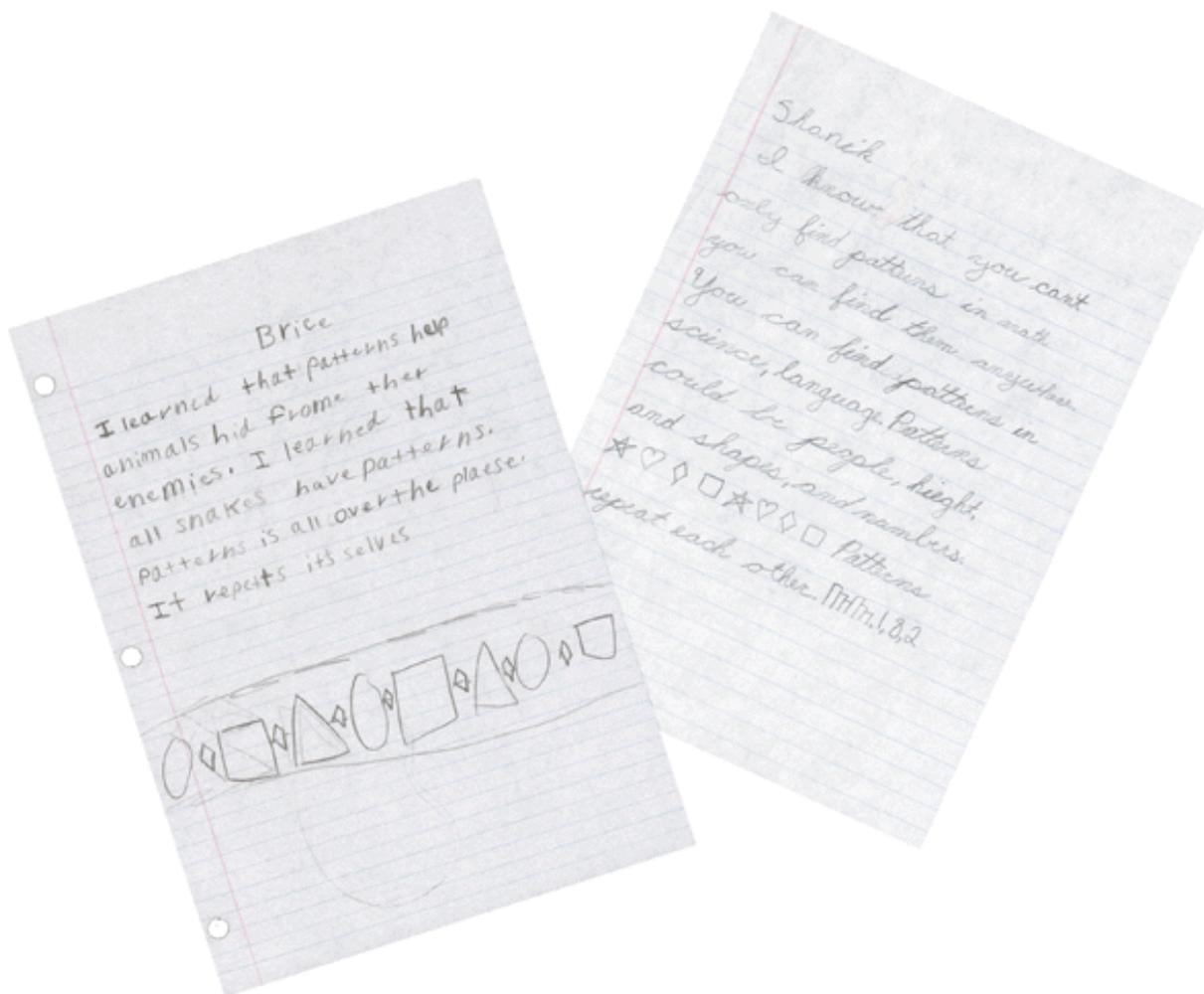
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Patterns are . . .

In their writings, fourth graders tell their teacher and themselves what they know and how they respond to new math concepts.

by [Peggy Bush](#), *Beechwood School, Whitehall, Ohio*

A few years ago I began asking students to comment in writing on a fact or concept that had been introduced in class. Generally, I posed a question to which they could respond. Sometimes the responses made me feel like crying in frustration, but more often they were a source of satisfaction and joy. Their journal writings gave me a more thorough picture of my students' comprehension than observation could. Their writings also guided my planning for future instruction.



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The math journal entries shown here were written by fourth graders early in the school year. The students came from different third-grade classrooms, and a few were new to the building. As a review, and to find out how well the children understood the patterns concept, I had presented one or two activities. From their writings, I would decide whether to spend more time on simple patterning or move on to more complex patterns. I posed this question: "Tell me what you have learned or already know about patterns. Why are they important?" The children had about 30 minutes to respond.

Twelve students responded, and I found their responses encouraging. Most of the 12 understood patterns as repeating units and knew that patterns are found in places other than the math classroom. Some could also draw or write an example of a pattern. I wanted to talk with a few of the students to clarify their responses.

Eleven students gave no response. Some complained that they did not know what to write; others said they had never written journals in math class and didn't know what I meant by "written responses." The 11 blank pages told me that even students who understood the concept of patterns might find writing in math class not only novel but confusing and frightening as well. For these students, I found other ways of evaluating their understanding while encouraging them to write down their thoughts in a future journal assignment.

It is possible that I could have discovered what most students understood about patterns by giving them a worksheet assessment. However, when the students share their understandings in writing, they not only tell me what they know but also increase their own understanding of their knowledge.

I believe that writing in the math class, like all other worthwhile tasks, must be done consistently until it becomes a purposeful routine. Math journals have given me a rich source of insight into students' learning.

***Peggy Bush** is a fourth-grade teacher and math coach at Beechwood School in Whitehall, Ohio. For the past seven years, she has also been active in the Science and Mathematics Network's Teacher/Leader Program. The Network, a part of the Ohio Regional Professional Development Centers, trains K-8 classroom teachers to be Math Leaders for their districts.*

Citation information

Patterns Are.... April 2001. *ENC Focus* 8(2) p.12-13.

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Professional Development

Wonder World Inspires Learning

Creating their own ideal vacation spot tied together the entire curriculum and led to yearlong learning and excitement for this class of fifth graders.

by Winnifred G. Bolinsky, Fogelsville Elementary School, Allentown, Pennsylvania

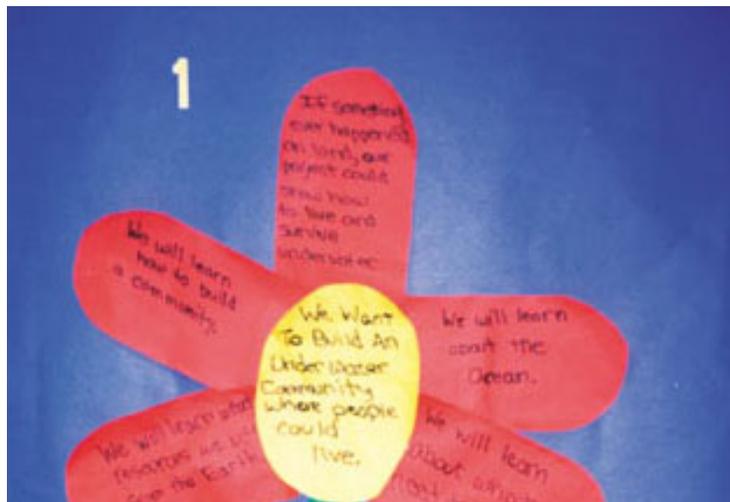
At the end of this article, see:

- [Student Writing: Students "Wonder Off into Imagination"](#)
- [ENC Celebrates Your Students](#)

What teaching and learning approaches capture the hearts and minds of elementary students, transforming abstract concepts and complex skills into valued understanding and usefulness? I believe that the best way to start is to allow students to take control of their own learning. In creating Wonder World, my fifth graders constructed a yearlong adventure brimming with opportunities to creatively apply and synthesize their math and science curriculum.

My role was to guide and facilitate their learning through an inquiry-based environment. Together we managed our time, space, and resources to maximize our learning endeavors.

Persuasive Posies



Originally, Wonder World was one of five proposals for yearlong projects developed by the students in September. I provided guidance so that student groups could propose projects that were broad enough to permit integration of our curriculum--what we call the big picture.

The student groups used their knowledge of plant

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parts to create Persuasive Posies to present their proposals (see photo). The parts of their plants served as graphic organizers, with the taproots and secondary roots containing what it would take for the class to accomplish their project goals.

To give the students experience in public speaking and to introduce the concept of market research, each group presented their project ideas to the fourth graders in our school. Wonder World, a project in which students would create the ideal vacation spot, won the fourth-grade vote as the

most interesting project.

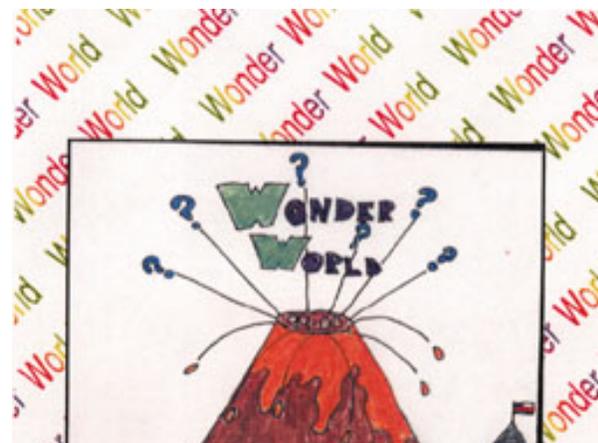
Data from the voting were tabulated by class and gender. The students created a wall-sized graph and were able to analyze the fourth graders' preferences based on these demographics. Students also produced numerous computer-generated graphs that they examined for a variety of trends.

Though only one project could be chosen, it didn't take long for the students to recognize that their ideas and efforts would determine the outcomes for Wonder World. They also saw that the other four project ideas were not necessarily defunct. For instance, the students who proposed colonizing Mars as a potential project were able to channel that enthusiasm into designing the Trip to the Planets ride for Wonder World.

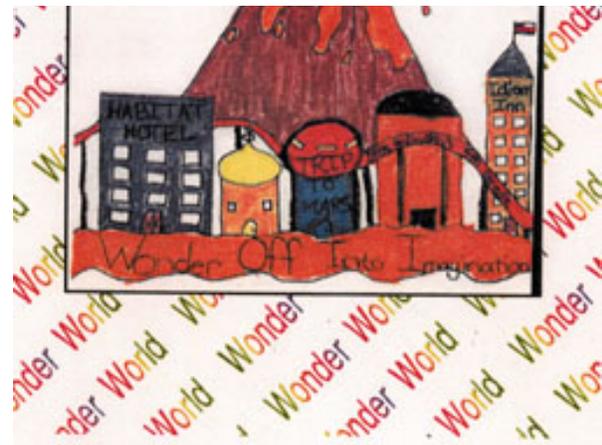
See the students' writing below for their perspective of what they are learning in designing such Wonder World attractions as the Biome Bed & Breakfast and the Habitat Hotel.

Wonder World Across the Curriculum

As the year progressed, Wonder World continued to merge elements of our curriculum. A study of the properties of light and electrical circuits provided basics for lighting the octagonal lobby of the Biome Bed & Breakfast. Concepts from physics supported our design of rides and other entertainment for this unusual vacation spot. Research and experiments provided students with the background to design and model a volcano tour.



In addition to the Biome Bed & Breakfast and Habitat Hotel, students analyzed real animals and created imaginary ones for their Portmanteau Petting Zoo. They incorporated idioms in the design and construction of the Idiom Inn.



Experts in the field supported students' endeavors by sharing their knowledge with the class. We visited the Allentown Art Museum, where students learned more about architecture and design. They also experienced the museum's library exhibit designed by Frank Lloyd Wright. Students analyzed practically everything we did to determine its potential for their Wonder World.

Throughout the project, we had far more questions than answers, more dreams in progress than quickly completed assignments. It takes time to absorb concepts and time to use them and related skills with relative ease and creativity.

Outcomes



Several students traveled to Harrisburg to share Wonder World's technology integration with state legislators and the public at the Pennsylvania Association for Educational Communication and Technology

(PAECT) Student Capital Technology Showcase. Our students were able to demonstrate how the Internet, concept mapping, desktop publishing (of advertisements, brochures, invitations, posters, programs), graphing, and word processing supported Wonder World endeavors. Students also produced an extensive PowerPoint presentation depicting the elements of Wonder World.

Perhaps the most revealing outcome was the play scripted and performed by the entire class, "Wonder World--The Play." The script indicates the impact that cooperative learning, long-term goals, and creative applications of content have on student motivation and success. The play was performed for the school, families, and community members. Students

published their script in book form through a grant from the Milken Family Foundation and Chapbooks.com.

By the end of the school year, much of what we did in mathematics and science, as well as other curriculum areas, showed up in Wonder World, where, to quote the students, visitors can "wonder off into imagination."

Winnifred G. Bolinsky teaches fifth grade at Fogelsville Elementary in Allentown, Pennsylvania. She is also a doctoral student at Curtin University.

Student Writing: Students "Wonder Off into Imagination"

Winnie Bolinsky's fifth graders were eager to share what they learned in designing and building Wonder World. Here are some excerpts from their writings throughout the project.

Wonder World is the ideal vacation spot. There will be restaurants, rides, and a great selection of attractions!

We have been using a lot of geometry for the Biome Bed & Breakfast. We learned a little about Frank Lloyd Wright, who was a famous architect. He sometimes worked with stained glass. Therefore, we are making stained glass windows for each biome at the Biome Bed & Breakfast.

In math, we made tessellations, or patterns. Some people used the tessellations for wallpaper in the habitat room they are designing by scanning the designs on the computer and decreasing their size.

In science we are learning about light and sound by reading and doing experiments. We can use those skills to light up some of the attractions and signs throughout Wonder World. That will make things look very interesting!

We designed a Wonder World logo and made our own T-shirts. We took designs from the T-shirts and used them for a background on the computers in the classroom.

We will need math and science for many other things in Wonder World, such as making precise measurements on the buildings to make them as perfect as can be. I predict, by the end of fifth grade, we will be experienced enough by all the measuring and building that we can possibly become a famous architect such as Frank Lloyd Wright.

Charlotte Barna

During our year so far, we have measured angles, created diagrams, made concept maps, learned to use computers, and, most of all, learned to work together. While having fun, we have learned immensely about language arts, natural life, geography, and math.

I, myself, had had it pretty easy the past few years. But Mrs. Bolinsky has really opened my eyes. I probably learned twice as much information this year. We have learned all about Earth's different biomes and habitats.

We also could not do anything without math. For example, we need to

make sure all of our squares and rectangles have 90-degree angles. We are also making lots of pictures with geometrical shapes.

Jack Stanley

One of the projects we did involved math. We did tessellations with squares that were four inches on each side. We came up with designs on two sides of a square, cut them out, and slid them to the opposite sides. Then we had to look at the shape and make it into something. Many people came up with good ideas. I decided my design looked like an elephant, so I ended up doing a pyramid of elephants.

For our Habitat Hotel, we had to pick an animal and learn about its habitat, so I picked the African elephant. We had to design a room on centimeter graph paper, then do a color drawing of the room. For my room, I chose my wallpaper to be my tessellation.

In the Biome Bed & Breakfast, we are putting a lot of math skills into the building. The building has a big octagon center with eight rectangles coming off of it. The rectangles are for eight biomes: rain forest, grasslands, tundra, freshwater, marine, desert, coniferous forest, and the deciduous forest. There will be eight restaurants, one for each biome. They will be in the shape of a trapezoid. Then, in the middle of the octagon, there will be a circle. It is an information desk and a check-in desk. We have to make sure all of the angles are perfect and that the lines are perfectly straight.

Next we are doing food stands. They have to serve food that is healthy in some way. We have to make a menu and research the nutrition of the different foods.

At the end of the year we will put on a play about what we learned while doing Wonder World. I'm so excited! I cannot wait till it's built.

Nicole Ruddy

The math and science we use in the Wonder World project helps us to see that the skills we learn will be useful in our lives. I plan to be a biologist, so one of the most interesting things was designing the Habitat Hotel.

The math is going to help me design habitats that are perfect for animals and birds. It helps us to estimate how big the animals will get and how much room they need to exercise. The science taught me about the animals and their environments and what they need to survive.

Kirk Miller

Some students did scale drawings of the layout of the Biome Bed and Breakfast, which required careful measuring. The layout uses many geometric solids and plane figures. Other students drew the pieces we would need to make the building on foam board, and we are now cutting them out.

We designed stained glass windows for our biomes, using only geometric plane figures. We scanned them on to the computers and printed them out on transparencies so they would look like real glass. After we finish our science unit on light, we will put a light bulb in the center of the building so that the windows will glow.

The Idiom Inn is a restaurant in Wonder World. We made ads for it and we scanned them on the computer. We are going to design menus with the food prices.

In math we did questionnaires on food to see which foods are the most popular. We typed them on the computer and printed them out. We are going to have the fourth graders in our school answer them. We will make food stands for Wonder World using the information they give us.

Wonder World is not done yet, but we have planned some of the things we will do. We are going to make a timeline showing the steps in Wonder World's creation. We will also make models of some amusement park rides, including a Trip to the Planets. At the end of the year our class will put on a play for our school using what we learned.

Heather Friedberg

It is hard work, but Wonder World is coming along great. We have just finished one tower of one of the many hotels we're doing, the Habitat Hotel. We have to measure 90-degree angles or the whole model will be off. It's hard.

In math we learn to do difficult problems. We also learn to use special buttons on our calculators to make the problems easier and make them go faster. When we grow up, if we become engineers, scientists, or mathematicians, or whatever we want to be, things will go a lot faster.

In science we do cool projects. My favorite project was when we had to light a light bulb using one, two, then three batteries, to see the difference in the light.

Mario Machado

ENC Celebrates Your Students

"What's wrong with our schools" is a prominent topic, especially in an election year. But teachers tell us that they wish that someone would focus on what is right: the wonderful young people who grow in so many exciting ways right before their eyes. This is the first in a series of features showcasing the learning that happens every day in schools all over the country.

You can take part in this effort by sending student work that demonstrates their involvement in mathematics, science, and technology. As is illustrated in this first article, the submission needs to include a brief introduction written by the teacher. Student artwork increases the likelihood of publication, but we can return it only if you provide a self-addressed, stamped envelope of adequate size. Please be selective; students can help evaluate their peers' work and choose the best for submission.

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Ideas and advice on how to incorporate literature in the math and science classroom.

[Children's Literature Across the Curriculum](#)

by Janet Hickman

What do teachers gain from using literature in their math and science classes?

[Innumerate and Proud of It](#)

by Mark Holtman

Mathematics teachers often feel that they are fighting an uphill battle. John Allen Paulos' books provide a cool drink for the climb.

[National Parks Mystery #1 Brings Intrigue To Yellowstone](#)

A book series from National Geographic combines fast-paced adventure with scientific accuracy to interest young readers in natural phenomena found in the national parks.

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Several years of winners of this National Council of Teachers of English (NCTE) award.

[The Proving Ground for History](#)

by Dave O'Connell

Thomas Kuhn's book *The Structure of Scientific Revolutions* provides answers to the questions students so often ask: Why should I learn this? Why is this important?

[Selecting Children's Literature](#)

by Karen Plummer

Using book review sources to identify appropriate books for students.

[Walter Wick's Tricks Engage Young Minds](#)

by Annette Thorson

These two articles provide advice for teachers looking for outstanding materials to use in science class.

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Professional Development

Children's Literature Across the Curriculum

by Janet Hickman

*Associate Professor of Children's Literature
College of Education
The Ohio State University*

Not very long ago it might have seemed odd to be talking about literature and science and math in the same breath. I used to ask classroom teachers taking my graduate course in Children's Literature Across the Curriculum to read an article about that issue written by a former editor of *Scientific American*, Dennis Flanagan.^[1] He wrote about the scientific culture and the literary culture, how for so long they were in some kind of apparent war with one another, and how that division is a false one. To make his point, Flanagan quoted Nabokov: "There is no science without fancy, and no art without facts."

I think one of the really encouraging things now is to see how many educators realize that literature and science have everything to contribute to each other. There are a couple of ways to look at this in terms of children's literature.

One is that within the body of work designated as children's literature, there is a good bit that really is science literature, or as John McPhee phrases it, "the literature of fact." Some of it is not strictly nonfiction, but it is, in its function, informational. I think that getting to know that body of material is one of the most important things that teachers can do.

The other way to think of the connection between children's literature and mathematics and science is to consider how fictional literature might influence kids' thinking about the issues that are involved in the scientific enterprises. A prime example is the writing of Jean Craighead George.^[2] A naturalist by training, she tells gripping stories that are centered in ecological mysteries and in issues that have to do with relations of humans to the natural world. And all of her stories are supported with a sound knowledge base.

In our graduate course on informational children's books, one of our goals is to get teachers better acquainted with the wealth of books they have to choose from. Typically, they comment, "I never knew that informational books were so interesting; I never knew that they were so appealing; I never knew that there was this much available." Tradition-ally, teachers have relied on textbooks for content material. On the other hand, some people who are true lovers of children's literature often don't consider informational books a part of that literature and so they haven't taken the opportunity to read very many of them.

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Literature and Mathematics

There is considerable tension, I think, in regard to tying literature to math because the abstract facets of mathematics make it particularly difficult to write about in the terms of a children's book. Certainly, mathematics is not an area about which very much is written in the fictional realm, although *Carry on Mr. Bowditch*, the 1956 Newbery Medal winner by Jean Lee Latham, tells the story of an uneducated seaman who mastered the mathematics used to compute a sailing ship's navigation.

Fortunately, there are a number of nonfiction or quasi-nonfiction books about mathematical concepts. Especially at the primary level, there are counting books, books about number concepts, and books that require mathematically based thinking. For older children, there are a few biographies about people who have made contributions in mathematics.

I have seen some encouraging changes in the relationship between children's literature and mathematics. Ten years ago, I could not find a professional book that presented a mathematical take on children's books, but now there are several major educational publishers who have been paying some attention to the topic. This is a sign of stretching, of beginning to see the connections.

Using Children's Books in Mathematics and Science Class

I tell the teachers taking my class that any good book that fits a content area should be usable in multiple ways. If it is a good book, it ought to trigger different kinds of ideas that might be classroom friendly.

Another rule of thumb for the use of children's literature is that generally two books are better than one. Encouraging students to make comparisons between books helps them understand the content of each separate book better. Such comparisons give students the opportunity to sharpen their critical judgments. It seems to me that comparing two science books about similar topics is a kind of science activity in itself.

Occasionally, the format or content of a book will inspire a teaching idea or a lesson approach. This is because every writer of an informational book has to develop an organizing principle for that book, as well as a hook for getting the child-reader's attention. Oftentimes, as a teacher, you can capitalize on this.

Some children's authors make wonderful connections among subject areas in their books. Since curricular integration is one of the guiding principles of most elementary school instruction (and it seems to me that this principle is moving up through the grades), taking advantage of the way books present their material in an embedded context can be very useful in the classroom.

Selecting the Best

Certain criteria for excellence, such as clarity and good organization, apply to any informational book. With a bit of thought and practice, classroom teachers can quickly become adept at judging these attributes.

However, if a primary criterion is accuracy and authenticity in a book that is to be used for instructional support, then the selector's lack of expertise is problematic. I think that many elementary school teachers have some concerns in the area of book selection because very few of them are

experts in mathematics or science. One of the first things I recommend to teachers is to look for evidence in the book that the content has been checked by some expert in the field.

I also encourage teachers who do not feel qualified to judge a book's accuracy and authenticity to look at the review journals, several of which are mentioned in this issue of Focus. But as we all know, that's really very hard when you have taken a classroom of kids to the library and you are standing with them trying to help them choose books. In such situations, I suggest that teachers look for simple things like publication dates and who reviewed the manuscript, which is usually in the fine print in the front--or sometimes in the back--of the book.

One thing I emphasize is use of the *Horn Book Guide*, simply because it deals with more titles than the review journals--it covers everything that the publishers chose to provide for review in a particular year. Also, the Guide lists books by series, and sometimes that is useful for teachers.

Of course, there are other book-selection criteria that are important for teachers. A book could be up-to-date, totally clear, well organized, and accurate but might really bomb in the classroom, and so teachers also need to look for elements of reader appeal.

One aspect of reader appeal is age appropriateness, but that is a hard call to make with informational books. Teachers need to be aware that a child's interest or desire to know about a topic frequently overrides the other markers for age appropriateness. Young children can go to a book that is apparently very difficult, but whatever information they can get from the pictures or from an adult reading them the captions may be very meaningful to them. On the other hand, older students may pick up a book that may seem too simple just because it is the only one available on a topic of importance for them.

In book selection, the important thing for teachers is to be able to look at a book and decide how it measures up in comparison with others of its kind. Teachers who want to learn to judge science books and apply selection criteria really ought to look at a lot of science books.

One teacher in the Children's Literature Across the Curriculum course went a bit further with the regular assignment on comparing books. She decided she had learned so much that she would ask her sixth graders to do the same. And so they went to their school library, picked sets of books about the same topic, and wrote recommendations to the librarian about which ones should be weeded. Then the class described the kinds of books that they would like to acquire. I think the point here is that teachers can learn to make judgments about book quality and then extend that knowledge to children to help them make those same kinds of judgments. What better way to develop students' critical thinking abilities?

Notes:

[1] Flanagan, Dennis, (1974). To each generation its own rabbits. *Wilson Library Bulletin*, 49 (2), 152-156.

[2] Books by Jean Craighead George include Newbery Medal winner *Julie of the Wolves* (Harper & Row, 1972) and Newbery Honor winner, *My Side of the Mountain* (Dutton, 1959).

*Janet Hickman writes books for children and young adults, including the Boston Globe-Horn Book Honor winner, *Jericho* (Greenwillow, 1994). She is also co-author, along with Charlotte Huck, Susan Hepler, and Barbara Z. Kiefer, of the comprehensive text *Children's Literature in the Elementary School* (Sixth Edition, Brown & Benchmark, 1997).*

[See Hickman's Suggested Professional Readings.](#)

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Innumerate and Proud of It

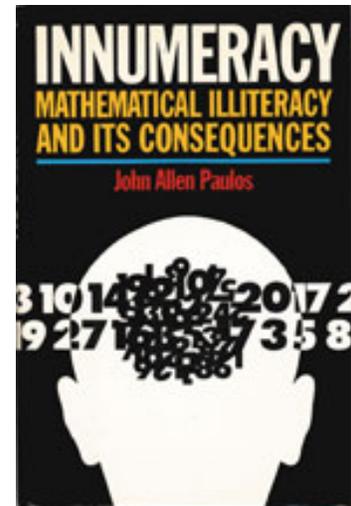
Mathematics teachers often feel that they are fighting an uphill battle. John Allen Paulos' books provide a cool drink for the climb.

by [Mark Holtman](#), *ENC Publishing*

Unlike other failings, which are hidden, mathematical illiteracy is often flaunted: "I can't even balance my checkbook." "I'm a people person, not a numbers person." Or "I always hated math."

-Innumeracy: Mathematical Illiteracy and Its Social Consequences, p 4.

The fact that innumeracy is a label that otherwise literate, educated people wear with pride is one of the major problems outlined in mathematician John Allen Paulos' book, *Innumeracy: Mathematical Illiteracy and Its Social Consequences*. The result of this attitude, according to Paulos, is that many people are grossly innumerate when it comes to the simplest tasks involving numbers; balancing the checkbook and estimating a grocery bill become time-consuming projects. The difference between a million and a billion? One million seconds is equal to approximately 11 days. One billion seconds is equal to approximately 32 years. This gives us perspective on what it means to be a millionaire or a billionaire, and it illuminates the mind-boggling extent of our national debt, a figure that would be closer to 32,000 years on this time scale.



Paulos argues that being numerate also allows us to critically analyze and think about the news. We are less likely to believe every statistic we read if we are able to logically step through the process of how the numbers were generated. To this and other serious issues, Paulos brings a sense of humor. Visitors to his web site ([math.temple.edu/~paulos](#)) will notice in the upper-left-hand corner a blurb that reads:

First this: An exhaustive international study has revealed that 62.381527% of all statistics are made up on the spot.

Innumeracy is filled with anecdotes about everyday life that have a funny

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spin to them. His more recent work, *A Mathematician Reads the Newspaper*, shows readers how mathematics affects every facet of the news, be it politics or the obituaries.

Humor may be the vehicle through which Paulos delivers his message, but his reasons for writing are serious:

I'm distressed by a society which depends so completely on mathematics and science and yet seems so indifferent to the innumeracy and scientific illiteracy of so many of its citizens...the desire to arouse a sense of numerical proportion and an appreciation for the irreducibly probabilistic nature of life... was the primary motivation for the book.

-Innumeracy: Mathematical Illiteracy and Its Social Consequences, p. 179

Mark Holtman, a technical editor at ENC, prepares the online version of ENC Focus.

Books by John Allen Paulos

Once Upon a Number. Basic Books, 1998.

A Mathematician Reads the Newspaper. Basic Books, 1995.

Beyond Numeracy: Ruminations of a Numbers Man. Knopf, 1991.

Innumeracy: Mathematical Illiteracy and Its Social Consequences. Farrar, Straus, and Giroux, 1989.

I Think, Therefore I Laugh. Columbia University Press, 1985.

Mathematics and Humor. University of Chicago Press, 1980.

Citation information

Innumerate and Proud of It. July 2001. *ENC Focus* 8(3) p.24.

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National Parks Mystery #1 Brings Intrigue to Yellowstone

by [Annette Thorson](#), *ENC Publishing Group*

Teachers and parents favor books that educate-youngsters crave books that exhilarate. The answer? National Geographic's new *National Parks Mysteries*, a series that combines fast-paced adventure with a scientifically accurate portrayal of natural phenomena in America's national parks.

Wolf Stalker([ENC-011618](#)) the first novel in the series, has just been released. Set in Yellowstone National Park, it is the first work of fiction ever published in the 110-year history of the National Geographic Society. According to Barbara Lalicki, director of children's publishing for National Geographic, her division wanted to reach out to young readers who might not be attracted to a strictly factual presentation.

To blend the best of the nonfiction and fiction genres requires the collaboration of two writers: Gloria Skurzynski, author of 38 award-winning children's books-many of them in the field of science-and Alane Ferguson, children's mystery writer who has won the Edgar Award from the Mystery Writers of America. In *Wolf Stalker*, the mother-daughter team combines talents to present the wolf-restoration project and the Yellowstone environment in a story of teenage rebellion that will appeal to middle school readers.

One of Skurzynski's goals was that readers could go to Yellowstone and retrace the path of the three young characters, experiencing for themselves the environment described in the book. Skurzynski herself walked each step of the way, taking notes and color photos, some of which are published in *Wolf Stalker* along with pictures from the National Geographic photographers.

Skurzynski is exacting in her approach to researching her science books partly because she loves science and partly because she respects children and knows they will be quick to notice inaccuracies. This combination of scientific rigor and understanding of young readers has brought Skurzynski's work the respect of scientists and science educators.

Books by Skurzynski include *Almost the Real Thing* (Bradbury, 1991), winner of the 1992 Children's Science Book Award from the American Institute of Physics. *Zero Gravity* (Bradbury, 1994) was named a National Science Teachers Association / Children's Book Council Outstanding Science

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Trade Book for Children for 1995 and a Children's Book of the Year by the Bank Street College Child Study Committee. Visit <http://redhawknorth.com/gloria> for more information about Skurzynski's other nonfiction science books and novels with a scientific twist.

Fans of Wolf Stalker will be pleased to know that Skurzynski and Ferguson are collaborating on the next *National Parks Mystery*, which is set in Hawaii Volcanoes National Park. The third book in the series will feature Mesa Verde National Park and the fourth will be set in either Denali or the Everglades. Skurzynski notes that National Geographic is interested in expanding the series to cover the rest of the national parks-all 50 of them!

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The Orbis Pictus Award for Outstanding Nonfiction for Children

Recognizing that "the world of children's literature contains a variety of genres, all of which have appeal to the diverse interests of children, as well as potential for classroom teaching," the National Council of Teachers of English (NCTE) established the Orbis Pictus Award for promoting and recognizing excellence in nonfiction books for children. The name, Orbis Pictus, commemorates the work of Johannes Amos Comenius, *Orbis Pictus--The World in Pictures* (1657), considered to be the first book planned specifically for children.



The award is presented for books published in the previous year: i.e., the 2001 award honors books published in 2000. The entire list of winners from the award's inception in 1990 is provided here. For more information, visit the NCTE Web site (<http://www.ncte.org>).

The books that ENC has in its collection have ENC numbers after them that will link you to the ENC record which includes ordering information.

2001

***Hurry Freedom: African Americans in Gold Rush California* by Jerry Stanley (Crown Publishing)**

Honor Books:

America's Champion Swimmer: Gertrude Ederle by David A. Adler, illustrated by Terry Widener (Gulliver Books)

The Amazing Life of Benjamin Franklin by James Cross Giblin, illustrated by Michael Dooling (Scholastic)

Michelangelo by Diane Stanley (HarperCollins Juvenile Books)

Wild and Swampy: Exploring with Jim Arnosky by Jim Arnosky (HarperCollins Juvenile Books)

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Osceola: Memories of a Sharecropper's Daughter by Osceola Mays and Alan Govenar, illustrated by Shane W. Evans (Jump at the Sun)

2000

***Through My Eyes* by Ruby Bridges (Scholastic Press)**

Honor Books:

At Her Majesty's Request: An African Princess in Victorian England by Walter Dean Myers (Scholastic Press)

Clara Schumann: Piano Virtuoso by Susanna Reich (Clarion Books)

Mapping the World by Sylvia A. Johnson (Atheneum)

The Snake Scientist by Sy Montgomery and illustrated by Nic Bishop (Houghton Mifflin)

The Top of the World: Climbing Mount Everest by Steve Jenkins (Houghton Mifflin)

1999

***Shipwreck at the Bottom of the World: The Extraordinary True Story of Shackleton and the Endurance* by Jennifer Armstrong (Crown)**

Honor Books:

Black Whiteness: Admiral Byrd Alone in the Antarctic by Robert Burleigh, illustrated by Walter Lyon Krudop (Atheneum)

Fossil Fued: The Rivalry of the First American Dinosaur Hunters by Thom Holmes (Messner)

Hottest, Coldest, Highest, Deepest by Steve Jenkins (Houghton)

No Pretty Pictures: A Child of War by Anita Lobel (Greenwillow)

1998

***An Extraordinary Life: The Story of a Monarch Butterfly* by Laurence Pringle, *Paintings* by Bob Marstall (Orchard Books)**

Honor Books:

A Drop of Water: A Book of Science and Wonder by Walter Wick (Scholastic) ([ENC-010721](#))

A Tree is Growing by Arthur Dorros, illustrated by S.D. Schindler (Scholastic) ([ENC-010812](#))

Charles A. Lindbergh: A Human Hero by James Cross Giblin (Clarion)

Kennedy Assassinated! The World Mourns: A Reporter's Story by Wilborn Hampton (Candlewick)

Digger: The Tragic Fate of the California Indians from the Missions to the Gold Rush by Jerry Stanley (Crown)

1997

***Leonardo da Vinci* by Diane Stanley (Morrow) ([ENC-016367](#))**

Honor Books:

Full Steam Ahead: The Race to Build a Transcontinental Railroad by Rhoda Blumberg (National Geographic)

The Life and Death of Crazy Horse by Russell Freedman (Holiday House)

One World, Many Religions by Mary Pope Osborne (Random House)

1996

***The Great Fire* by Jim Murphy (Scholastic)**

Honor Books:

Dolphin Man: Exploring the World of Dolphins by Laurence Pringle (Simon & Schuster)

Rosie the Riveter: Women Working on the Home Front in World War II by Penny Colman (Random House)

1995

***Safari Beneath the Sea: The Wonder of the North Pacific Coast* by Diane Swanson (Little, Brown) ([ENC-007483](#))**

Honor Books:

Wildlife Rescue: The Work of Dr. Kathleen Ramsay by Jennifer Owings Dewey (Boyd's Mills) ([ENC-016079](#))

Kids at Work: Lewis Hine and the Crusade Against Child Labor by Russell Freedman (Clarion)

Christmas in the Big House, Christmas in the Quarters by Patricia McKissack & Frederick McKissack (Scholastic)

1994

***Across America on an Emigrant Train* by Jim Murphy (Clarion)**

Honor Books:

To the Top of the World: Adventures with Arctic Wolves by Jim Brandenburg (Simon & Schuster)

Making Sense: Animal Perception and Communication by Bruce Brooks (Farrar, Straus & Giroux)

1993

***Children of the Dust Bowl: The True Story of the School at Weedpatch Camp* by Jerry Stanley (Random House)**

Honor Books:

Talking with Artists by Pat Cummings (Simon & Schuster)

Come Back, Salmon by Molly Cone (Little, Brown) ([ENC-007495](#))

1992

***Flight: The Journey of Charles Lindbergh* by Robert Burleigh and Mike Wimmer (Putnam)**

Honor Books:

Now is Your Time! The African American Struggle for Freedom by Walter Dean Myers (HarperCollins)

Prairie Vision: The Life and Time of Solomon Butcher by Pam Conrad (HarperCollins)

1991

***Franklin Delano Roosevelt* by Russell Freedman (Clarion)**

Honor Books:

Arctic Memories by Normee Ekoomiak (Henry Holt)

Seeing the Earth from Space by Patricia Lauber (Grolier)

1990

***The Great Little Madison* by Jean Fritz (Putnam)**

Honor Books:

The Great American Gold Rush by Rhoda Blumberg (Simon & Schuster)

The News About Dinosaurs by Patricia Lauber (Simon & Schuster)

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The Proving Ground for History

Thomas Kuhn's book *The Structure of Scientific Revolutions* provides answers to the questions students so often ask: Why should I learn this? Why is this important?

by [David O'Connell](#), *ENC Publishing*

When I was fourteen years old, I wanted to be an astronomer. What drew me to backyard stargazing was a fascination with the unknown. Was space really infinite? Was there a place where space, as we conceived of it, simply ended? If so, what then? Though I wouldn't have then articulated it in this way, my interest was as much philosophic and religious as it was mathematic and scientific. Most importantly, seeking answers to these questions seemed adventurous. Looking back, I see now how my interest in the movement of planets and the creation of galaxies was tied to my whole process of adolescence; I was trying to come to terms with my place in the universe.



Of course, my notions about the astronomer's life were terribly romantic. And yes, my interest was fueled by heavy doses of Arthur C. Clarke and Ray Bradbury. Even so, the slight quickening of pulse I felt when rooting through my high school library's old *Astronomy* magazines can't be explained away simply by this naiveté. Something within the nature of science, something at its core, seemed to necessitate romanticism. As a high school freshman, I sensed that science was the product of curiosity and imagination, the building blocks of creative thinking. I wanted to be a person who had such a mind.

My aspirations of being a scientist didn't last long. Somewhere between September and June of my junior year, between learning the periodic table and calculating moles in chemistry class, I lost the belief that science allowed for creativity. Each time my classmates and I fired up our Bunsen burners, I saw myself becoming part of a safety-goggled herd looking for a single correct answer.

Though I had my fair share of disasters in the lab, my frustration wasn't so much a result of failure. I had a good teacher and, with his help, became quite well informed in the process of science. I could pass the tests. I could

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meet most expectations. Nevertheless, as I acquired the skills necessary to get the right answers, I lost the sense of science as a creative enterprise. Where was there room for individuality when every answer was pre-existing? In other classes, particularly English, my ideas were valued. In science I felt my contributions were limited to the regurgitation of facts.

I struggled through physics and, by high school graduation, figured that I had done my time. In college I opted for the "science for nonscience majors" classes and doted on my new love, the humanities. Then, in my junior year of college, with one science requirement left to fill, I read Thomas Kuhn's *The Structure of Scientific Revolutions* and was inspired to rethink my whole concept of science and my relation to it.

You Say You Want a Revolution?

Since its first printing in 1962, Kuhn's text stands as one of the most influential philosophic works of the 20th century. Though this is a book about the scientific community, Kuhn's ideas have reached far beyond his primary audience. His theory of paradigm shifts has found its way into the disciplines of sociology, literary criticism, and political science, to name just a few. Kuhn's work has also had influence beyond the academy. Former presidents George Bush (senior) and Bill Clinton have both used terminology coined by Kuhn, and *Structure* is said to be Al Gore's favorite book (Franklin, 2000).

When I first read *Structure*, I was captivated by Kuhn's version of scientific history. This was a history I had never comprehensively received in high school. While I was taught, and expected to memorize, the products of scientists' work over the ages, very little time was spent discussing the stories behind the creation of the formulas I used. This is unfortunate because I have always found it easier to remain focused on abstract work if I first know the concrete, human history behind its generation.

By providing history's panorama, stories about scientific achievement provide answers to the questions students like myself so often ask:

Why should I learn this?

Why is this important?

Moreover, because these are stories about the products of creative genius over the ages, scientific history proves the dynamic nature of the scientific world to the easily jaded student. I often wonder if I would have abandoned the sciences if I had had a better grasp of the human drama behind scientific advancement.

Instead of drama, most of the scientific history I did receive in school made scientific advancement out to be boringly linear: first came Ptolemy, next came Copernicus, and so forth. The whole process of learning this history was akin to memorizing a chronological list of presidents without being provided any of the political struggles that gave rise to each.

Kuhn, on the other hand, describes scientific history as being essentially volatile. According to him, scientific history has been comprised of long bouts of "normal science" that are occasionally interrupted by what he terms "paradigm shifts." These paradigm shifts are moments in history when a theory forces the scientific community to see all of reality in a radically new way. Because this new vision is completely incompatible with the paradigm that preceded it, it must sever ties with its predecessor. According to Kuhn, this shift is not progressive, but revolutionary.

For example, in order for Copernicus' heliocentric model of the solar system to be accepted, astronomers were forced to abandon a paradigm (Ptolemy's geocentric model) that had sustained their community for almost eighteen hundred years. We can only imagine how frightening this was. What we know for sure is that this shift was a slow and sometimes dangerous process. Galileo's heresy conviction and subsequent house arrest by the Inquisition is a classic example of the power struggle inherent to paradigm shifts. Though every revolution might not be as volatile as the Copernican, the drama behind scientific history is there for those who seek it out.

Kuhn in the K-12 Classroom

Though Kuhn's book is probably too technical for even the high school science curriculum, a reading of *Structure* would provide every teacher with a number of new ideas on how to bring the excitement of scientific history into the classroom. Like any good historian, Kuhn pulls his reader into his book by painting the mindset of those who worked with a now defunct paradigm. By demonstrating how a paradigm that seems inconceivable to us today was once taken for granted, he challenges us to reexamine our own preconceptions and allows us to see that scientific answers are far from preexisting.

For example, I had never really considered how devastating it would be for a person who once accepted that the earth was the center of the universe to be forced to accept that it was, in fact, merely one of many planets speeding around the sun. Such a person must have wondered what else that he accepted as truth was actually illusion.

Naturally, I began asking myself the same questions. What exactly did I know for sure was true? How was I sure? How would I act if I had to abandon the notion that the earth revolved around the sun? These types of "big picture" questions are there for the asking, whether in biology, physics, or chemistry, and they can fuel students' interest in science.

Teachers may even experiment with role-playing, story and poem writing, and drawing in an attempt to concretize these questions and generate discussion. Far from diverting students' attention away from science, such techniques bring about the realization that one must turn to experimentation to answer these questions. This brings about unique opportunities. Unlike American or world history, scientific history allows students to take part in experiments that literally trace the paths of his or her scientific predecessors. The lab becomes the proving ground of history.

It should be pointed out that many critics vehemently disagree with Kuhn (Franklin). A number of these detractors have argued that Kuhn's model of scientific history is unduly influenced by sociologic theory. Regardless of whether or not Kuhn is right, the intensity of this ongoing critical debate demonstrates the inherent value of his theories. That Kuhn's model continues to draw both scientists and nonscientists alike into this dialogue is perhaps the greatest testament to his achievement.

I believe this dialogue to be more important today than when Kuhn first published *Structure*. As our society's dependence upon science and technology continues to grow, it is important that a broad-based contingent of the population feels comfortable enough--if only with the idea of science--to remain tuned in to the many issues related to scientific advancements that will be raised in the future.

While it is unrealistic to hope that every student will learn the necessary

skills to fully understand these advancements, a general, conceptual knowledge of the scientific community would give every student a context within which to process the information he or she will read in the newspaper or see on television 20 years after graduation. Most important, this context would allow for an educated debate about the social and ethical ramifications of science upon society.

I will probably never go back into a physics or biology classroom. Nevertheless, I know that my overall interest in science is keener for having been exposed to Kuhn's theories. It seems to me that this lifelong interest in science, or science literacy, for every citizen has always been one of the goals of science education. It is often forgotten by the nonscientist that all scientific theories are attempts to discover truth. Those of us who shied away from science often fail to see it as an adult's way of carrying on the existential questioning that begins with adolescence. As with artists, philosophers, and writers, scientists' endeavors to ascertain truth are the most human of enterprises. It is the humanity of this field, demonstrated by the stories of the community's history, which could help K-12 students remain students for life.

David O'Connell is a poet and teacher. He recently completed a Master of Fine Arts Degree in Creative Writing at The Ohio State University.

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Professional Development

Selecting Children's Literature

by Karen A. Plummer
ENC Catalog Coordinator

How can you learn about children's books? Where do you start? You could go to the local book store and browse through their offerings, glancing through the books themselves and reading dust jackets. In the best of all possible worlds, this would be wonderful; but, unfortunately, it's not practical. Who has that kind of time to spare? What book store has such a comprehensive selection of children's books that you wouldn't miss crucial titles?

So we turn from the primary source (the books themselves) to secondary selection aids, such as bibliographies, award-winner lists, "best of" lists, and so on. These sources are helpful for finding basic citations to works, sometimes organized by subject with annotations that provide a summary of the work. While these sources are useful, they don't always provide enough information for making choices. The principal selection aid used in libraries and media centers is the book review. Book reviews normally discuss a book's subject, style, quality, and suitability for a particular audience. Reviews may also provide publisher name, publication date (or proposed date), and price.

What is important when selecting the most useful review source for your situation? William A. Katz identifies six key points for evaluating review sources:

- Scope:** How many reviews are published per issue and what categories are covered (nonfiction/fiction, adult/young adult/children's titles, subjects, print/nonprint)?
- Timeliness:** What kind of a gap is there between publication of a title and the time it may be reviewed (pre-publication, or weeks, months, years after publication)?
- Reviewers:** Is a reviewer identified for each review? Do the reviewers have the appropriate qualifications for evaluating the books objectively? If reviewers are not identified, do you trust the reputation of the publication enough to consider its recommendations?

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Recommendations: Does the review source balance favorable and unfavorable reviews? Does it only review what it considers the "best" in the field?

Comparison: Do the reviews compare the title under consideration with other similar resources in the same field?

Format: Does the review include information about the format of the book; pointing out indexes, appendices, bibliographies, and the importance of illustrations to the text? [\[1\]](#)

Specific Review Resources for Children's Literature:

1. *Appraisal: Children's Science Books*. (Cambridge, MA: Children's Science Book Review Committee, 1967--).

Reviews are by science and children's literature experts from Harvard and New England Libraries. Children's science titles are rated for audience age and difficulty.

2. *Booklist*. (Chicago, IL: American Library Association, 1905--).

In-house staff with library, publishing, and subject specialization backgrounds review all subject areas and all age ranges, generally four to six weeks after titles are published. Booklist covers only those titles it recommends, but does include some critical review of those titles.

3. *Bulletin of the Center for Children's Books*. (Chicago, IL: University of Chicago Press, 1947--).

Reviews cover K-12 titles in all subject areas, with a focus on the elementary grades. Includes recommended and non-recommended titles.

4. *Horn Book*. (Boston, MA: Horn Book, 1924--).

Reviews preK-12 titles in all subjects, grouped by age interest. Considered to be one of the top selection aids for children's literature. Also includes general articles on children's books.

5. *In Review: Canadian Books for Children*. (Toronto, Ontario, Canada: Provincial Library Service, 1967--).

Critical reviews with definite recommendations for or against purchase. Focus is on titles published in Canada.

6. *School Library Journal*. (New York, NY: R.R. Bowker, 1954--).

Reviews 2,500+ K-12 titles annually on all topics. Titles are usually

reviewed one to two months after publication.

7. *Science Books and Films*. (Washington, DC: American Association for the Advancement of Science, 1965--).

Critical reviews of science print and nonprint for all age levels (child through adult), focusing on titles likely to appeal to the public, not just experts/professionals in the field.

8. *VOYA (Voice of Youth Advocates)*. (New Brunswick, NJ: Dorothy Broderick and Mary K. Chelton, 10 Landing Lane, 1978--).

Focusing specifically on young adults, VOYA reviews print and nonprint titles.

Additional titles with reviews and/or articles focusing on mathematics, science, and connections to literature include:

1. *Mathematics Teaching in the Middle School* (Reston, VA: National Council of Teachers of Mathematics).

2. *Science & Children* (Arlington, VA: National Science Teachers Association).

3. *Science Scope* (Arlington, VA: National Science Teachers Association).

4. *Teaching Children Mathematics* (Reston, VA: National Council of Teachers of Mathematics).

David K. Brown has provided a great service for anyone selecting children's literature materials with his Web site, *The Children's Literature Web Guide: Internet Resources Related to Books for Children and Young Adults* (<http://www.ucalgary.ca/%7Edkbrown/>). This site includes a number of sections such as "Journals and Book Reviews" (including pointers to review sources online, such as *Booklist* and the *Bulletin of the Center for Children's Books*); "Resources for Teachers" and quick reference tools such as lists of children's book award winners and the *Doucette Index to K-12 Teaching Ideas for Literature: An Index to Books and Websites with Teaching Suggestions* (searchable by children's literature titles and authors/illustrators to retrieve citations or pointers to supporting non-fiction items).

References

[1] Katz, W. A. (1980). *Collection Development: The Selection of Materials for Libraries*. New York: Holt, Rinehart and Winston.

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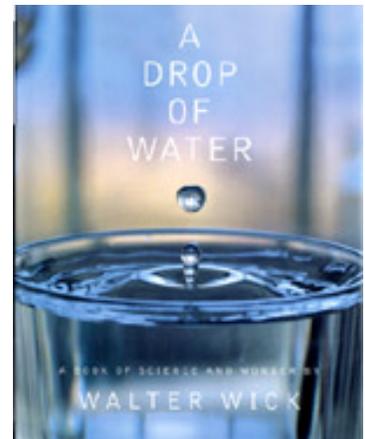
Professional Development

Walter Wick's Tricks Engage Young Minds

Choosing enticing materials, such as the books created by Walter Wick, is an important part of setting the stage for classroom inquiry and problem solving. See the accompanying article for tips on selecting books for your students.

by *Annette Thorson, ENC Publishing*

Walter Wick's photos have been used on the covers of more than 300 books and magazines, including *Newsweek*, *Discover*, and *Psychology Today*. Among the many admirers of Wick's work is the National Science Teachers Association (NSTA), which named his book *A Drop of Water: A Book of Science and Wonder* the Committee's Choice Book, the top honor of all the books on NSTA's annual list of Outstanding Trade Books for Children.



The committee felt that Wick had approached the work as a scientist, and their description of the book reveals why:

Easy-to-read text and exquisite photographs explain the concepts of evaporation, condensation, capillary attraction, and surface tension. The camera halts and magnifies the action so that all states of water can be observed. A collection of simple, exceptional experiments offers ways to further investigate the principles of water transformation.

Despite such [recognition](#) from NSTA and other authorities in children's literature, Wick emphasizes his work has never had a more appreciative audience than the children themselves. Wick's understanding of his young readers qualifies him as an educator, as is clearly shown by his insightful descriptions of his interactions with them.

He loves to share a letter from a kindergarten class. On a large sheet of lined paper, the children composed a list of hypotheses on how he had taken a photo in which objects appear to float. Their first guess was that he must have worked in zero gravity so perhaps he had taken the photo while riding in the Space Shuttle. (In actuality, Wick had painstakingly glued the objects to a piece of Plexiglas to give them a floating appearance for the photo.)

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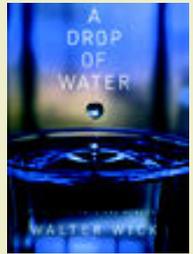
The joy teachers find in classroom breakthroughs is apparent in Wick's description of one of his many school visits. One child had obviously studied the photos in his *I Spy* series of books with attention to the smallest detail. The student gave an animated explanation of a photo in which a series of dominoes begins a chain reaction that topples larger and larger objects. Such an enthusiastic response to one of his books is not unusual; what made it special for Wick was the comment from the classroom teacher. Wick remembers, "She said she was amazed. That particular child had never spoken in class before."

Children's and teachers' appreciation of Wick's work is likely to continue. His latest book, *Walter Wick's Optical Tricks*, blends the playful visual games of *I Spy* with the solid base in inquiry found in *A Drop of Water*. It is this combination that has earned Wick the right to be called a scientist and an educator, as well as a gifted photographer.

Honors for A Drop of Water: A Book of Science and Wonder

Written and illustrated by Walter Wick

- American Library Association Notable Children's Book
- *Booklist* Editors' Choice
- *Boston Globe/Horn Book Award* for Nonfiction
- Bulletin of the Center for Children's Books Blue Ribbon Book
- *Horn Book* Fanfare Book
- National Council of Teachers of English *Orbis Pictus* Honor Book for Outstanding Nonfiction
- National Science Teachers Association Committee's Choice Book



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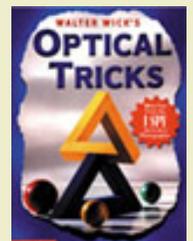
Book List (All books are published by Scholastic.)

Written and illustrated by Walter Wick:

- **Walter Wick's optical tricks**



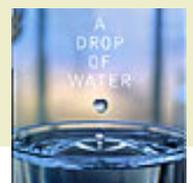
Date: 1998 **Grade**
(s): K - 12 **Cost:** \$13.95 **ENC#:** 014413
(For more details, see [ENC Record.](#))



- **A drop of water : a book of science and wonder**



Date: 1997 **Grade(s):** K - 8 **Cost:** \$16.95
ENC#: 010721 (For more details, see [ENC Record.](#))



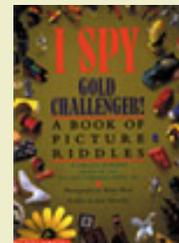


Written by Jean Marzollo; illustrated by Walter Wick:

- **I spy gold challenger : a book of picture riddles**

Date: 1998 **Grade(s):** K - 8 **Cost:** \$12.95

ENC#: 014414 (For more details, see [ENC Record.](#))



- *I Spy Little Wheels*, 1998*
- *I Spy Little Animals*, 1998*
- *I Spy Super Challenger*, 1997
- *I Spy Little Book*, 1997*
- *I Spy Spooky Night*, 1996
- *I Spy School Days*, 1995
- *I Spy Fantasy*, 1994
- *I Spy Fun House*, 1993
- *I Spy Mystery*, 1993
- *I Spy Christmas*, 1992
- *I Spy; A Book of Picture Riddles*, 1992
- *Board Books

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Selecting Books? NSTA Provides Guidance

Using book award lists such as those provided by the American Library Association, the National Council of Teachers of English, the National Science Teachers Association, the Children's Book Council, and other respected groups is an excellent way for classroom teachers to select books for their students. However, since not every good book receives such an honor, teachers also need to develop the expertise to evaluate books themselves.

One strategy is to look at books through the eyes of the experts by applying the selection criteria they use. Along with their annual list of Outstanding Trade Books for Children, NSTA publishes information about the selection process used by their book review panel, which consists of NSTA and Children's Books Council experts. Although the summary supplied here is specific for science books, teachers can apply many of the points to books in other subject areas.

NSTA Book Selection Criteria

Content:

- The book has substantial science content.
- Information is clear, accurate, and up to date.
- Theories and facts are clearly distinguished.
- Facts are not simplified so much that the content is misleading.
- Generalizations are supported by facts, and significant facts are not omitted.
- The book is free of gender, ethnic, and socioeconomic bias.
- Presentation is logical, and sequence of ideas is clear.
- The content level is appropriate for the intended audience.

Illustrations and format:

- Illustrations enhance the presentation.
- Items shown are accurate in size, color, and scale.
- Illustration labels are clear.
- Illustrations showing people portray cultural diversity and gender equity.
- The size, format, and typeface of the book are appropriate to the subject and audience.
- Layout is well organized and advances the text.
- The paper, binding, and reproduction are of high quality.

Subject-specific criteria:

- Nature books offer the natural history and life cycles of organisms.
- Experiments suggested for children lead to an understanding of basic principles and are safe, feasible, and appropriate for the intended age level.
- Science books for children (particularly picturebooks with minimal text) are free of personification, teleology, or animism.
- Science books may contain stories, folktales, and poetry based on nature, but a book should stand on its own as a science book without them.
- Biographies convey the full sense of the person's character although the books might seek to inspire as well as convey the facts of the person's accomplishments.

Note: NSTA's annual list of Outstanding Trade Books for Children is published each year in the March issue of *Science and Children*. See this publication on the NSTA Web site at <http://www.nsta.org/120/#journal>

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References

Madrazo, Gerry M., Jr. (1997). Using Trade Books to Teach and Learn Science. *Science and Children*, 34(6).

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