Making Elementary Science Exciting

By Gail Perry Rittenbach

Placing a shell in my outstretched hands, Sheila said, "Isn't it pretty?" We examined it together—a mottled brown, common garden snail shell, with a tinge of yellow. The spirals were opaque, letting the translucence surrounding it glow in the afternoon light.

"What kind of snail did it come from?" Sheila asked, her eyes lingering on this amazing treasure.

"Let's find out!" I said. In the school library, we found a nature book and began to compare pictures of land snails to our shell. In those few moments, another scientist was born.

Science and nature are compelling topics for our young students. How can we as teachers keep the fires of science roaring? Let's review the elements of science teaching as a start.

Be excited about science. Children catch your love of learning. You can enhance their learning by having your own area of scientific expertise. How? Develop a scientific hobby. This can be a collection of insects, butterflies, rocks and minerals, or nature photography. Whatever it is, you will be the expert at least in this one area, and your enthusiasm will be contagious.

Use metric only. In science, metric is the universal measurement. Invest in inexpensive measuring items such as tape measures with centimeters and meters, rulers with millimeters, and measuring utensils for cooking with liters and milliliters. Ohaus from Fisher Scientific (http://fishersci.com) offers an inexpensive electronic balance scale that measures in grams.

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Be safety conscious. Prevention is an imperative in any science class. Post safety rules in the classroom, and have students review them each time they perform a science experiment. Ask each child to purchase inexpensive goggles and put his or her name on them. Do not allow them to share the goggles with anyone, since eye infections are very contagious. The goggles can be kept in a shoe caddy when not in use. Also, have a first aid kit handy, and know how to use it.

Use science journals and resources. Schools need to include in their budget some funds for subscriptions to science publications for their libraries, and ensure that students can access science materials on the Internet. Help your students think critically about science "facts" they find, and encourage them to research from credible sources whether the claims are true.

Encourage your students to create questions about their learning. Ask them to record several questions after each day's lesson. These questions can be anything they'd like to learn more about, a concept from the textbook that they don't understand, or something they wonder about as they ponder the day's lesson.

At the next class, they can share the questions with each other (this will give you some insight into areas that require reteaching). Try organizing the students into small groups, and have each group answer one of the questions. Or have the class choose several of the questions, then research the answers in the library or on the Internet. ("Ask Jeeves" is a good site to use: http://ask.com). The following day, the students can share what they learned with the class or with their small group. Each group can combine the information from the members' research and report to the class. This cooperation builds community and knowledge and lessens the paperwork for the busy teacher!

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Employ trade books. There are numerous picture books and reference books that illustrate the common strands of elementary science. Use them to supplement your lessons and the textbook. To encourage critical thinking, have students read several books on the same topic and write in their journals what they learned, as well as whether the books disagreed on certain facts. Encourage students to research differences between the sources' evolutionary viewpoints and their beliefs about Creation.[1]

Schedule blocks of uninterrupted time. Children need adequate time to explore. Take them outside to observe and record their ideas and questions in a journal. Encourage them to draw what they see, make notations about what they feel, record what they hear, and list questions they have about their observations.

After this activity, ask the students to try to find the answers to the questions by using the Internet, textbooks, or trade books. They can even ask an expert! When they are investigating the answers to their own questions, they will be motivated to learn and will enjoy the activity.

Provide models. If you have assigned a project or a sketch, or even a paragraph, provide a model of the quality you wish your students to emulate. This allows them to visualize the possibilities and improve upon the example! Given a little encouragement, your students' work will often exceed the model you give them.

Build community. "Ideally, classrooms are places where teachers and students work as a unique community of thinkers."[2] It is vital to the nurturing aspect of your science classroom to take time to build a community of investigators who share and collaborate. By meeting together to discuss observations, share learning, and reflect, students directly model the real world of scientists, who regularly use a team approach for problem-solving. Learning to work together and collaborate should begin in the elementary science classroom.

"Community is also evident in the standards students set for their work. Because they see themselves as practicing authors or scientists, their results are presented to and evaluated by peers."[3]

Enhance your textbook. Gathering information from one source is inadequate, especially if the source is a textbook. No one source can contain all the facts about any subject. Also, students need to understand that researchers may reach different conclusions. To broaden your students' under-

standing, have them investigate and share facts and research they've uncovered on a specified topic. Ask each student to find at least five facts from research—either from a journal, the Internet, or from an interview with an expert.

After the research is completed, have each student share at least three facts from his or her journal while the other students copy the facts into their journals. This community approach to learning creates an audience for learners and helps students better understand the scientific method. If they find discrepancies in the findings of various experts, engage them in discussion of the reasons for the differences, and help them draw conclusions from the evidence.

Emphasize discrepant events. Try creating some magic in your classroom by the use of a few simple materials. The unexplainable can be a springboard of thoughtful questioning that will set the stage for wonder-filled learning.

"The 25-kilogram child who can lift her 65-kilogram teacher with the aid of a lever fashioned from a sturdy two and a half-meter board can set a group of young children to thinking. Seeing an ice-cube floating in a clear liquid (water) while a cube from the same tray sinks in another clear liquid (alcohol) can bring adolescents to their feet."[4]

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"A good discrepant event tends to create a strong feeling in the observer. Generally, there will be an inner feeling of 'wanting to know.'"[5]

A good source is *333 More Science Tricks and Experiments*.[6]

Make room for science. If you create a specific place in the room for science, this makes a visible statement of how important science is in the curriculum. Furthermore, this allows children to "do" science anytime, even during free times.[7]

Assessment. The use of alternative ways to measure knowledge and progress in science is crucial in a process-oriented approach. Integrating other subject matter into science class such as reading, writing, and mathematics will ensure that the ubiquitous worksheet pages don't comprise the bulk of the grade.

"Assessments such as portfolios provide a valuable opportunity to integrate other subject areas into a science lesson."[8]

"Journals can be used during science classes to record observations, calculations, concept maps, and so on."[9] Not only do journals help students organize their learning, but the pride of ownership makes them careful about their recorded observations, drawings, data- and fact-gathering, as the work acquires a personal dimension.

Integrate other subjects. Memorable learning takes place when students are engaged and interested. What better way to teach science than to use reading, art, Bible, math, or writing

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time to learn about science? Ask students to read picture books, investigate biographies of scientists (include women scientists, too), create stories of inventions, engage in art projects using nature to hone observation and questioning skills, report on why things work the way they do, identify insects seen at recess, share information orally with the class, graph and plot data, and convert data using percentages. (These are just a few suggestions to get you started.)

Engage students in science every day. "While the Bible should hold the first place in the education of children and youth, the book of nature is next in importance. God's created works testify to His love and power."[10]

Some American schools are cutting science entirely from the curriculum at certain grade levels to concentrate on reading and mathematics in order to prepare students for high stakes state tests. Combined with many teachers' lack of preparation and distaste for science (including some at the secondary level who lack a degree in a science field), this often means that science does not play a prominent role in the curriculum.

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Considering the importance of science in modern society and the need for students to be knowledgeable about the many ways it touches their lives, as well as to be prepared for advanced topics in science at the college level, it is important for science to have a visible place in the K-12 curriculum. Modern living increasingly relies on science and technology, so our students need to be informed consumers. Furthermore, to be productive workers, students need to have a background in science, since jobs are increasingly using scientific and technical tools.

And perhaps most important, studying science helps students develop a clear, personal connection to God. "Nature is full of lessons of the love of God. Rightly understood, these lessons lead to the Creator."[11]

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