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ABSTRACT

Science programs, such as the ones described in this publication, advance the goals of public library service to children. Throughout the programs, boys and girls are introduced to an array of literature exploring science topics. Librarians present subjects of great interest to children creatively using local experts, realia, child-conducted experiments, and craft activities. This document presents the "Who, What, When, Where, Why, and How" of 25 science programs for children. A checklist of guidelines for planning and presenting science programs, recommendations for children's science education, and safety considerations for science programming are provided. Contains a 22-item annotated bibliography of Science Book Awards and review journals, a 14-item list of professional reading and reference books, and a 94-item bibliography of children's literature used during a library-tested science program and described in this publication. (AEF)

From Loraxes to Thoraxes:

Science Programs for Children in Libraries

Maryland Library Association

October 22, 1993

Barbara Holton

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Introduction

Libraries and Science Education

One of the most compelling reasons to offer library programming to children is to nurture and support their love for books and reading. The Vermont State Department of Libraries states in their *Guidelines for Public Library Service* that, "The goals of public library service to children are: to introduce children to reading and good literature; to provide them with appropriate materials and programs that will satisfy informational and recreational needs; to stimulate their imaginations; to help them understand themselves and the world they live in; and to make them lifelong library users."

Science programs, such as the ones described in this publication, advance all of the goals of public library service for children. Throughout the programs, boys and girls are introduced to an array of literature exploring science topics. Librarians present subjects of great interest to children creatively using local experts, realia, child-conducted experiments, and craft activities. By communicating understandable concepts in science in a fun and relaxed atmosphere, children begin to understand the world and their place in it. They also discover that the library is a source for answers for their many questions. [research about library users childhood use]

Intuitively we know that public and school libraries are valuable resources for budding scientists. The National Assessment of Educational Progress conducted research in science education which proves that claim. Their findings, published in *The 1990 Science Report Card* (Jones et al., 1992), show that there is a direct correlation between the quantity and variety of reading materials in the home and science proficiency on standardized tests; the greater the number of reading materials the higher the test score.

Librarians and Science Education

Librarians frequently describe themselves as humanities people and most of the librarians named in this brochure do not have a college degree in science. Librarians, however, are analytical and methodical in their thinking and this is a significant strength when introducing science to children. The American Association for the Advancement of Science (AAAS) recommends that children learn science, not as disconnected facts and formulas, but as a network of interrelated systems.

In *Science Matters: Achieving Scientific Literacy* (Hazen and Trefil, 1990), the authors write, "Science is organized around certain central concepts, certain pillars that support the structure. There are a limited number of such concepts (or `laws'), but they account for

everything we see in the world around us." If any professionals, other than scientists, are experienced at organizing innumerable subjects by a limited number of concepts, surely they are librarians.

The AAAS asserts in *Science for All Americans* (Rutherford and Ahlgren, 1990) that science education should help children develop scientific habits of mind, the systematic application of curiosity, diligence, fairness, imagination, integrity, openness to new ideas, and skepticism. "Scientific habits of mind...help people...deal sensibly with problems that involve evidence, quantitative considerations, logical arguments, uncertainty and the ability to think critically and independently." In other words, learning to think like a scientist is very much like learning to think like a librarian. Curiosity, diligence, fairness, imagination, integrity, openness to new ideas, and skepticism are attributes necessary in the laboratory and the library.

Librarians, Science, and Books

Children do not learn science exclusively through the use of experimentation or from reading textbooks. Outstanding trade science books play a significant role in guided and independent learning. Choosing the best science materials, though, poses special challenges. A critical evaluation of science books for children requires subject specialization and a background in children's literature. Science books must be accurate, current, organized, and effectively illustrated. They should also be well-written and inspire further investigation by the child (Holzheimer, 1991).

Children's literature used in these library-tested science programs include picture books, folktales, myths, field guides and other reference books, biographies, poetry, and science books. During a single program, librarians move from field guides to poetry to picture stories, all addressing the theme from a different angle. Each genre enriches the subject and expands children's awareness of the range of materials available to them in the library. Using several types of literature to enlighten and entertain children also demonstrates that science is not something dry and remote. In fact, science permeates our culture and our lives.

Guidelines for Planning and Presenting Science Programs

The science programs described here have some common characteristics which contributed to their success. [in terms of motivating children to read, expanding children's awareness and understanding of their world, A blend of informational and recreational reading material]

- ☐ Make books and other media an integral part of the program. Use a combination of fiction and factual books to appeal to a wide variety of literary tastes. Display subject-related books and other media, including any you used to prepare your presentation, for browsing and borrowing following the program.

- ☐ Start with information that is interesting and familiar to the children. We learn by connecting new information with our prior knowledge of the subject.

- ☐ Introduce unifying concepts. Focus on the predictability of objects and events in the world, such as the seasons, life cycles, and the common characteristics of birds.

- ☐ Present the information in a variety of ways. Use hands-on materials, discussion, visual materials, and activity to convey the subject.

- ☐ Make the program fun! Use as the theme a personal interest of yours or invite a local expert or enthusiast to make a presentation utilizing hands-on materials.

Recommendations for Children's Science Education

The following recommendations are from the AAAS book *Science for All Americans*. Consistent with scientific research, these recommendations provide children with the opportunity to develop scientific habits of mind. It is unlikely that a library program could incorporate all of these element, but these points may facilitate effective planning.

- ☐ Engage the children actively. Skills, such as comparing, counting, and measuring, should be integrated into the program whenever appropriate.

- ☐ Demonstrate how to collect and use data. Provide children with practice in collecting, sorting, analyzing, and interpreting evidence.

- ☐ Provide a historical perspective. Help children appreciate the growth of scientific ideas by sharing with them the progression of beliefs and theories as they developed over

time.

- ☐ Emphasize accurate communication. Avoid vague generalities and oversimplifications. Introduce technical terms only to eliminate ambiguity; vocabulary, for its own sake, should not be stressed.

- ☐ Use the team approach. Scientists and engineers frequently work in groups and children also learn from each other when they work together on projects.

- ☐ Make finding out as important as knowing. Encourage children to continue learning on their own and offer them a selection of library materials they can enjoy browsing through or borrowing.

Safety Considerations for Science Programming

A word of caution is necessary when science programs involve: live animals, chemicals, microscopes, lenses, glass, taste tests, flying or rollling objects, or heat. The science programs described in this publication are safe to conduct in the library, however, be aware of the safety implications when planning a science program of your own.

Precautions can be as simple as having children form a line when holding test flights of paper airplanes, or increasing the level of supervision by including parents in the program. A good source for information about science education safety is *Developing Science in the Primary Classroom* (Harlen and Jelly, 1989).

Conclusion

The librarians interviewed for this publication enjoyed drawing upon their hobbies or personal interests for program ideas. Local experts were pleased to share their enthusiasm for their area of science with the children in their community. Whether the program was on gardening, stargazing, recycling, bird watching, or cooking, the subject was presented in a logical, scientific manner.

When it was necessary to research a subject or locate an appropriate experiment or activity for the program, librarians used books from the children's room. At the conclusion of the program, children frequently asked for the information source and those books were available for borrowing.

By combining good books with fun science activities, children find enlightenment and

entertainment at the library. While enjoying a science program which helps them understand themselves and their world, they can also be inspired to read and learn independently.

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Current Events, Books, and the Library

Who: Jane Ostrand, School Librarian

What: Book displays for elementary-age children

When: Throughout the school year

Where: Kingsbury School in Oxford, Michigan

Why: To increase students' awareness of the scope of materials in the library.

How: She calls attention to items from the collection by displaying newspaper articles along with books on the subject and providing directional sign indicating where they can look for more information. For example, when beavers began building a lodge in a pond on school property the librarian displayed books that had information about beavers including *Meet the Beaver* by Leonard Lee Rue III with William Owen and *Busy Beavers* by M. Barbara Brownell.

The Kingsbury School librarian highlights any school, local, national, or international events which may inspire children to begin their own research. When a child brings a pet to school for show-and-tell, Jane Ostrand gathers and displays library materials about the care and feeding of pets. News reports that can provoke scientific inquiry include stories on oil spills, rain forests, alternate sources of energy, and wayward whales.

Information Skills and Science

Who: Ann Potter, Library Media Specialist

What: A school library program for third graders

When: Throughout the school year

Where: McKinley Elementary School in Arlington, Virginia

Why: To develop information skills by using library materials.

How: Third graders received instruction in information skills and science through cooperative planning and teaching between the classroom teacher and Ann Potter, the library media specialist. During a year-long series of lessons and activities, the students learned how to use an index, the phone book, title pages, the Dewey Decimal Classification, and reference books. They also learned what primary and secondary sources are.

The students independently viewed the sound filmstrip, *Introduction to Natural Science: Living and Non-Living Things*, following specific instructions on how to use the appropriate audio visual equipment and materials. After watching the filmstrip, using sets of large, numbered picture cards of objects from nature, the students sorted the objects into living or non-living classes on a prepared response sheet.

As a class, the third graders grouped themselves in the library media center according to various attributes: gender, eye color, hair color, number of siblings, and favorite colors. With each child holding a large picture card of an animal, they classified themselves as mammals, birds, reptiles, amphibians, and fish.

Earth Day

Who: Caroline Parr, Coordinator of Children's Services and the Children's Librarians

What: A public library program for first through fifth graders

When: April 22

Where: The Central Rappahannock Regional Library in Fredericksburg, Virginia

Why: To motivate children to read stories and factual books about ecology and the environment.

How: The Rappahannock Regional Libraries celebrated Earth Day in April by leading discussions about recycling and preserving the environment with boys and girls from first to fifth grade. The children listened to stories related to the theme, such as, *The Little House* by Virginia Lee Burton and *Where the Forest Meets the Sea* by Jeannie Baker. The boys and girls planted bean seeds in paper cups and created toys from recycled materials. The programs concluded with each child pulling a slip of paper describing a simple recycling or conservation activity from a globe-like bowl and resolving to begin that practice. Ideas for the program were drawn *Recyclopedia* by Robin Simons and *50 Simple Things Kids Can Do to Save the Earth* by EarthWorks Group.

The librarians created an attractive four-page brochure on bright, standard-size paper, printed landscape style, featuring a picture of the Earth from space on the cover. The two pages of recommended titles were grouped under the following headings: The Natural Environment, The Threatened Environment, Endangered Species, Overcrowding, Recycling, and Things To Do. For each suggested book, the title, author, reading level, and call number were listed. The brochure listed on the last page several other subject headings that library users may explore to find more materials on the subject.

Go Green at the Library

Who: Rhode Island Department of Library Services and children's librarians throughout the state

What: A summer reading program for elementary-age children

When: Summer

Where: Libraries in Rhode Island

Why: To motivate children to continue reading throughout the summer.

How: Children read books about protecting the environment, attended an awareness-raising program presented by a paid performer, and participated in an anti-litter activity. The anti-litter activities ranged from distributing homemade litter bags, to planting an organic garden, to participating in a neighborhood clean-up day.

Green Pickle Storytimes for kindergartners to second graders featured stories with a nature theme and ecologically-sound crafts. During one program, Jack and the Beanstalk was read and the children planted their own bean seeds in recycled cottage cheese containers.

Fourth through sixth graders were recruited to clean up the library grounds, and plant and maintain flowers throughout the summer. The librarians used books on plants to engage the youngsters in decision-making on what would thrive in locations around library. The youngsters read books, such as *The Garden of Abdul Gasazzi* by Chris Van Allsburg, *Keepers of the Earth: Native American Stories and Environmental Activities for Children* by Michael J. Caduto and Joseph Bruchac and *What on Earth You Can Do with Kids: Environmental Activities for Every Day of the School Year* by Robyn Freedman Spizman and Marianne Daniels Garber. Juice and cookies were served to conclude the weekly meetings of the Dare to Care Club.

READiscover Planet Earth

Who: Lynda Welborn, Senior Consultant/School Library Media at the Colorado State Department of Education and children's librarians throughout the state

What: A summer reading program for elementary-age children

When: Summer

Where: Libraries throughout Colorado

Why: To motivate children to continue reading throughout the summer.

How: The boys and girls began learning about landfills from *Trash!* by Charlotte Wilcox before conducting a decomposition experiment by burying pieces of vegetable, newspaper, and styrofoam in separate piles in the library yard and watered the soil. They made labels indicating the object and date it was buried. During subsequent weeks, the children dug the items up, compared the stages of decomposition of the various items, and recorded their observations in a journal before re-burying.

The boys and girls made collages with environmental themes by cutting out pictures, words, and letters from junk mail. They created costumes from recycled objects such as dust mops, pillows, boxes, bags, and stockings.

Amy's Dinosaur by Syd Hoff, *The Salamander Room* by Anne Mazer, *The Mountain* by Peter Parnall, *The Talking Earth* by Jean Craighead George, *Tunafish Sandwiches* by Patty Wolcott, and *Just a Dream* by Chris Van Allsburg were a few of the stories read during these programs.

The Think Tank

Who: Carolyn Morgan Burrier, Head Children's Librarian

What: A free-standing mini-lab for elementary-age children

When: Anytime

Where: Stow Public Library in Stow, Ohio

Why: To inspire an interest in library materials on science and technology.

How: The Children's Services of the Stow Public Library used a $10,000 bequest to create Think Tank, a science, math, and geography area filled with interactive materials. Think Tank features an Apple IIGS computer loaded with science, math, and thinking skills software, such as *Where in the World Is Carmen San Diego?*®, *Where in Time Is Carmen San Diego?*®, and *The Tree House*® produced by Broderbund. Microscopes, puzzles, prisms, magnets, kaleidoscopes, plants, and rabbits encourage the youngsters to observe, experiment, make discoveries, and read. Displays are frequently added or changed; boys and girls grow crystals, learn how to run a clock with a potato, and observe, measure, and record the growth of an amaryllis.

Many of the ideas are based on hands-on activities and experiments described in science books in the collection, including *Science Fun with a Homemade Chemistry Set* by Rose Wyler, *The Science Book of Sound* by Neil Ardley and others in the series from Harcourt Brace Jovanovich, and *Fun with Science: Light* by Brenda Walpole and others in the series from Warwick Press.

How To Make A Science Fair Project!

Who: Mary Alice Deveny, Youth Librarian

What: A public library presentation for elementary and middle school students and their parents

When: January

Where: Selby Public Library in Sarasota, Florida

Why: To help students get started on their science fair projects and become familiar with the science resources available to them.

How: The Sarasota County School System's Science Fair Director presented information on developing a science fair project to elementary and middle school students and their parents. The one-hour presentation covered the following areas of interest: selecting a topic; using scientific methods to develop the project; following the guidelines of the school system; keeping a log book to record data and observations; and creating an attractive and effective project board. The talk was followed by a question-and-answer session.

Handouts at the presentation recommended *Chemically Active!* by Vicki Cobb, *The Way Things Work* by David Macaulay, and *How Science Works* by Judith Hann, and *The Complete Science Fair Handbook: For Teachers and Parents of Students in Grades 4-8* by Anthony D. Fredericks. Children and parents also received "Exploring Nature: Field Trips for Families," a guide to twenty-eight outings from Tampa to Naples and "A Science Fair Project Pathfinder," prepared by children's librarians.

A Science Fair Project Pathfinder

Who: Mary Alice Deveny, Youth Librarian

What: A four-page brochure for elementary and middle school students and their parents

When: Anytime

Where: Selby Public Library in Sarasota, Florida

Why: To help students and their parents discover the science resources available to them.

How: Mary Alice Deveny and other children's librarians produced "Science Fair Project Pathfinder," an attractive, four-page brochure on bright yellow standard-sized paper, which they distribute throughout the year. Having a pathfinder saves the staff from repeating the same information hundreds of times and provides concrete guidance for the science students and their parents.

The pathfinder features two maps; one is of the interior of the library with the children's library, periodicals, and the adult reference area circled. The other map gives directions to the Ann Marbut Environmental Library, a special collection open to the public and located a few miles away.

The pathfinder encourages amateur scientists to browse the stacks by listing the 500's and 600's of the Dewey Decimal Classification, both broken down ten subject headings. Short lists of references sources, organized by location on the corresponding map, list their call numbers, and include a space for a checkmark after examining the book. The reference sources are divided into six separate locations: juvenile reference, juvenile circulating books, the computer catalog, periodicals, adult reference, and the environmental library. Lastly, other resources in the community, such as, school and university libraries, businesses, hospitals, museums, and government agencies are suggested for further research.

The Sky Is Full of Stars

Who: Rita Stahlmann, School Librarian

What: A school library program for first graders

When: Throughout the school year

Where: Albertville Elementary School in Albertville, Minnesota

Why: To conduct a scientific inquiry into constellations using library materials.

How: First graders were introduced to astronomy by the school librarian when she read legends and myths about constellations, such as "Bursting from the Hen's Egg: Phan Ku the Creator," from *In the Beginning* retold by Virginia Hamilton, and *Her Seven Brothers*, a Cheyenne tale retold by Paul Goble. After discussing the colorful creation stories, read *The Big Dipper*, *Shooting Stars*, and *Star Guide* by Franklyn M. Branley to learn scientific information about stars.

The first graders referred to *Stars* by Seymour Simon, *Stars* by Herbert S. Zim and Robert H. Baker, *Glow-in-the Dark Constellations: A Field Guide for Young Stargazers* by B. E. Thompson, and *The Starry Sky* by Rose Wyler to learn to recognize constellations. Using star maps, they made their own portable planetariums by recreating a constellation with pinpricks in black construction paper. By holding their pinpricked sheets up to a light and looking at them through a tube, such as an empty salt container, they could re-create the appearance of the night sky.

The culmination of this series of programs was a nighttime viewing of the sky at the school with the first graders' parents. The class demonstrated its knowledge of constellations by locating and identifying them for their parents.

Our Sensational Solar System

Who: Rita Stahlmann, School Librarian

What: A school library program for first through fourth graders

When: Anytime

Where: Albertville Elementary School in Albertville, Minnesota

Why: To conduct a scientific inquiry into the solar system using library materials.

How: First through fourth graders learned about the solar system from library materials, such as, *Mars*, *Jupiter*, and *Neptune* by Seymour Simon, *Planets in Our Solar System* by Franklyn M. Branley, and *The Magic School Bus: Lost in Space* by Joanna Cole. After researching and discussing the celestial bodies, they built a large mobile of the nine planets, the sun, and the asteroid belt which hung in the library.

The fourth graders created an outer space travel bureau for space travelers and developed an advertising campaign touting the attractions of the planets. They also "discovered" a tenth planet and issued a press release in which the new planet was named, its location in the galaxy identified, and its surface described in detail.

Acid Rain Research

Who: Linda Crump, School Librarian

What: A chemistry laboratory in an elementary school library

When: A pre-determined eight-week period scheduled several times throughout the school year

Where: Chevy Chase Elementary School in Chevy Chase, Maryland

Why: To conduct a scientific inquiry into acid rain using library materials and a national computer network.

How: After the librarian received training from the National Geographic Society for participation in NGS KIDS NETWORK's *Acid Rain* unit, the fourth graders at her school began learning about acid rain while gathering data. They learned how to read the pH scale and how to use the pH paper included in the kit. The students designed and built their own rain collectors and measured the acidity of local rainwater.

During an eight-week period, using the computer and modem in the school media center, the students compared their measurements with those taken by other fourth and fifth grade students nationwide throughout the network. With the help of a professional scientist, they looked for geographic patterns in the data.

Linda Crump also assisted the classes in contacting local officials and organizations to learn of their positions and policies for protecting the environment. The students have learned more about the local and national situation by interviewing a county councilman and former Senator Al Gore and researched environmental pollution by reading *Polluting the Sea* by Tony Hare, *Acid Rain* by John McCormick, *Rain of Troubles: The Science and Politics of Acid Rain* by Laurence Pringle, and *Pollution and Wildlife* by Michael Bright.

Kitchen Chemistry

Who: Nancy Gifford, Children's Librarian

What: A public library program for six- to eleven-year-olds

When: Anytime

Where: Schenectady Public Library in Schenectady, New York

Why: To inspire children to explore chemistry through stories and factual books.

How: The Schenectady County Public Library presented Kitchen Chemistry to children from six to eleven as part of a Science in the Summer reading program. One of the children's librarians, an avid cook, explained to the boys and girls about the leavening properties of baking powder, yeast, and baking powder with vinegar. The group observed the chemical reaction created when sugar is added to warm water and yeast and beheld the volcanic-like eruption of baking soda combined with vinegar. The children tasted and compared biscuits made with and without the baking powder and salty and salt-free potato chips. The librarian read *The Lady Who Put Salt in Her Coffee* adapted by Amy Schwartz and *Salt: A Russian Folktale* by Jane Langton.

A book display and booklist were available for the children who wanted to look into chemistry on their own. Resources for the program were *Science Experiments You Can Eat*, *More Science Experiments You Can Eat*, and *Chemically Active!: Experiments You Can Do at Home*, all written by Vicki Cobb.

The Science in the Summer program for children at the Schenectady County Public Library is made possible in part through funding from the ELFUN Society of General Electric.

How's the Weather?

Who: Rita Stahlmann, School Librarian

What: A school library program for third graders

When: Anytime

Where: Albertville Elementary School in Albertville, Minnesota

Why: To conduct a scientific inquiry into weather forecasting using library materials.

How: Gifted and talented third grade students, in groups of ten to fifteen, learned about superstitions and folk sayings about the weather by reading *A January Fog will Freeze a Hog and Other Weather Folklore* compiled and edited by Hubert Davis. They read about and discussed storms, winds, clouds, weather symbols, and maps in the school library over a period of weeks. The class used library materials, such as *What Will the Weather Be?* by Lynda DeWitt, and *It's Raining Cats and Dogs: All Kinds of Weather and Why We Have It* by Franklyn M. Branley for their research.

Using *Five-Star Forecast*™, a software program from the Minnesota Educational Computing Corporation (MECC), the class learned how the variables of air temperature, wind direction, and wind speed affect the weather. They also discovered how relative humidity, cloud cover, and air pressure influence weather conditions.

As a culmination of the unit planned and taught by the school librarian, they produced a weather program on video, complete with their own forecasts and weather maps. The TV program was both scientific and silly because the children based their weather report and predictions on the book *Cloudy With a Chance of Meatballs* by Judi Barrett.

Discovering Dinosaurs

Who: Rita Stahlmann, School Librarian

What: A school library program for first graders

When: Anytime

Where: Albertville Elementary School in Albertville, Minnesota

Why: To conduct a scientific inquiry into dinosaurs using library materials.

How: Using *Dinosaurs* by Herbert S. Zim, *New Illustrated Dinosaur Dictionary* by Helen R. Sattler, and *Dinosaur Bones* and *Fossils Tell Us of Long Ago* by Aliki, first graders learned about dinosaurs. They made their own fossils and casts of dinosaur footprints, teeth, and bones from homemade modeling clay. The group also developed an historical perspective by creating their own time line to chart the appearance and demise of many species of dinosaurs.

The boys and girls also made fanciful dinosaurs out of paper plates, construction paper. Moving parts were attached with brads, other anatomical features were glued on the plate. Throughout the activities, the children relied on materials in the library for information and inspiration.

NatureConnections

Who: Jane Sorenson, Project Director, and children's librarians throughout the library system

What: A public library program for elementary-age children

When: Throughout the year

Where: Chicago Public Library in Chicago, Illinois

Why: To inspire an interest in library materials on natural history and to establish a link between the library collections and the many educational institutions in Chicago.

How: Through a grant from the Hermon Dunlap and Ellen Thorne Smith Fund of the Chicago Community Trust, NatureConnections collaborates with network of zoos, museums, science centers in Chicago. Located at forty-three Chicago Public Library locations, NatureConnections boasts a unique collection of natural history materials for children, including books, magazines, magazines, videos, pamphlets, and realia.

The librarians work with representatives of the other institutions to select the best reading materials to supplement their exhibits. The museums and nature centers loan display materials for exhibit in the NatureConnections locations. The library sponsors staff development science-related field trips, meetings, and workshops for the children's librarians.

NatureConnections has developed materials for children which enhance the connection between natural history materials at the library and the zoos, museums, and nature centers in Chicago. On one game sheet, children are asked to match Chicago landmarks with an appropriate children's book (Shedd Aquarium matches with *One Fish Two Fish Red Fish Blue Fish* by Dr. Seuss, the Adler Planetarium matches with *Goodnight Moon* by Margaret Wise Brown, and *Danny and the Dinosaur* by Sid Hoff matches with the Field Museum.)

Portable Pockets

Who: Karen Slachta, Children's Librarian

What: A public library program on nature for preschoolers

When: Fall

Where: Interboro Unified Districts Library in Peckville, Pennsylvania

Why: To provide an opportunity for children to observe nature and enjoy stories and factual books about nature.

How: During the fall, a children's librarian with the Interboro United Districts Library in Peckville, Pennsylvania, read to preschoolers stories about nature and talked about what could be found outside, such as colorful leaves, acorns, rocks, and pine cones. The children decorated paper lunch bags to use as portable pockets during a nature walk to be taken with a parent sometime during the week.

The following week, the boys and girls brought their portable pockets back to the library with their nature finds and were excited to show off their discoveries. The storytime centered on discussing subjects stimulated by their curiosity about the objects that had been found. Some books recommended for the program were *Peter's Pockets* by Eve Rice, *Fall* by Ron Hirschi, *The Berenstain Bears' Nature Book* by Stan and Jan Berenstain, *Fall* by Ron Hirschi, and *A Pocketful of Cricket* by Rebecca Caudill.

Space Tomatoes

Who: Jane Ostrand, School Librarian

What: A botanical laboratory in an elementary school library

When: Spring

Where: Kingsbury School Library in Oxford, Michigan

Why: To conduct a scientific inquiry into tomato plants using library materials.

How: Tomato seeds that had been stored in space for six years, obtained from the National Aerospace Administration (NASA), were planted in pots in the school library. Seeds from ordinary tomato plants were planted in separate pots and labeled.

Jane Ostrand kept a log book near the tomato plants and which the students recorded their observations, measurements, and comparisons of the two plants. Books on gardening and gardens. including *Tomato* by Barrie Watts and *Linnea's Windowsill Garden*, *Linnea in Monet's Garden*, and *Linnea's Almanac* by Christina Bjork were prominently displayed in the library. As a result of the experiment, many students began growing plants indoors at home and experimenting with the growing conditions.

Trees, Nuts, and Fruit

Who: Rita Stahlmann, School Librarian

What: A school library program for first through fourth graders

When: Fall

Where: Albertville Elementary School in Albertville, Minnesota

Why: To introduce scientific inquiry into trees using tree leaves and library materials.

How: While on a nature walk, observing the changes of the season, the boys and girls collected leaves to take back to the library. Using *Trees* by Herbert S. Zim and Alexander C. Martin, the students identified the trees the leaves came from, then compared, measured, and graphed the leaves according to length. The students also read *Tree* by David Burnie, *The Tree* by Judy Hindley, and other books in the collection to learn what products come from trees.

After sharing with the fourth graders Dorothy Hinshaw Patent's *An Apple a Day: From Orchard to You* and Charles Micucci's *The Life and Times of an Apple*, each child received a paper bag containing an apple. The apples were of many different varieties and the students compared the appearance of their own apple to those of others in the class. They each wrote a detailed description of the outside of their apple before tasting it and describing the flavor and the appearance of the inside of the apple. Using library materials, they each drew a map of Minnesota and placed symbols on the map to indicate orchards and the type of apple grown there.

Creepy-Crawly Storytime

Who: Carolyn Caywood, Area Librarian

What: A public library program for four- through eight-year-olds and their parents

When: Spring, summer, or fall

Where: Bayside Public Library in Virginia Beach, Virginia

Why: To introduce scientific inquiry into insects and spiders and to enjoy stories, poems, and factual books about them.

How: The price of admission to this library program was a live bug in a jar with holes poked in the lid. Everyone's insect was displayed on a long table and admired before the differences among the insects and spiders were discussed. With a parent, the youngsters used *Peterson First Guide to Insects* by Christopher W. Leahy and *No Bones: A Key to Bugs and Slugs, Worms and Ticks, Spiders and Centipedes, and Other Creepy Crawlies* by Elizabeth Shephard to identify the creature they had brought.

The group learned some basic characteristics of insects and enjoy stories which reinforced the theme. *Sam's Sandwich* by David Pelham; *Aminal* by Lorna Balian; *Joyful Noise: Poems for Two Voices* by Paul Fleischman; *Someone Saw a Spider: Spider Facts and Folktales* by Shirley Climo; *Like Jake and Me* by Mavis Jukes; and *Bugs* by Nancy Winslow Parker and Joan Richards Wright are a sample of stories that have been read at these entertaining storytimes.

Lively Ladybugs

Who: Phyllis Franklin, Children's Services Coordinator

What: A public library program for preschoolers

When: Spring or summer

Where: Margaret Cooper Public Library in Linton, Indiana

Why: To provide an opportunity for children to observe live ladybugs and enjoy stories and factual books about them.

How: The program began with Phyllis Franklin reading Eric Carle's *The Grouchy Ladybug* and *The Life Cycle of a Ladybug*. She then brought out a glass jar of live ladybugs for the children to observe. The boys and girls learned that ladybugs have six legs and three body sections and are a boon to gardeners because they eat aphids.

The children each made a ladybug out of two 8" circles of construction paper, one black and one red. The red circle was cut in half and glued to the black circle with corners touching at one end. This gave the appearance of a ladybug spreading her wings. The children used black crayons to make the black spots on the wings. *The Ladybug and Other Insects* by Pascale de Bourgoing and a number of other books on insects were displayed and loaned.

Bird Watcher's Observatory

Who: Jane Ostrand, School Librarian

What: A library-based bird observatory for elementary school students

When: Throughout the school year

Where: Kingsbury School in Oxford, Michigan

Why: To conduct scientific inquiry into birds indigenous to Michigan using library materials.

How: School Librarian Jane Ostrand placed a bird feeder outside the window of the school library and displayed *Birds* by Herbert S. Zim and Ira N. Gabrielson, the *Audubon Society Pocket Guide to Familiar Birds of North America: Eastern Region*, and *Kitchen Table Bird Book* by John Ham near the window along with a log book for the students' observations.

Students enjoyed watching the birds at the feeder while visiting the library. They learned how to use a field guide to identify the birds at the feeder and learned to recognize different species by sight. Recording their findings and reading the log book to learn what birds other students had documented enhanced the entertainment and educational value of the observatory.

Birds, Birds, Birds!

Who: Jill Randolph, Children's Librarian

What: A public library program for pre-kindergarten to third graders

When: Spring

Where: Stow Public Library in Stow, Ohio

Why: To provide an opportunity for children to learn about birds and enjoy stories, poems, and factual books about them.

How: The owner of a wild bird store gave a short talk to the children about how to feed wild birds and to recognize them by sight and by their calls. The boys and girls also examined flight, contour, and down feathers and discovered the purpose of each type.

The group listened to the children's librarian read *Urban Roosts: Where Birds Nest in the City* by Barbara Bash and then made bird nesting boxes from wax-impregnated, recycled cardboard kits purchased from the Phillips 66 Company.

Other books featured during the program were *Brother Eagle, Sister Sky: A Message from Chief Seattle* adapted by Susan Jeffers, *Big Friend, Little Friend: A Book about Symbiosis* by Susan Sussman and Robert James, and *Birds, Beasts and Fishes: A Selection of Animal Poems* compiled by Anne Carter. The boys and girls were encouraged to borrow fiction and factual books about birds following the program.

Blast Off with Reading!

Who: Mary Ann Mrozoski, Children's Librarian

What: A summer reading program for elementary-age children

When: Late spring and summer

Where: Gary Public Library in Gary, Indiana

Why: To motivate children to continue reading throughout the summer.

How: During visits to Gary elementary schools to promote the summer reading program, Mary Ann Mrozoski wore a rented spacesuit to create interest and sign up children for participation. A display of autographed photographs of astronauts, model rockets, and books that reinforced the space theme, such as *Spaceships* and *The Space Shuttle* by Gregory Vogt and *Rockets and Satellites* by Norman S. Barrett were displayed throughout the summer.

The space flight theme was carried through many activities during the summer. The boys and girls experimented with aerodynamics by making paper airplanes and flying sauces of different designs. Children from each age group rode on the library-sponsored float in the Fourth of July parade. Blast Off with Reading! banners, a giant model rocket, and a children's librarian in a space suit made the float complete.

To celebrate the successful completion of the summer program, the children attended a one-hour program on space exploration of the planets and stars at a local junior high school's planetarium. Prizes of balsa wood model rockets, photographs and other educational materials, some courtesy of the National Aeronautics Administration (NASA) and the National Air and Space Museum, were awarded at the conclusion of the program.

Rocket Launch

Who: Catherine Christmann, Children's Librarian

What: A public library program for six- through twelve-year-olds

When: Summer

Where: Charleston Public Library in Charleston, South Carolina

Why: To inspire an interest in books about rocketry and space travel.

How: Cadets from the nearby Air Force ROTC presented a one-hour program on rocketry. The cadets explained to the children some principles of aerodynamics and how a three-stage rocket works. The program culminated with the launch of a solid fuel, three-stage model rocket in a park adjoining the library grounds. The boys and girls watched in delight as the rocket was fired and proceeded to separate into stages before falling back to earth on parachutes.

A collection of books, such as *Rockets and Satellites* by Franklyn M. Branley, *To Space and Back* by Sally Ride and Susan Okie, *Easy-to-Make Spaceships That Really Fly* by Mary Blocksma and Dewey Blocksma, and *Projects in Space Science* by Robert Gardner were gathered and displayed for browsing and borrowing by the children.

Thomas Edison

Who: Mary Ann Mrozoski, Children's Librarian

What: A public library program for families

When: When scheduled by the Indian Humanities Council

Where: Gary Public Library in Gary, Indiana

Why: To entertain, educate, and inspire the public to read about Edison and other scientists.

How: The Indiana Humanities Council subsidized performances of a one-man play about Thomas Edison written and acted by an Indiana scholar-artist. The career and personal life of Edison was revealed to the audience by the inventor, his son, Henry Ford, and a stagehand. The program focused on the myths surrounding Edison, his place in history, and the personal costs of genius. The audience, playing the role of the media, was encouraged to ask questions during the Light's Golden Jubilee portion of the program, a celebration of Edison's invention, hosted by Ford on the fiftieth anniversary of the light bulb.

The Gary Public Library hosted one of these performances, which was open to the public and families were encouraged to attend. The children's librarian created a display of children's books about Edison and his inventions, other scientists, inventors, and the invention of common household objects. *Thomas Alva Edison: Great Inventor* by David A. Adler, *Samuel Todd's Book of Great Inventions* by E.L. Konigsburg and *Mistakes That Worked* by Charlotte Foltz Jones and other children's books were prominently displayed in the library for browsing and borrowing before and after the performance.

Science Book Awards and Review Journals

American Association for the Advancement of Science

(202) 326-6400
1333 H Street, NW
Washington, DC 20005

Publishes *Science Books & Films: Best Books for Children 1988-1991*, an annotated, indexed list of about fifteen hundred science books for children from preschool through eighth grade. A panel of college science students, science teachers, children's librarians, and children's literature professors evaluate the books and make the recommendations for inclusion.

Science Books & Films is the only critical review journal devoted exclusively to print and nonprint materials in all of the sciences and for all age groups. Reviews are written by scientists, science educators, and other professionals who have specialized knowledge needed for in-depth evaluations of science materials. Accuracy of scientific information, scope, and quality of illustrations or cinematography are considered during the evaluation process.

The levels of appraisal given a work are: highly recommended, recommended, acceptable, questionable, or not recommended. Levels of difficulty are indicated: K for preschool through kindergarten; EP for Elementary, grades 1 & 2; EI for elementary, grades 3 & 4; EA for elementary, grades 5 & 6; JH for junior high, grades 7 & 8; YA for young adult, grades 9-12; C for college; T for teaching professional; and GA for general audience.

American Institute of Physics

(212)661-9404
335 East 45th Street
New York, NY 10017

Administers the AIP Science Writing Award for the best children's book treatment of physics or astronomy. The judges, a panel of scientists and science journalists, select the book which they believe combines skill and originality of expression, clarity and accuracy of interpretation and graphic presentation. The award is announced through the media in late January.

American Nature Study Society

(607)749-3655
5881 Cold Brook Road
Homer, NY 13077

Presents the Eva L. Gordon Award for Children's Science Literature annually. "The award honors the body of work of an author or illustrator whose books reflect the high standards of good

attitudes, understanding of interrelationships, accuracy, readability, represents new adventure, scientific observations, joyousness and timeliness, while they extend either directly or subtly an invitation to the child to become involved." The winner of the Eva L. Gordon Award is announced every year in the Society's journal *Nature Study* and can also be found in *Children's Books in Print*.

Appraisal: Science Books for Young People

Children's Science Book Review Committee
605 Commonwealth Avenue
Boston, MA 02215

In conjunction with the New England Roundtable of Children's Librarians, sponsored by the Science Education Department of Boston University's School of Education, the Children's Science Book Review Committee quarterly publishes *Appraisal: Science Books for Young People*. Books are evaluated by a librarian and by a scientific specialist. Two reviews and ratings are published for each title. Ratings are: E for excellent; VG for very good; G for good; F for fair; U for unsatisfactory; and * indicates that qualifications are included in the review.

John Burroughs Association

(212) 769-5169
15 West 77th Street
New York, NY 10024

Founded and headquartered at the American Museum of Natural History, the organization is named for a Hudson River Valley naturalist and essayist and author of *Nature Lore*, a book on how to teach children to love nature. The Association presents the "John Burroughs List of Nature Books for Young Readers" every spring. The winning books are selected by subject specialists and children's librarians for "their perceptive and artistic accounts of experiences in the natural world." To receive the "John Burroughs Association List of Nature Books for Young Readers," send a stamped, self-addressed envelope to the above address.

National Science Teachers Association

(202)328-5800
1742 Connecticut Avenue, N.W.
Washington, DC 20002

Every year the March issue of *Science & Children* features "Outstanding Science Trade Books for Children in 19--." The books are primarily for preschool through eighth grade. The criteria for selection are: the book must be accurate, readable, and pleasing in format and illustration. The Book Review Committee is appointed by the National Science Teachers Association in cooperation with the Children's Book Council.

Science Resources

The resources listed here were utilized during a science program in a library or are reasonably-priced or free.

American Chemical Society

(202) 872-4600
1155 16th Street, NW
Washington, DC 20036

WonderScience: Fun Physical Science Activities for Children and Adults Together, published monthly from October through May, is an eight-page full-color magazine of hands-on physical science experiments, activities, and information for elementary school students. Using an interdisciplinary approach to explore a single topic per issue, *WonderScience* focuses on subjects such as recycling, static electricity, plastics, earthquakes, magnets, crystals, reflection, and the physics of music. *WonderScience* is published in conjunction with the American Institute of Physics. Attractive and educational posters with general science and chemistry themes are also available.

Broderbund Corporation

(415)382-4400
500 Redwood Boulevard
Novato, CA 94948

Produces the *Where in the World Is Carmen Sandiego?*® software series of educational computer programs based on the public television program. Also produces science, math, and language software programs for children.

Minnesota Educational Computing Corporation

(800) 685-6322
6160 Summit Drive, N.
Minneapolis, MN 55430

Produces software and videodiscs for Apple computers and, to a lesser extent, computers using MS-DOS for children from preschool through high school. The interactive, educational programs focus on science, math, social studies, thinking skills, and cooperative learning.

National Aerospace Administration

(202) 453-9241
Education Publications/NASA Headquarters
400 Maryland Avenue, S.W.
Washington, DC 20546

The tomato seed experiment was created by the Oklahoma State University Aerospace Services Education Program. Tomato seeds stored in space are available free of charge to educators working with young people from fifth grade through college. For a packet of seeds, call (202) 453-2991 or write to: Code FEO, NASA Headquarters, Washington, D.C. 20546.

National Air & Space Museum

(202) 357-1504
Education Resource Center
Smithsonian Institution
601 Jefferson Drive, SW
Washington, DC 20560

The National Air and Space Museum's Educational Resource Center offers materials on aviation, space, and the Museum's collection which include curriculum packages, public domain software, videodiscs, CD-ROMS, slide sets, filmstrips, and videos.

For more information, call (202) 786-2109 or write on library letterhead to Education Division, MRC 305, National Air and Space Museum, Washington, DC 20560. For NASA-produced filmstrips, call (301) 763-1896 or write to National Audiovisual Center, 8700 Edgewood Drive, Capitol Heights, MD 20743. Request a catalog for information, posters, and audiovisuals from NASA CORE, Lorain County JVS, 15181 Route 58 South, Oberlin, OH 44074.

National Audubon Society

(202) 547-9009
801 Pennsylvania Avenue, SE
Washington, DC 20003

Program schedules and teacher's guides are available for quarterly National Audubon Society programs on public television. For copies of selected television productions, contact National Audubon Video, Inovision, PO Box 576, Itasca, IL 60143-0576, or call 1-800-523-5503. For Audubon educational videos, contact: PBS Video, 1320 Braddock Place, Alexandria, VA 22314, or call 1-800-424-7296. Audubon has begun the Audubon Science Institutes, an educational partnership joining educators, business, and government.

"Underwritten by Citibank and the U.S. Department of Education, Audubon Science Institutes offer environmental education workshops for teachers, provide hands-on technical training for

science instructors, show teachers ways to include environmental science in existing science curricula, and supply materials for hands-on classroom activities reflecting real-world environmental issues." For more information, contact: National Audubon Society Productions, 666 Pennsylvania Avenue, SE, Washington, DC 20003.

National Gardening Association

(802) 863-1308
180 Flynn Avenue
Burlington, VT 05401

Publishes a journal of garden-based learning called *Growing Ideas* which prints experiments with plants, seeds, and bulbs sent in by educators across the country. History, geography, math, language, and art activities using plants are described in detail. This project is supported, in part, by the National Science Foundation.

National Geographic Society

(202) 857-7000
17th and M Streets, NW
Washington, DC 20036

NGS KIDS NETWORK offers a unit Hello! which introduces the students to scientific methods by having them collect and share original data about the pets they own and their communities. Other NGS KIDS NETWORK units are: Too Much Trash?, What Are We Eating?, Weather in Action, What's in Our Water?, and Solar Energy. For more information about these units or other National Geographic products, write to the National Geographic Society, Educational Services, Washington, DC 20036 or call 1-800-368-2728.

National Science Resources Center

(202)357-2555
Smithsonian Institution
1201 Jefferson Drive, SW
Washington, DC 20560

Publishes *Science for Children: Resources for Teachers*, a comprehensive list of science activity books, science museums and technology centers, science magazines for children, science book lists, and other related educational materials.

National Wildlife Federation

(202) 797-6800
1400 16th Street, NW
Washington, DC 20036

Publishes *Ranger Rick*, a monthly nature magazine for elementary-age children. Publishes *Ranger Rick's NatureScope*, "a creative education series dedicated to inspiring in children an understanding and appreciation of the natural world while developing skills they will need to make responsible decisions about the environment." Each issue of this science series focuses its activities and concise background information on subjects such as astronomy, dinosaurs, insects, mammals, and wetlands.

Office of Elementary and Secondary Education

(202)357-2425
Smithsonian Institution
1201 Jefferson Drive, SW
Washington, DC 20560

Publishes *Art-to-Zoo* quarterly, a newsletter with information and activities for grades three through eight. Each issue offers ideas for using museums, parks, libraries, zoos, and other community resources. Also publishes a series of books filled with simple science experiments.

Phillips 66 Company

(918)661-6600
A Division of Phillips Petroleum Company
410 Reda Building
Bartlesville, OK 74004

Phillips sells thirty wax-impregnated recycled cardboard birdboxes for $35.00. Write to Birdbox Program, Phillips 66 Company, A Division of Phillips Petroleum Company, 410 Reda Building, Bartlesville, OK 74004. Phillips 66 makes the Birdbox Environmental Education Program available to educators and children through a matching grant with the Oklahoma Department of Wildlife Conservation.

Project WILD

(303) 444-2390
PO Box 1806
Boulder, CO 80308-8060

"Project WILD is an interdisciplinary, supplementary environmental and conservation education program for educators of kindergarten through high school age young people. The goal of Project WILD is to assist learners of any age in developing awareness, knowledge,

skills, and commitment to result in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment upon which all life depends."

Six-hour long workshops for twenty to thirty people are sponsored in parks around the country; the participants receive an extensive guide to learning activities about nature. Other programs, offered through this organization, are Project Learning Tree and Aquatic Project WILD. For more information, contact the Department of Game and Inland Fisheries in your state.

Scientific American Frontiers

(800) 523-5948
Connecticut Public Television
P.O. Box 260240
Hartford, CT 06126

Scientific American Frontiers airs monthly on PBS, October to February, with science news and feature stories that explore the fields of wildlife, medicine, technology, nature, and human behavior. The program offers free off-air videotaping rights and free teaching materials are also available. The guide for each show includes student labs, worksheets, instructor's notes, behind-the-scenes information, teaching tips from educators around the country. The series is underwritten by GTE Corporation and produced in association with *Scientific American* magazine.

U.S. Department of Energy

(202)586-8949
Office of University and Science Education Programs
1000 Independence Avenue, SW
Washington, DC 20585

Produces many energy-related materials and operates numerous programs for schools. *Dinosaur and Power Plants* includes a teacher's lesson plan, activity guide, and student materials on fossil fuels for grades four through eight. The Department of Energy also offers support materials for National Chemistry Day, Earth Day, and National Science and Technology Week.

WORLD OF SCIENCE ®

(716)426-1540
1665 Buffalo Road
Rochester, NY 14624

THE WORLD OF SCIENCE® operates retail stores across the country and also sells items through catalogs. The products encompass the full spectrum of science and nature investigation: anatomy, chemistry, biology, earth science, magnetism, optics, astronomy,dinosaurs, electronics, crystal growing, and more.

Professional Reading and Reference Books

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