Looking for FOSS materials to implement in your middle school? We are happy to announce that four FOSS Middle School courses, designed to be logical extensions of the elementary program, are now ready for teachers and students. The four courses now available are Planetary Science, Human Brain and Senses, Earth History, and Electronics. A total of nine courses will be available in three strands: Life Science, Physical Science, and Earth and Space Science.

The middle school courses carry on the FOSS philosophy by using direct personal experience and inquiry as the starting point of investigations, and employing the strategies of collaboration and discourse to help students turn data and information into understanding. The courses are consistent with the spirit and intent of the National Science Education Standards concerning inquiry and depth of understanding. They provide students the opportunity to develop logical thinking and critical decision-making skills.

FOSS Middle School students learn science by doing science that has relevance to their lives and that relates to issues in the adult world they are entering. FOSS Middle School materials and instructional strategies are developed and tested by FOSS staff in typical middle school classrooms before they are drafted for national testing at 20 diverse sites around the country. Feedback from teachers in the national field trials, critical review by scientists, and the findings of an external evaluation team inform the revision of the courses for commercial publication.

Each middle school 9- to 12-week course includes these components:

Teacher Guide
A comprehensive guide in a 3-ring binder that includes science background for the teacher, detailed lesson plans, assessments, and resource lists.

Continued on page 2
Planetary Science

Astronomy, one of the ancient sciences, looks at the big picture—the biggest picture of all, the universe. With senses turned outward, the astronomer seeks answers to some of the most fundamental questions: Where am I? Where did everything come from, and where is it going? How big is this universe? What else is in it with me?

The universe is a large subject for study—too large for one middle school course to cover. For this reason the FOSS introduction to astronomy is limited to our local neighborhood—our solar system. The Planetary Science course has four main goals. Students will:

1. Understand that the Sun, Moon, Earth, and other planets comprise a dynamic solar system, the motions of which account for year, month (roughly), day, Moon phases, and eclipses;
2. Use a variety of resources (laboratory materials, field observations, print, multimedia, Internet) and inquiry methods to construct explanations for the structures and behaviors of objects in the solar system;
3. Think logically and critically to make inferences, solve problems, and reach conclusions about the solar system; and
4. Work collaboratively (as well as alone) to express understanding of important ideas associated with the solar system.

The Planetary Science course curriculum structure uses two organizational themes. One is historical, guiding students to revisit some of the major observations and discoveries in astronomy. The second method is to start the investigation on familiar ground, the Earth, and move progressively farther and farther afield as the study advances. Combining these two curriculum strategies provides students with a sense of the sequence in which information was acquired as well as the accelerating rate at which planetary knowledge is growing.

The course starts with an exercise in which the students create maps of their school grounds and study images of their school from six vantage points above the school. Students are introduced to their home as an isolated planet in the vastness of space while keeping one foot securely planted, figuratively, on familiar turf. They revisit the historical evidence that informed ancient astronomers that the Earth was a sphere and the phenomenon of day and night. Then they turn their attention to our nearest celestial neighbor, the Moon. They study photos of the Moon’s surface and conduct investigations to answer their own questions, such as “How big and how far away is the Moon?” “Why does the Moon change shape?” and “What are all those circles on the Moon?”

Students study lunar geology and compare Moon rocks and minerals to Earth rocks and minerals. They use this information to support or refute the popular theories of lunar formation.

The curriculum uses a wide variety of teaching approaches, including simulations, data collection and analysis, field observations, artistic representation, and experimentation. By studying the Moon in detail, the students develop the skills and strategies for investigating Mars and the other planets.

Human Brain and Senses

It has been said that the human brain is the only organ capable of studying itself. Inside this 1.5-kg marvel lies the capacity for learning, emotions, perception, and response to a multitude of situations and stimuli. The brain, protected by the helmet-like skull, depends on the senses for information about the outside world. All senses start with receptors that translate an environmental stimulus, such as light, pressure, or sound waves, into electricity. A basic knowledge of this process by which the brain senses and transmits information to the rest of the body is important for students to understand how their own bodies function.

The FOSS Human Brain and Senses course challenges students to discover their own learning styles. They explore visual, auditory, and tactile memory as well as the role of association. Through these experiences, students begin the course with strategies to assist them in their own learning.

Students also explore the sense that the majority of humans rely on most for information about the world—vision. Through investigations of optical illusions, light, lenses, and the structure and function of eyes, they discover how the stimulus of light is received by the eye as the first step in getting the message to...
the brain. Students use MRIs to “follow” the optic nerve from the back of the eye to the brain itself. Each student then uses MRIs to put together a three-dimensional brain model, which is used as a reference throughout the rest of the course.

Students then move on to brain function. Students map EEG recordings and learn that different parts of the brain are used for different functions. They investigate the receptors and the part of the brain that is involved in the sense of touch. Students trace the pathway of information through the neurons from fingertip to brain and back. They are then challenged to explore the other senses—hearing, taste, and smell—through a series of projects that they design.

Students revisit learning and memory, applying what they know about brain structure and function to refine and extend their knowledge of their own cognitive abilities. Students acquire a sense of the power and capability of their own brains.

**Earth History**

Evidence used to decipher Earth’s prehistoric past is hidden in its rocks. Sedimentary rocks have sequentially recorded many Earth-shaping events and different environments over geologic time. These layers of rocks may be read much as one reads the pages of a book, although many of the pages and numerous characters are missing from this history, especially for the earliest chapters in the story. It is up to the clever and imaginative student of geology to put the pieces together, interpret the clues, and reconstruct the missing parts to tell Earth’s story.

The Grand Canyon provides one of the best places on the planet to begin looking back into Earth’s history. Students join Major John Wesley Powell on his epic adventure down the Colorado River in small wooden boats in 1869. The Canyon’s sandstones, shales, and limestones contain fossils that provide evidence of over 1.5 billion years of changing environments. Students recreate the processes that contribute to the creation of these kinds of rocks, from making sand from chunks of granite to observations of stream tables used to demonstrate that rock particles can be removed from one location (eroded), transported by water, and deposited in a distant location. They make sandstone, shale, and limestone to verify that particulates from massive rocks can be reconstituted and cemented together to form new rocks.

The study of Earth history challenges students to consider deep time—time measured in millions and billions of years, rather than the minutes, hours, and days with which students are more familiar. They begin by putting their own lives into a time perspective, considering changes year by year. Students then gradually work toward an appreciation for the length of time that the Earth has existed.

As they observe and compare the processes happening today, both in the classroom and in the world outdoors, they begin to visualize how these same processes may have acted to create the rocks in the Grand Canyon. And by looking carefully for fossil clues in the rocks, they can infer the conditions that were present in the environments in which the rocks formed.

The guiding focus behind the FOSS Earth History course is for students to consider what they know about Earth’s past (e.g., 250 million years ago what is now the Colorado Plateau was a warm, shallow sea) and then ask the question, “How do we know?” Through their inquiries, students begin to understand the magnitude of time and the extent of the processes that have shaped the Earth and may even begin to consider how these same processes are shaping the planet today and will continue to do so in the future.

**Electronics**

Electronics is the branch of physics concerned about the behavior of electrons in circuits and the effects produced by those electrons. Grossly oversimplified, electronics is electricity controlling electricity. A basic knowledge of electronics is fundamental to understanding the foundation of contemporary civilization.

Students learn that current electricity is energy, in the form of moving charges (electrons), and that it has a source. The pathway carrying electricity from its source to where it will do something useful is a circuit, and electricity in circuits can be controlled in several ways. Students learn about components that impose some control over circuits—switches, resistors, diodes, and capacitors—by inserting them into circuits and observing what happens.

The curriculum helps students make sense out of what they observe. Two natures of electricity are introduced: voltage, the amount of force available to push electrons through a pathway, and current, the number of electrons flowing. Through experimentation and focused thinking the students work out the relationships between the voltage, the current, and the resistance in a circuit (Ohm’s law).

Students explore the diversity in switches, conduct a home electronic device inventory, dissect electronic devices, and design game-like projects (wonder card analysis, poster displays, multimedia simulations) to reinforce the concepts of electronics and promote creative thinking and problem solving.

Transistors, the gateway to solid-state electronics, are introduced. With what they have touched on in the study of transistors, students will build one or two transistor projects that suggest an amazing universe of possibilities.

Students grapple with concepts and models to explain the behaviors of something they can’t see—something they can only come to know by inference. Thus, it is essential that students carefully gather data, organize it for effective analysis, and construct meaning from the experience through various methods of communication. The curriculum comes to life as inquiry when the experience is infused with mathematics and language skills.
“Look, this one is mine!”
“See, I made this one!”
“Here’s mine!”
Voices call for attention, fingers squash the fabric pointing to artists’ squares, and little eyes attract a visitor to gaze at each unique area of the class quilt.

Four teachers at The Howard Early Childhood Center were using the FOSS kindergarten module, Fabric, which consists of two big activities, each with many parts—Activity 1: Fabric All Around and Activity 2: Fabric Interactions. The teachers chose student-designed quilts as a culminating experience to the Fabric All Around investigation. This Alamo Heights Independent School District kindergarten center is located in San Antonio, Texas. Last January, when Carol Fenley, Lisa Susan, Holly Siskovic, and Janet Weatherston collaborated on planning a language arts theme of studies, they realized how naturally the FOSS Fabric Module integrates science and mathematics into their Winter Unit.

The first activities in Fabric All Around involve students in discovering and describing fabrics, hunting for fabrics, making a fabric collage, pulling fabric apart, weaving, and sewing. Before launching into these activities, Howard students use math pattern blocks and manipulatives to explore, build, discuss, and draw patterns.

“What I love about the Fabric Module is that it starts with the properties of fabric and observations about how fabrics are different,” Carol comments. Students observe different kinds of fabrics by matching cloth squares placed inside feely boxes. Then they discuss the various textures and fabrics. “You would not think they would like taking fabric apart and looking at the parts and fibers with a magnifying glass, but students love it! They also enjoy weaving and sewing in small center groups. Some students love sewing so much and feel so successful, they want to do more and more.”

Parent involvement weaves throughout the fabric investigations. Families donate scraps of material. A parent assists with small groups during sewing activities. Parents become involved at home during the quilt-designing process. In the Fabric Interactions activities “another parent came to class one day who had never had the opportunity to visit before. She stayed and helped students when they washed the cloth.”

“Students feel proud of a quilt that they work together to design,” states one teacher. Creating the class quilt as a culminating activity means students are becoming more and more like experts about fabrics. Students do most of the designing and making of the individual quilt piece at home. They sew, paint, or glue. With so much creativity involved, students take ownership of each unique square. An interesting aspect of the quilt-making process is the discussion and “Aha” that happens when working together on a common project. Each person does a little piece. Students see that combining all these pieces into a larger quilt means something big and beautiful can come from the small efforts of individual students. If one person had to make all of the squares, the task would be more difficult. Students recognize and discuss teamwork.

What about the students whose parents don’t get involved at home? Who sews all of the pieces together into the final product? Howard students can create a square at center time during the regular school day if necessary. Most families and students participate enthusiastically in this engaging activity. Lisa, Holly, Janet, and Carol constructed the quilts this first year. Teachers could request parent volunteers to help with the final quilt assembly and sewing. Adding each block with the young designer watching during the actual process of assembling the quilt pieces can enhance the understanding of how finished cloth products are made.
Highlights of the integration of the fabric study with the winter unit include rich discussions about fabrics and textures. What fabric would be appropriate for certain types of clothing? What fabric would make the best winter jacket? What do you wear if you snow ski or live in the north? Students think about applications, some obvious and others not so obvious. Some students noted how boys and girls might wear different fabrics. For example, boys’ shirts are not commonly made out of satin.

Classes shared books from the FOSS recommendations and others to enhance discussions about cold weather and appropriate clothing. Some of the books that were shared include The Hat by Jan Brett, The Mitten by Jan Brett, and Coat of Many Colors by Dolly Parton.

Experiencing the complete Fabric Module really takes children to a deeper level of understanding. The study of fabrics leads to asking questions that encourage children to engage, enjoy, think, create, and communicate. In the section on how certain elements and fabrics interact, the class moves tubs outside to work in small groups. Doing this activity during recess worked well. A group of four to five students could stain and then wash the cloth while others played. When they finished, another group took their turn. Student response to this activity? “It was fun. We got fabric dirty. We put ketchup, grass, dirt, mustard, and dressing on pieces of white fabric. After we got them dirty, we washed them. My mom changed the water.”

Howard teachers came up with several ideas to extend the Fabric Module.

- During the washing investigation, students washed with dishwashing liquid and with laundry soap powder. They discovered, discussed, recorded, and charted their results to find out which cleanser worked best. Students could also find out which cleanser makes the most suds.
- To integrate technology into the Fabric Module, students could search the Internet on the topic of quilts. They can find other colorful designs to view as they consider their own quilt-design ideas. Some sites to check out are:
  - San Jose Museum of Quilts & Textiles
    http://sjquiltmuseum.org
  - Animas Quilts
    http://animasquilts.com
  - World Wide Quilting Page
    http://mail.kosmickitty.com/QuiltBlocksPage.html
- Students can place their own fabric samples in a portfolio book and include captions. Captions might include: I can sew. I can weave. I can take fabric apart. I can make a fabric collage. Our class learned about fabric. We made a quilt. Students and teachers both were quite satisfied with the outcome of their efforts with the Fabric Module. One teacher commented that it was her favorite activity of the year. Another is looking for additional ways to integrate technology into the fabric study. When the quilting project ended, students had these comments.
  - “I wish we could take turns sleeping with it at home.”
  - “It’s big!”
  - “If I was sleeping with this quilt, it would make me think of so many things: trucks, airplanes, clouds. I would imagine I was an airplane flying.”
  - “My baby brother would like to sleep with this quilt. It would keep him warm.”
The classroom is decorated with brightly-colored bulletin boards. Student work is creatively displayed on the walls. Students’ desks are aligned in small pods ready for group work. Yet, as you enter the classroom, you are distracted from its order. Groups of students on the floor draw your attention. They are seriously busy—shaking, rolling, and observing bottles filled with various liquids. You’re amazed by the children’s intense interest, so you venture closer to listen as the teacher asks questions.

Perhaps it’s time to get your hearing checked. First graders are answering questions with vocabulary such as “transparent,” “translucent,” and “viscous.” Not only are these children using the vocabulary correctly, but also they appear to savor each syllable of the words. One would think “viscous” was a fine wine (or at least a chocolate ice cream cone).

Are these children in a gifted program? Is this school located in a wealthy suburb? No! These are students of various abilities attending a school where 99 percent of the pupils qualify for free breakfast and lunch. The class is part of a large, urban school district with all of the challenges one associates with such a system.

Why are these students “loving” science? The teacher is using the FOSS Solids and Liquids Module. Students are constructing understanding through inquiry. FOSS provides experiences that help students formulate predictions and explanations for scientific concepts. Each student plays an important role in the learning process. Hands-on activities, graphic organizers, discussions, and group and individual explorations reach out to grab and hold the interest of six- and seven-year-olds.

Impressed? When was the last time you were eating breakfast and your six-year-old stated that her pancake syrup shows a property of liquids called “viscous”? It can happen! 🍃

Mary Frances Smitley wrote this vignette as a student of Dr. Jodi Haney at Bowling Green State University in Ohio. You can find an article by Dr. Haney called “Getting the Word Out to Decision Makers” on page 8 of the Fall 1995 FOSS Newsletter.

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various types of informational reading: expository, historical, biographical, narrative, question-and-answer format, technical (following written and pictorial directions), journal format, fact and fiction lists, and encyclopedia entries. *FOSS Science Stories* also include features commonly used in nonfiction writing: charts, graphs, tables, pictures, maps, diagrams, cartoons, italics, boldface, titles, headings and subheadings, captions, guide questions, purpose statements, and review questions.

Before students begin to read, it is important to set the purpose, make predictions, develop questions, and reflect on prior knowledge. Informational reading works best after real-life experiences with the topic, including hands-on investigations. Other important activities before reading include building prior knowledge, introducing new vocabulary, and previewing text structure.

Corvallis teachers have found three reading strategies especially effective with the *FOSS Science Stories*. They include:

- A coding system (described above with the snail article).
- The VIP (Very Important Point) strategy.
- The “Read, Cover, Remember, and Retell” strategy.

Both the coding system and the VIP strategy use sticky notes torn into smaller pieces or a piece of paper clipped to the margin of the page.

With the coding system students read and then mark statements in the text with:
  - ! WOW.
  - + New information.
  - * I already knew this.
  - ? I don’t understand.

After reading students meet in pairs to share their reactions to the text. Jennifer England, a fourth-grade teacher, used this strategy as students read “Inside a Snail’s Shell” and “Basic Snail Facts” in the *FOSS Science Stories Structures of Life*. Everyone read silently, but she heard many “wows” quietly vocalized. They were especially impressed by facts such as snails are right- or left-handed and that a snail has as many as 150,000 teeth!

Peggy Thomson’s fifth-grade class used this same strategy while reading “Sink or Swim” in the *FOSS Science Stories Variables*. Before reading the last three paragraphs that challenge students with a new experiment, students went back and reread the sections they marked as new information and discussed it as a group. Finally, with this preparation, they were ready to tackle the final challenge at the end of the article.

The VIP strategy asks students to choose three very important points from the reading selection. The number of points is limited to force students to think about which ideas are most significant. Peggy Thomson used this strategy as her students read “Swinging Through History” in the *FOSS Science Stories Variables*. After reading, students meet in pairs to defend their choices and collaboratively rank the VIPs by importance. When the pairs were in agreement, two pairs joined to form a group of four and decided on the three most important points. Using this process, students refine their ideas about what are main ideas and what are supporting details.

“Read, Cover, Remember, and Retell” is an excellent way to help students understand difficult reading material. Students in Jennifer England’s class used this strategy to read the two Thomas Edison selections in the *FOSS Science Stories Magnetism and Electricity*. After reading each paragraph aloud, students reread, covered the paragraph, and then took turns retelling information to a partner. She found this to be a good way to cover a lot of factual information with a high degree of involvement by all students. Patti Ball’s multi-age students (third–fifth grade) tackled the articles about Jane Goodall and Sir Isaac Newton in the *FOSS Science Stories Variables* using this strategy. After each paragraph, they wrote notes about the information (a written form of “retell”).

Special thanks to:

- Pam Mathews, Corvallis School District Reading Specialist.
- Patti Ball, Multi-age teacher (third–fifth grades) at Fairplay School in Corvallis.
- Jennifer England, fourth-grade teacher at Franklin School in Corvallis.
- Peggy Thomson, fifth-grade teacher at Adams School in Corvallis.
As I reflect on the 1999–2000 school year and the turn of a century, the changes in my professional life feel as momentous. Teaching is and has been the main focus of my life. I had wanted to be a teacher ever since I can remember. When it came time to choose a college major, it was easy: education. I did my student teaching and taught for several years in New York during the 1970s. I taught science from an old and dusty textbook. I found it boring and abstract; the kids did, too. I knew it should be different, but I didn’t know how to change it. Real science? I didn’t even know the names of the equipment, never mind where to go to buy it.

I moved from New York to California and became involved with educational publishing. I continued to see myself as an educator, now working with teachers, helping them to explore innovative instructional materials. I worked with teachers who wanted to change the way they taught. I was able to bring them programs to implement that change. I felt that I was making a difference. Teachers would thank me for the new insights I helped them develop.

Then I found FOSS! As a FOSS sales representative I was selling a program that helped elementary teachers with little science background to teach real science. Even I could ask the questions that would help learners discover how to construct an electric circuit that actually worked! FOSS was so complete that, when one teacher in Southern California asked me what a D-cell was and how it worked, we looked in the background information of the FOSS Magnetism and Electricity Module teacher guide, found the answer, and understood it!

But something started to change. Each time I worked with a group of teachers, the end of the day would be difficult. The teachers would be working together, excitedly planning how they would use FOSS with their students. I would eavesdrop as I gathered my materials, organizing them to go on and meet with a new group of teachers at the next site, work with those teachers to get them started with FOSS, and then leave again. I was jealous. I wanted to stay with those teachers. I wanted to participate in the planning and, even more important, I wanted to teach in the classroom.

Those feelings grew stronger. I had my California Teaching Certificate. The media said California needed teachers. I started to look for a teaching job. It wasn’t simple. I discovered I had to pass CBEST, a qualifying test. I tackled the test prep books and
jogged my memory. I took the test and passed. I worked as a substitute teacher for a while. Even with that experience, I still wanted to be a classroom teacher. I joined the FOSS revision team to earn a living during this transition. As production manager for the FOSS revision teacher preparation videos, I worked with FOSS educators and with students in classrooms every week. Sometimes it was hard. Sometimes students were not eager learners. I still wanted to stay in those classrooms and teach FOSS.

At one of the videotape sessions, I met Caroline Yee, Principal at Hillcrest School in Oakland, California. Hillcrest is a small, public K–8 school. It had a sixth-grade teacher opening for the fall of 1999. I applied and got the position! I would no longer be selling FOSS—I would be teaching it!

I found myself in a self-contained sixth-grade classroom with many teaching responsibilities. In many ways I was an experienced teacher. I certainly knew a lot more than I did my first year of teaching. But many years had passed and in many ways I was a first-year teacher. Science became a very powerful part of my program.

Hillcrest is one of the schools where the FOSS team from the Lawrence Hall of Science does its development work. They chose my classroom for their efforts last year. Although I had described the unique development to teachers and administrators during my years as a FOSS sales representative, this was a side of FOSS I had never actually witnessed. Neither the students nor I understood what FOSS development really meant. The kids were really excited that the authors of the black-and-white boxes were coming to work with them. I may have led them to believe there would be fireworks every day. But that’s not what development is like. When FOSS salespeople, like myself, said that sometimes these lessons had to be written, rewritten, and rewritten again, we weren’t kidding.

The kids were given many choices during the development process. Each day the FOSS team came in they presented an investigation or other activity. They used different approaches to convey the science content. The developers wanted to see which strategies kids selected and how well the strategies worked. Students had to write a lot about what they were doing. It was hard for the kids to understand why. It felt confusing and repetitive to them. I didn’t understand their reaction at first. Sometimes I would say, “What do you mean? Don’t you realize what these people are doing? Children all over the country will get the best science instruction ever because of the work you are doing!”

I’m not sure how it happened. At last the kids understood that while they were investigating science something bigger was happening. They began to give direct feedback to the developers. “These directions were confusing. I learned more doing it this way than that way. Why do we do this part after that?” They began to see themselves as part of the team and part of the development process.

During this time, I also had the opportunity to teach FOSS to my sixth graders. As a salesperson, I would usually teach one or two lessons from a module. And I would be teaching them to teachers. I talked so much about really teaching FOSS. Now it was my turn. The first module I taught was the revised Levers and Pulleys Module. As I looked at the boxes of stuff and that thick teacher guide, I had to remember my own words. I spread out the equipment, opened the teacher guide, and watched the teacher preparation video. Would it work?

My students found the investigations challenging. Sometimes they wanted to do things differently. So we did many of the investigations several times and compared the data we carefully collected. The students had small group and whole-class discussions. We all asked questions, and they used the equipment, technology, and print materials to find the answers. This frequently led to more questions. We used the new assessment tools throughout the module. Some of them were really challenging. I tried to help the kids see that we were looking for depth of understanding, rather than just the “right answers.” The assessments really did help me see what kids understood and what we needed to do next. For many the process was a struggle. For many it was the first time they found themselves leaders.

As a salesperson, I talked about how science can level the learning field. Students who don’t read well, have weak language skills, and are not the most successful in traditional classrooms can be stars in science. If we provide students with activities that challenge their thinking, regardless of gender or how well they have learned to read textbooks, they often can demonstrate that they can think and learn. I had said this so many times to teacher groups. I found out firsthand how well it worked in my classroom.

The first day the groups worked with two-pulley systems, they were challenged to set up a system where the advantage would be greater because of the second pulley. The first student to succeed with this challenge was a student in the resource program. Her standardized test scores indicate she has learning disabilities. I doubt that she or I will ever forget the look on her face when she realized what she had done. She demonstrated her system to the rest of the class.

Continued on page 10
project-ideas sheet in the teacher guide. It helped students formulate their culminating projects.

We used the guidelines and rubrics. We carried on class discussions, and I held individual conferences with the students. They had two weeks to complete their projects. Every student completed a project. The results were great. Some students used the ideas and suggestions provided in the program. Others were able to take their knowledge and develop their own ideas. We all learned from each other.

I’m back in the classroom again, working with the sixth, seventh and eighth graders. I work with my partner teacher and discuss which modules we will teach. We are working on the lesson plans to help all students experience those wonderful moments of discovery, just as my students and I did last year.

Notes from the Field...

**SOUTH DAKOTA**

“I intended to mention in my last message the tremendous successes we have had with our FOSS Eisenhower Summer Institutes and the FOSS program during the past six years. The reception by the students and teachers has been phenomenal. Students beg to have science with FOSS. A third-grade teacher gave her students a questionnaire and asked them which they preferred: science, mathematics, or recess! She made a bar graph of the responses, and a really tall bar represented science, a much shorter bar recess. The shortest bar was mathematics. In May during my follow-up visit to instituted schools I met an Eagle Butte Tribal School teacher who had participated in the summer institute one year ago. She told me she always had hated science and did not like to teach science, but since our FOSS Summer Institute and using FOSS, she now loves science and teaching science! In my 26 years at the university, I never found a program that was so universally accepted by teachers and students. It is wonderful for Native American students. Good job!”

Paul Otto
Professor Emeritus, Science Education
University of South Dakota

**TEXAS**

The *Dallas Morning News* included an article in its May 20, 2000, issue focusing on the use of FOSS in a Lisbon Elementary School sixth-grade class. The Dallas school district adopted FOSS ©2000 this past spring, becoming one of about a dozen Texas school districts to select a hands-on science program over textbooks. The Dallas school district had previously used FOSS as a supplement to textbooks.

Pam Murray teaches the sixth-grade class and has been using FOSS for the past four years. Her students were shown working with the humdingers from the FOSS Models and Designs Module. Their efforts in recreating her humdinger hidden in a paper bag ranged from frustration to the excitement of discovery. According to Dr. William Tate, the school district’s scholar in residence for math and science, “Frustration is wonderful. Science is all about trying to resolve a conflict.” A comment from a student was, “It’s fun. We get to figure out what to do, and we have no directions. We got to figure it out on our own.”

Training for teachers unfamiliar with FOSS took place this past summer. Lisbon teachers plan to educate parents about FOSS during open houses this year. They have considered that FOSS might be a “harder sell” for some teachers and parents but think students will learn more science with the hands-on approach. We’ll certainly hear more from Dallas and Lisbon Elementary School in future issues of the FOSS Newsletter.

**CALIFORNIA**

First-grade students at Hillcrest School in Oakland, California, participated in a science fair project involving the FOSS Air and Weather Module. The students took temperatures at different times of day in a number of locations around the school and looked for patterns. They made graphs of the temperature. Teacher Barbara Buswell figured out a way to superimpose two temperatures for one location so that both temps could be seen at once. This created a sort of a maximum-minimum thermometer for a selected time period. Watch for more details on this project in future FOSS newsletters.

**MINNESOTA**

“We have been having a wonderful time with our mealworm unit, but have run into a snag. As the pupa transform into beetles, we have had several dry up and die on their second day. This has only happened in the student vials, not in our large class set. Should we be transferring the beetles to larger containers, giving them more food or moisture, or ...? We are quite befuddled, and the teacher guide doesn’t give any specific direction (or at least I missed it). I would appreciate hearing back from someone quickly. Thank you!!!”

Jeanne Sumnicht
Countryside Elementary
Edina, Minnesota
The FOSS Response:

Hi Jeanne,

This isn’t a problem that we have seen before. Usually the problem is too much moisture in the vial so that the bran gets moldy. The adults don’t need much moisture—a bit of carrot or apple or potato is all they need, just like the mealworms.

Since you have identified a trend, I suggest that you have the students transfer the adult beetles from their vials to the class container as soon as they emerge from the pupa.

Let me know how that works.

Best of luck,
Linda De Lucchi

NOTE: Can you help? Has anyone else had this particular mealworm problem? If you did, have you solved it? We’d love to hear from you.

National Trials Teachers Check Out the Weather in California

An important step in the development of a FOSS Middle School course is national trials. Feedback from national trials teachers provides valuable input when the FOSS staff prepares a middle school course for commercial distribution. On July 24–25, 2000, the latest group of national trial teachers visited Lawrence Hall of Science in Berkeley for training in the new middle school course, Weather and Water. These photos give just a glimpse into what happened those two days in July.
On June 26, 2000, 27 educators from all over the United States (Arizona, California, Colorado, Delaware, Minnesota, New Mexico, North Carolina, New Hampshire, New Jersey, New York, Oklahoma) began their week-long FOSS Earth History adventure on the South Rim of the Grand Canyon. The workshop was a cooperative effort between FOSS and the National Park Service at Grand Canyon. The participants hiked Grand Canyon trails, engaged in FOSS Earth History classroom investigations, heard from Grand Canyon National Park staff, spent time in the computer lab, and toured the Colorado Plateau just outside of the park boundaries. These “postcards” give just a glimpse into the week’s activities.

June 26, 2000

Hi!
I arrived at the Albright Training Center apartments at Grand Canyon yesterday. Started the FOSS Earth History workshop this morning at the Albright Training Center. We met Jacob Fillon, the Grand Canyon Environmental Education Specialist, who helped Sue Jagoda from FOSS put the workshop together. The Park Superintendent, Robert Arnberger, also welcomed us. This afternoon we took our first hike along the South Rim. I got my first look at the Grand Canyon. All I have to say is, “Wow!” It’s better than the pictures.

More later.
T

June 27, 2000

Hi again!
This morning we took our first hike below the Rim. We trekked down the Hermit Trail to see the fossils in the Kaibab Formation. Then we went further down to look for the reptile and insect tracks in the Coconino Formation. We didn’t get our first view of the Canyon until we came around a bend after the Kaibab fossils. It’s different every time you see it. Tomorrow we tackle the South Kaibab Trail! This afternoon we’re in the classroom to explore more of the FOSS Earth History course.

Onward!
T

June 28, 2000

Greetings from Grand Canyon!
Enormous proportions and colorful scenery! I won’t forget that. Jim Heywood, one of the park rangers, emphasized those ideas when he led the hike down the South Kaibab Trail today. We left at 7 a.m. to avoid the hot afternoon hours and walked 15 miles down to Cedar Ridge. Some more incredible views as we passed through the Kaibab, Toroweap, and Coconino layers. My students won’t believe I did this! Tonight we’re all invited to an art opening and reception at Kolb Studio.

I’ll sleep well tonight.
T
June 29, 2000

Hey!
Day 4 is over. The bus tour outside of the park today was great! Dennis Reason from Amfac led the trip. We visited a petrified forest, saw some ripple marks in rock layers turned on edge, examined some dinosaur tracks, and encountered an amazing new canyon on the Colorado Plateau. It’s called Coal Mine Canyon. The rocks are younger than those at Grand Canyon. Terry Shaw, the other workshop presenter, challenged us to figure out why the coal looked burnt. The Navajo Tacos we had for lunch in Tuba City were delicious.

Later,
T

June 30, 2000

Hi!
Hard to believe this is the last day of the FOSS workshop. We spent the day in class working on plans for using FOSS Earth History when we get back to our students. Everyone shared their plans in the afternoon. They had so many good ideas. It was a great week, between exploring Grand Canyon, getting involved with FOSS, and interacting with the folks from all over the U.S. AND the fire restrictions have been lifted, so we get to have our farewell BBQ at Shoshone Point tonight!

See you soon!
T

BACK ROW:
Mark Thompson (CA), Jean McGaw (CA), Jim Duffy (MN), Keith Worman (NJ), Tarren Shaw (OK), Sharlene Kleine (OK), Terry Shaw (OK), Norma Binder (NM), Gary Zahn (MN), John Delmonico (CO), Randy Redard (DE)

MIDDLE ROW:
Sheila Dunston (NY), Kristin Moorhead (AZ), Michelle Camber (NY), Debbie Powell (OK), Lisa Simpson (OK), Dors Tso (AZ), Sandy Wolford (DE), Deloria Chapo (NM), Katie Ivanoff (NC), Tonia Fuller (NC), Elizabeth Cotter (NM [now MA])

FRONT ROW:
Sue Jagoda (CA), Nancy Jones (CA), Vicki Russell (OK), Barbara Novelli (CA), Kenneth Holyan (NM), Roger Peacock (AZ)

STRETCHED OUT IN FRONT:
Phil Browne (NH)
This issue of the FOSS Newsletter highlights selected books from the FOSS Life Science strand. For a more complete listing of books, check the Resource lists in the FOSS ©2000 teacher guides or the FOSS website at http://www.fossweb.com.

Food and Nutrition Module

Fats

Describes fats and their function in our diet. Includes a gram-calorie chart and experiments.

Fiber (Food Facts)

Identifies what dietary fiber is and discusses its importance and its sources. Includes recipes and related activities.

Sugar Was My Best Food: Diabetes and Me

At the age of nine Adair found out he has diabetes. This is his story of how diabetics changed his life and how he came to terms with his illness. He wrote the book to help other children facing the same challenge.
Loaves of Fun: A History of Bread with Activities and Recipes from Around the World

A collection of recipes for various kinds of breads, arranged in a time line that charts the history of this staple food from the earliest civilization to the present. Includes instructions for related activities.

Human Body Module

Bones: Our Skeletal System

A unique book with images that were taken with various kinds of scanners, which change X-ray photos into computer code to make clear, colorful graphics.

Dem Bones

Vibrant paper-collage illustrations introduce human anatomy in this exuberant rendition of an African American spiritual.

Muscles: Our Muscular System

Stunning photographs and clear text describe the nature and work of muscles. Describes the different kinds and the effects of exercise and other activities on them.

El Esqueleto Dentro de Ti

Explores the wonders and function of the human skeletal system with its more than 200 bones.

Environments Module

City Kids and City Critters: Activities for Urban Explorers from the Houston Arboretum & Nature Center

A look at identifying habitats in urban areas and how to observe and understand them. Provides activities on natural-resource conservation.

Frozen Girl

Describes 1990 discovery of a mummy of a 13-year-old girl who lived over 500 years ago in Peru. The mummy was discovered on the frozen peak of Mount Ampato in Peru.

The Big Book of Bones: An Introduction to Skeletons

An introduction to endoskeletons and exoskeletons. Full of fascinating facts and information about humans and animals and skeletons from the past.

The Skeleton and Muscular System

Explains the various parts of the human skeleton and different types of muscles and their functions.
**SOFTWARE**

*Human Body Module*

My Amazing Human Body
http://www.dk.com

Seymour Skinless takes students on a CD-ROM adventure, answering questions about the body and how it works. The four parts, Take Me Apart, Build Me a Body, Me and My Day, and What Am I Made Of, present information on all the body systems. Windows and Macintosh.

**The Magic School Bus Explores the Human Body**
http://www.microsoft.com/kids/msh/humanbody.htm

The CD-ROM version takes Ms. Frizzle and her students (and you) on a field trip into the human body. You’ll visit 12 body parts, review cool fact sheets, and discover experiments hidden on the bus. Windows and Macintosh.

**The Case of the Sore Team**
http://www.videodiscovery.com/vdyweb/scho ol/catalog/SSE.htm

Science Sleuths, elementary version, is a CD-ROM or laserdisc interactive investigation. Students use critical thinking skills to solve a mystery or a problem. In this episode, all members of the company egg-racing team have sore legs and the students (Science Sleuths) find the cause. Windows and Macintosh.

**Environments Module**

*Exploring Land Habitats*
http://www.steck-vaughn.com/

This interactive exploration focuses on a variety of environments, including deserts, forests, grasslands, towns and cities, and rivers and lakes. Windows and Macintosh.
Online Connections for FOSS Modules

The following are just a few of the websites that have been listed on FOSSWEB for the FOSS Life Science modules. Check out FOSSWEB for other recommendations from both FOSS staff and FOSS users. You can add your own personal favorites to FOSSWEB, too. FOSSWEB is located at www.fossweb.com.

Biosphere 2
http://www.bio2.edu/visitor/home_ent.htm
Take a virtual trip to Biosphere 2, a 204,000-cubic-meter (7,200,000-cubic-foot) sealed glass and spaceframe structure. It includes elements from the original Biosphere 1. Inside the structure you’ll find seven wilderness ecosystems, including a rainforest and a 3,400,000-liter (900,000-gallon) ocean, as well as a human habitat which now houses interactive exhibits. (Environments Module)

Food and Nutrition Module

Fats of Life
The Learning Seed, Lake Zurich, IL, 1997. Grades 5–Adult. Catalog # 211. Phone: 800-634-4941. E-mail: learnseed@aol.com
http://www.learningseed.com/
This program contains sound, video, and text to teach the basics of dietary fat and good nutrition. Students can select their own paths as they examine eating habits in terms of fat and calories. There are video and slide presentations, games, tests, and challenges. Windows or Macintosh.

VIDEOS

Food and Nutrition Module

Kitchen Fun for Kids
Center for Science in the Public Interest, Washington, DC, 1997. Grades 3–6. E-mail: circ@cspinet.org
This fun live-audience kids’ show features food facts, safety tips, and recipes for delicious low-fat, healthy food that kids can make themselves. Order from CSPI-Video Order, 1875 Connecticut Avenue NW #300, Washington, DC 20009.

Environmental Defense
Fund/Scorecard
http://www.scorecard.org/
Find out how your community rates on the pollution scorecard. All you need to know is your zip code and you will get a report of the major polluters that affect your area. (Environments Module)

Response Time Histogram
http://www.explorescience.com/activities/Activity_page.cfm?ActivityID=17
This Shockwave response time activity allows you to collect data about your response time and display it on a histogram. (Human Body Module)
**Calendar of Events**

**NSTA AREA CONVENTIONS FALL 2000**
- October 5–7  Boise, ID
- October 19–21 Milwaukee, WI
- November 16–18 Baltimore, MD
- December 7–9 Phoenix, AZ

**NSTA NATIONAL CONVENTION**
- March 22–25, 2001  St. Louis, MO

**INFORMATIONAL INSTITUTES (at NSTA Conventions)**
- Wednesday:  10/4; 10/18; 11/15; 12/6; 3/21/01
  - 8:30–4:30
    - FOSS K–6 Introductory Institute
    - FOSS Middle School Short Courses
    - FOSS K–8 Workshops
- Thursday:  10/5; 10/19; 11/16; 12/7; 3/22/01
  - 8:30–4:30
    - FOSS K–6 Introductory Institute
    - FOSS Middle School Short Courses
    - FOSS K–8 Workshops
- Friday:  10/6; 10/20; 11/17; 12/8; 3/23/01
  - 8:30–4:30
    - FOSS K–6 Introductory Institute
    - FOSS Middle School Short Courses
    - FOSS K–8 Workshops

**USDA Center for Nutrition Policy and Promotion**
- Get information about the latest government policies concerning nutrition and dietary guidelines. Includes an image of the Food Pyramid.  
  (Food and Nutrition Module)

**Nutrition Café**
[http://www.exhibits.pacsci.org/nutrition/](http://www.exhibits.pacsci.org/nutrition/)
- This site includes a set of online exhibits from the Pacific Science Center in Seattle, Washington, and the Washington State Dairy Council. Try your hand at Nutrition Sleuth, Grab a Grape, or Have a Bite. You can also link to other nutrition resources from this site.  
  (Food and Nutrition Module)
FOSS Institutes

Delta Education will host Informational Institutes this academic year in conjunction with the NSTA Area and National Conventions. On Wednesdays FOSS staff will present a K–6 Introductory Institute; on Thursdays staff will present two half-day Middle School Short Courses featuring Planetary Science and Human Brain and Senses. These Institutes are designed for all educators—lead teachers, administrators, curriculum coordinators, university methods instructors, science committee members, and school board members—who are interested in finding out what FOSS is, who developed it, what philosophy of education it supports, and to begin networking with other FOSS users. A lot of time at these Institutes is spent with the program materials, doing activities and engaging in inquiry.

During the summer Delta hosts Implementation/Leadership Institutes. These meetings are designed for educators who have adopted FOSS and are into their implementation process. Some time will be spent working with the FOSS materials, but a greater proportion of time will be spent delving into issues of management, teacher preparation, materials maintenance, and a host of other subjects.

Most Institutes are led by FOSS development staff. There is no charge, but participants must register in advance to attend. Times and locations are listed in the calendar. To secure your spot at the Institute of your choice, call, write, fax, or e-mail:

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80 Northwest Boulevard
Nashua, NH 03063
pfrisoni@delta-edu.com
Phone: 1.800.258.1302 ext. 503
Fax: 603.579.3504

Calling All FOSS Students (and Their Teachers)!

How would you like to share what you’ve learned during FOSS investigations with other students and teachers? We’re looking for authors to contribute articles for the FOSS Newsletter. Your contribution could be anything from a description of what happened during a FOSS investigation or project, results of an investigation, or interactions with other classes, teachers, parents, administrators, or your community. Did something funny happen in class that you’d like to share? Written text, drawings, and photographs will all be considered. The FOSS Newsletter is the place to share what you know and what you’ve found out about FOSS science. If your contribution is accepted, you’ll get extra copies of the newsletter to share with family and friends, plus an entry on your résumé!

Text is most easily used in electronic form, but you can also send text, drawings, and snapshots via snail-mail to the address below. Digital photos may also be used if they are high-resolution (250+ dpi is best).

Send your contributions to:
FOSS Newsletter Editor
Lawrence Hall of Science
University of California
Berkeley, CA 94720-5200
e-mail: skjagoda@uclink4.berkeley.edu
Phone: 510-642-8941

We’re looking forward to hearing from you.

Yes! I’m interested in attending a one-day FOSS Informational Institute being held in conjunction with the NSTA Convention.

(Location)

Yes! I’m interested in attending a FOSS Implementation/Leadership Institute being held during the summer.

Yes! I’d like to attend a FOSS Middle School Short Course.

Please send me registration information.

Name

School District

Title

Address

City State Zip Daytime Phone Fax

I did not receive this FOSS newsletter in the mail. Please add my name to the mailing list.
About This Newsletter . . .

The intent of the FOSS Newsletter is to help FOSS users develop a network of support across the country. Delta Education and LHS will work together to bring you news two times per year, including articles regarding the latest development of modules, tips about management from teachers and administrators, ways to make connections with other teachers and districts, extensions and reading materials to add to modules you are already using, and informative articles about good educational practices.

So, we need your help. If you have a tip that enhances the teaching of FOSS or would like to submit an article (with photos) about exciting activities or school programs, management, implementation projects, etc., please send them in. We would also like to hear from your students, whether they have questions about the content, projects they have done, photos or other images they have created, or insights into how they use the World Wide Web with FOSS. Send your contributions to:

FOSS Newsletter
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University of California
Berkeley, CA 94720-5200

The deadline for submissions to the next issue is January 12, 2001. We’re waiting to hear from you.

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