"Correspondence School": Inspiring a Future Generation of Scientists with Science-By-Mail

I've always liked to write letters, and like most people, I like to receive letters even more. So when I heard about an innovative science education project called Science-By-Mail (SBM) that links groups of children across the nation with scientist pen pals, I signed up immediately. I have now served three years as a volunteer scientist with the program, which is coordinated through the Museum of Science in Boston.

SBM's dual intent is to provide high-quality materials to supplement school science instruction and to introduce children early in their lives to enthusiastic "real" scientists. SBM works like this: Children register for memberships either through school programs, in family groups, or individually. The children are then mailed science challenge packets, each with a story line incorporated into an instruction book and with all the materials needed to perform a set of experiments. Once the children work through the project, they send their results and thoughts to their pen pal scientist. The scientists, who are recruited by SBM and each assigned to five memberships, read through the results and then return a letter commenting, adding ideas, or just saying "good job!"

Each year, Science-By-Mail produces three new science challenge packets covering a range of topics. This year's packets focus on structures, sound, and time. The story line for the structures packet tells about three children—Rosie, Sandra and Max—who accidentally activate an incredible shrinking machine, which leaves them only four inches tall. In order to return to full size, they have to build a tower which will support them as they climb to the reverse switch. Along with the protagonists, the children build a tower out of straws and paper clips. In the process, they try different building designs that increase the strength of the tower, such as widening the base or adding cross-beams. The story characters next need a stronger tower to reach the top of the machine, so the children are asked to build a tower out of index cards and compare its strength to that of the straw tower. They learn that each building material has different properties (straws are good for height, cards for support) and that you maximize these characteristics depending on the purpose of the structure to be built.

The final challenge, in which the students build a freestanding bridge 20 inches long, gets them to work with a structure based on triangular trusses, one of the strongest structural components in architecture. The children have already discovered the strength of the triangle from the cross-beams in their tower, so they can now assimilate the complicated idea of a truss that balances the forces of tension and compression. The children are asked to draw blueprints of their bridges, so that they learn both about making diagrams of structures and about measurement. And in a very important concession to reality, they are also asked to calculate the cost of building their bridges.

Betty George, a science teacher at the Sarah W. Gibbons Middle School in Westborough, Massachusetts, has been using Science-By-Mail as a part of her curriculum for three years. She devotes nine weeks of the year to the packets and finds that the projects are most useful in helping the children develop critical thinking and spatial and communication skills. "It really appeals to their right brains," she explained. "They love to be creative." What they like best about the SBM activities is that the class is more relaxed. The children work at their own rates, and they work with other children they like. Sometimes this atmosphere helps children who wouldn't have found such success in a traditional structured setting. Chelsea, a very bright 12 year old whose mother is supervising her SBM work, says that she's not good at "school science." "They're always telling you do this, do that," she says. "But learning on your own, that's fun. And I like to hang out in labs and stuff."

The projects in the packets are important, but they are only part of the SBM experience. "I can't stress enough how important the volunteer scientists are to these kids' lives," Mrs. George said. "It's important for the kids to feel that they are a part of science. Last year one of our volunteer scientists stopped in when she was just passing by on the turnpike. She was the main act for those kids—they were in awe! The program loses something if it doesn't have that personal involvement."

The kids aren't the only ones who benefit from the personal side of SBM. Hands down, the best part about the program

Highlights of the 1993–94 Science-By-Mail Challenge Packets

Topic	Final Project	Main Concepts
Structures	Build a bridge that is freestanding, spans a distance of 20 inches, and supports a load of one pound.	1. How load, tension, and compression affect a structure's ability to stand alone. 2. How type and shape of building materials affect design and strength of a structure. 3. Important ideas to consider when designing a structure for a specific purpose.
Sound	Create a radio play by identifying the pitches, volume, and timbre of sounds from the environment so as to accurately recreate them.	1. Sound is caused by vibrations. 2. Pitch, volume, and timbre are three qualities of sound. 3. Sound can be transmitted through many materials. 4. The parts of the ear work together to transmit sounds and translate them from vibrations to electrical impulses that the brain can interpret.
Time	Build a timepiece that can accurately measure one minute and is simple enough to be used by others.	1. Understand the importance of measuring time. 2. Learn about the devices that people have used throughout history to measure time.

https://doi.org/10.1557/S0883769400047849 Published online by Cambridge University Press

for scientists like me is getting letters from the kids. They are filled with joy and hope and even bubbling energy (that often comes out as irascibly bad handwriting!) "Will you write soon? I love to write," says Ariela-Lucy. She also tells me that she has "gymnastics Monday, violin rehearsals Tuesday, piano lessons Wednesday, orthodontist appointments Thursday, and shopping Friday." Often they share their hopes and dreams with you: "I would like to be a singer and a part-time writer," writes Miri. Lori wants to be a veterinarian, but she's worried about having to dissect animals in vet school. "I like zoology a lot, but I don't want to be a zoologist!" says Becky. Alisha wants to be a fashion designer or an art teacher. Her SBM partner Laura wants to be a surgeon or an OR nurse for Massachusetts General Hospital.

Sometimes you meet exceedingly precocious children too. "I think it's amazing you're a neurobiologist," writes Alma, age 11. "I myself happen to be fascinated with the brain, but have a few questions: Are the neurons you're studying the same as the neurons that, along with protons, are in atoms? What exactly do you do? At the biology meeting were there inventions? What were they like?" And on and on.

Volunteer scientists are asked to respond to all communications from their budding scientists within two weeks. And if you can meet that mild commitment with enthusiasm, you, too, could be somebody's favorite scientist.

Science-By-Mail is now in its seventh year: 25,000 4th–9th graders and 2,000 volunteer scientists participate in 17 SBM chapters in the United States plus one that just opened at the Ontario Science Center in Canada. The program is looking to expand its membership by adding chapters across the United States as well as increasing its international enrollment. Expansion is limited primarily by SBM's ability to raise funds to support the distribution and development of the science challenge packets. In addition to a grant from the National Science Foundation, the program raises money from corporate and private sources. A membership, which can include one to four children, currently costs $56/year within the United States or $62 elsewhere. The fee entitles the students to a set of the science challenge packets plus assignment to a scientist pen pal. Scholarships are available for students or school groups unable to afford the modest enrollment fee.

If you would like to help sponsor a membership, or, if you would like to get involved for the 1994–95 year as a volunteer scientist, contact: Science-By-Mail, Boston Museum of Science, Science Park, Boston, MA 02114; phone (800) 729-3300, or in the Boston area (617) 589-0437.

ANNE E. WEST

Anne E. West is an MD/PhD candidate in the Program in Neuroscience at Harvard Medical School in Boston, Massachusetts. She has been a volunteer scientist with Science-By-Mail for three years.

The Education Exchange highlights the experiences of scientists and engineers with local schools, along with helpful hints and resources. If you would like to share your own involvement in science education, contact: Finley Shapiro, Department of Electrical and Computer Engineering, Drexel University, Philadelphia, PA 19104, U.S.A. Phone (215) 895-6749; fax (215) 895-1695; e-mail: shapiro@ece.drexel.edu

To receive additional information on how you can get involved in enhancing K-12 science education, circle number 120 on the Reader Service Card.

https://doi.org/10.1557/S0883769400047849 Published online by Cambridge University Press