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Authentic marine science books for children

Scientific ideas and processes that come from high quality informational literature help children meet personal needs, become informed citizens, and develop important career decisions. Basic science has now become part of children's everyday lives. Children are surrounded by an environment they must interact with and technology they must use in the pursuit of scientific knowledge and critical thinking.

Thematic studies integrate the content areas that are typically taught in a particular grade or school. Educators suggest using children's literature as a basis for thematic units. Science is one of the easiest content areas to integrate; creative writing with environmental issues of the future, measuring and graphing plant growth, studying the history of whaling in the old days and present day migrations of whales are only a few of the many ideas one can pursue. Decision making and observation are lifelong skills that can be developed from a science base. Authentic science literature helps build prior knowledge, dispels myths and brings good workable literature to children. In addition it enhances teaching units about our seas and oceans. Marine science books for children, actually written by or in collaboration with marine scientists, provide a strong basis for thematic studies involving the ocean.

Science is the ultimate integrated subject area. Science is biology, chemistry, physics, and geology. Science crosses disciplinary boundaries. Many of the science programs and curricula for young people today recognize the connection between and within fields of study.

Friedl (1991) emphasizes an integrated process approach. Science activities, as well as other content areas should include specific skills such as classifying, comparing, contrasting, demonstrating, describing, estimating, generalizing, graphing, inferring, interpreting, measuring observing, predicting, and recording.

Science and math are already integrated in the real world, and these areas should be treated so in the curriculum. Science is the art of hypothesizing, testing, investigating, discovering, concluding, and communicating. Math is the "language" that gives clarity, objectivity and understanding to what we are doing. Social studies is the study of what, when, where, who and why our planet takes shape in the environment. Language arts are the listening, speaking, reading, writing and viewing skills, needed to learn and communicate our knowledge in the sciences. All of these disciplines can be combined to establish a marine science theme.

AIMS Educational Foundation (1992) has documented the benefits of thematic teaching, including literature for children. These benefits include:

- Science becomes more meaningful, better understood and more useful.
- The extent to which science is studied and understood is substantially increased.
- Quality of learning and retention improves dramatically when activities are integrated.
- Motivation and participation increase dramatically.
- Student attitudes toward the sciences

improve.

Children's non-fiction science books are among the most popular books for school age children. Trade books allow the teacher to select a variety of reading levels on the same topic for the varied needs of his[her] class.

Delta Education's (1995) *Model of Inquiry Learning & Teaching* works well with the addition of literature. Using a model like the one that follows introduces higher level thinking skills and helps children become scientific problem solvers of the future.

The Learning Cycle

A Model of Inquiry Learning & Teaching with Authentic Science Literature

EXPLORATION

- Children "play" with materials
- Open ended questions are asked
- Time to check on prior knowledge & misconceptions
- **Use independent or easy authentic science literature books**

CONCEPT INTRODUCTION

- Concepts are "invented" from hands-on activities
- Conceptual understanding is achieved through:
 - interaction with more materials
 - vocabulary development
 - information seeking
 - investigating concepts
- **Use authentic science literature at an instructional level**

CONCEPT APPLICATION

- Students discover the connection between the new science concept and their own world.
- Students apply concepts to new situations
- Students study further these or new concepts
- **More science literature at both levels**
- **Fiction can be used to determine scientific fact from fiction**

Literature based curricula give teachers the flexibility to select texts and activities that best fit the instructional need of the students and the many reading levels within a class. With the use of thematic units, whole language, integrated curriculums and school wide themes, teachers are encouraged to link literature with all the content areas. Often if children can follow a story line they will understand the scientific concepts better.

"If the large majority of tomorrow's citizens don't achieve scientific literacy, society may be in peril, for ignorance in this post-industrial era can devastate the planet." (Fort, 1993) One way of achieving scientific literacy in marine science is using authentic, non-fiction marine science books specifically for children and young adults.

The following are examples of authentic marine science books for children.

ARMSTRONG, P. *Sea searcher's handbook*. Monterey Bay Aquarium, 1996. (All grades)

An activity book that lets you explore rocky shores, wetlands, sandy shores, kelp forests, and the sea. Written by various marine educators and tested by over 70,000 kids who visit the Monterey Bay Aquarium each year.

ARMSTRONG, P. and CONWAY K. *Young explorer's guide to undersea life*. Monterey Bay Aquarium, 1996. (All grades)

Excellent water colors that feature marine plants and animals in their natural habitat. Helpful for inland students. Information is given on how they survive in the oceans.

BENCHLEY, P. & GRADWOHL, J. *Ocean planet: Writings and images of the sea*. Smithsonian, 1995. (All grades)

A fantastic anthology of writings and photographs that deal with our ocean planet. It discusses how the oceans have influenced and shaped the lives of the people of the world. The book is to inspire all of us to preserve the planet for the future. The sections with offerings from many scientists and writers are: visions of the sea, seafarers, discovery, and oceans in peril.

CONLEY, A. *Window on the deep*. Franklin Watts with the New England Aquarium, 1991. (Intermediate to upper grades)

A photojournal look at the adventures of marine biologist, Sylvia Earle, and her underwater explorations of ocean trenches.

CONNOR, J. *Seashore life on rocky coasts*. Monterey Bay Aquarium, 1993. (Intermediate to upper grades)

The book deals with rocky coasts around the world, what is common and uncommon about the seacoasts. Excellent photographs

serve as a guide for those that have been and those that have never been on a rocky shore.

CONNOR, J. and BAXTER, C. *Kelp forests*. Monterey Bay Aquarium, 1989. (Intermediate to upper grades)

Another book in this wonderful series from the Monterey Bay Aquarium. This piece of scientific literature deals with the kelp forest habitat, interactions, communities, and uses of this algae.

DORIS, E. and RUBENSTEIN, L. *Meet the anthropods*. Thames and Hudson with The Children's School of Science Woods Hole, 1996. (Intermediate to upper grades)

Animals from six classes of Anthropods, such as horseshoe crabs, are introduced. Photos show children at the Children's School of Science in Woods Hole interacting, setting up, and maintaining ecosystems.

DORIS, E. *Invertebrate zoology*. Thames and Hudson with The Children's School of Science Woods Hole, 1993. (Intermediate to upper grades)

A wonderful approach to science for children. The book focuses on seven major groups of organisms. Shows children how to dissect a clam and watch sponges regenerate. Ideal book for home and school. Project and experiments are done by children at the Woods Hole School in Massachusetts.

DORIS, E. *Marine biology*. Thames and Hudson with The Children's School of Science Woods Hole, 1993. (Intermediate to upper grades)

Children are encouraged to discover nature through first-hand experience. Looks at marine organisms in the different marine environments. Also helps you set up a salt water aquarium for those not near the ocean. Would work as a text in the classroom. Good illustrations, photography, and scientific information. Has children doing science.

EARLE, S. *Dive: My adventures undersea*. Smithsonian, 1999. (Intermediate grades)

An excellent book for children. Dr. Earle has been an ambassador for the oceans for many years. Now children can go with her into the deep ocean, walk the seafloor, and cruise in

the submersible Deep Rover. The book contains a good index and glossary.

EARLE, S. *Hello, Fish*. Smithsonian, 1999. (All grades)

Dr. Earle, oceanographer shares her love of the sea in this excellent book with wonderful photos. The large close up photos will intrigue children. A map of the world's coral reefs is included.

EARLE, S. and DELBOURGO, J. *Sea change: A message of the oceans*. Fawcett Publishing, 1996. (Intermediate to upper grades)

Called the Rachel Carson book for saving our oceans in the millennium. *Sea Change* is the story of Dr. Earle's three decades of under-sea exploration as a marine biologist and role model for looking at our planet's oceans and protecting them. A good source for teachers too.

FERGUSON, A. and CAILLIET, G. *Sharks and rays of the Pacific Coast*. Monterey Bay Aquarium, 1990. (Intermediate to upper grades)

A collaborative book from the Monterey Bay Aquarium and many marine scientists. This piece of literature has excellent scientific information and photographs. A major focus is the habitats of sharks and rays.

FOSDICK, P. *National aquarium in Baltimore: The mission and the magic*. National Aquarium in Baltimore, 1990. (All grades)

An excellent reference that explains how an aquarium sets up and maintains the ecosystems for display. Also gives information on the species in the aquarium.

FURNWEGER, C. and GARFINKEL, C. *A walk along the coast*. John G. Shedd Aquarium, 1995. (All grades)

A wonderful guide book for any age that takes you through the Shedd oceanarium and a look at coastal ecosystems of the Northwest. Animals discussed are the Beluga whales, Pacific White-sided dolphins, harbor seals, sea otters, and penguins.

GEORGE, J.C. *Scylla the humpback whale*. National Aquarium in Baltimore, 1991. (Primary to intermediate grades)

The story of a whale that researchers followed and documented. Told in story form with more scientific information at the end of the book.

GORDON, D. G. *Seals and sea lions*. Monterey Bay Aquarium, 1994. (Intermediate to upper grades)

An interesting book about these pinnipeds. The colorful illustrations take a look at the California sea lions, harbor seals, northern elephant seals, Steller sea lions, and northern fur seals; their adaptations and the latest scientific findings.

GORDON, D. G. and BALDRIDGE, A. *Gray whales*. Monterey Bay Aquarium, 1991. (Intermediate to upper grades)

This non-fiction book about the once nearly extinct Gray whale has excellent photographs, water colors, and charts. The book shows the migration from the Bering Sea to Baja California and back for the more than 21,000 whales.

GOURLEY, C. *Hunting Neptune's giants: True stories of American whaling*. The Millbrook Press in association with Mystic Seaport Museum, 1995. (Intermediate to upper grades)

An authentic story of the history of whaling in America. The book has excellent reproductions of old paintings, drawings, charts, and actual photographs of this lost industry. The narrative is accompanied by authentic log entries of New England whalers.

HEKKERS, J. *et al.* *A commemorative guide: Tennessee Aquarium*. Tennessee Aquarium, 1992. (All grades)

Guide books have been included here because they have much information to offer the reader. The book shows how the aquarium was built and how to follow the ecosystems. Cove forest, Tennessee River, Delta country, Gulf of Mexico, rivers of the world, and discovery falls are illustrated with drawing and photographs.

HLEBICA, J. *Legacy of exploration*. Scripps Institution of Oceanography, 1993. (Intermediate to upper grades)

A short book that details the history of Scripps and the science of oceanography.

The illustrations and photographs show the scientific equipment advances over time and the scientists who are responsible for these advancements.

KATONA, S., ROUGH, V. and RICHARD, D. *A field guide to whales, porpoises and seals from Cape Cod to Newfoundland, 4th ed.* Smithsonian, 1993. (Upper grades)

A good reference book for the older grades and the good reader. Illustrations are well done and help with the reading and identification.

KOVACS, D. *All about dolphins*. Third Story Books with Sea World, 1994. (Primary grades)

Simple picture book for young readers. Good photographs and scientific information.

KOVACS, D. *All about whales*. Third Story Books with Sea World, 1994. (Primary grades)

Simple picture book for young readers that deals with the training of Shamu. Good photographs and scientific information for the young reader.

MALLORY, K. *A home by the sea*. Steck Vaughn with the New England Aquarium, 1998. (Intermediate to upper grades)

The latest in books by Mallory, who is affiliated with the New England Aquarium in Boston. The book discusses the conservation efforts to protect endangered species in New Zealand. One of the animals is the little blue penguin. His words help children understand the scientist's work.

MALLORY, K. *Families of the deep blue sea: Saltwater Secrets*. Charlesbridge Publishers, 1995. (Primary grades)

An illustrated look at the birth and early life of saltwater fish, bird, mammal, and reptile. Excellent illustrations by the Pecks will entice young readers and adults.

MALLORY, K. *The Red Sea*. Franklin Watts with the New England Aquarium, 1991. (Intermediate grades)

A vivid portrait of the Red Sea's underwater garden of treasures. The book also looks at the problems of overfishing, oil spills, sewage

problems, and the need for conservation.

MALLORY, K. and CONLEY, C. *Rescue of the stranded whales*. Simon and Schuster with the New England Aquarium, 1989. (Intermediate grades)

This is the true story of three young pilot whales that beached themselves on the Cape Cod shore. Follow the work of volunteers and scientists as they rescue, care for, and release them back into the ocean.

MINASION, S. and BALCOMB, K. *The world of whales*. Smithsonian, 1984. (Upper grades)

Everything you ever wanted to know about whales. Charts and photos are excellent reference materials.

RESNICK, J. *All about sharks*. Third Story Books with Sea World, 1994. (Primary grades)

Easy to read, short picture book for young readers. Good photographs and scientific information.

RIGSBY, M. *Monterey Bay Aquarium*. Monterey Bay Aquarium, 1993. (All grades)

A colorful overview of the workings of an aquarium. A good text for those children who may never get to see what an aquarium is all about. The book also emphasizes animals found on the California coast with excellent photographs.

RIGSBY, M. *Mating games*. Monterey Bay Aquarium, 1993. (All grades)

Mating Games discusses reproduction and survival in the aquatic world. This well illustrated text talks about how reproduction shapes and defines life on Earth.

SPRINGER, V. and GOULD, J. *Sharks in question: The Smithsonian answer book*. Smithsonian, 1987. (Upper grades)

High level reading but an excellent resource and guide book for the interested learner. Good illustrations for identification of sharks.

WALFORD, L. *Marine game fishes of the Pacific Coast from Alaska to the Equator*. Smithsonian, 1965. (Upper grades)

This resource narrative will be difficult for young children. Excellent color plates for identification purposes.

WHITE, S.V. *Wonder with me*. Tennessee Aquarium, 1995. (Primary grades)

This is an interactive coloring, discovery book that children and parents can do together. The book is divided into five animal groups: reptiles, amphibians, birds, mammals, and fish.

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