It's spring! For many FOSS students and teachers K through 8, it's time for life science and the excitement of having living, growing, crawling creatures in the classroom. It's also time to plan in advance for the care of the organisms so the learning experience is enjoyable, safe, and a successful one for all.

Where do I find isopods? What's a nightcrawler? Where can I buy darkling beetles? If you are asking questions like these, the first place to check is your FOSS Teacher Guide. In the Materials chapter you'll find the Planning for Live Organisms section. It describes how to obtain the particular organisms needed for the module. Later in the Investigations, the Getting Ready sections will further describe the preparation and care required for keeping animals healthy. As always, it's important to get each organism from the correct source for the safety of the creatures, the students, and our environment.

Another place to find information on living organisms is on www.FOSSweb.com. Go to Info for Teachers and Parents/Materials Management/Plant and Animal Care. There you will find an alphabetical index of organisms by name and module. Information is provided for each organism about its biology and care in the classroom. Make sure to read the Introduction to Life in the Classroom section, and especially the National Science Teachers Association Guidelines for Responsible Use of Animals in the Classroom. FOSS endorses the NSTA statement, which describes the role teachers have in guiding student learning through the use of live organisms. Humane care and handling of the organisms are emphasized as well as consideration for the appropriate future care and disposition of the animals at the conclusion of the study. The statement includes other important guidelines for elementary and middle school classrooms to follow.

In addition, the Sources for Organisms section on FOSSweb, under Materials Management, provides a listing of each

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For More Information
For information about purchasing FOSS or for the phone number of your regional representative, call Delta Education toll free at 800.258.1302, or log on to www.delta-education.com.

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Springtime FOSS Science continued

animal and where to obtain them. Delta Education sells coupons for most of the organisms through its website at www.delta-education.com or via phone, 800-258-1302. These coupons, or Living Materials Cards, require the teacher to call in or fax the coupon code 4–6 weeks prior to needing the organisms. Great care is given to safely packaging and delivering your order so creatures arrive in good health. Here are some tips to keep in mind when planning for living creatures in your classroom.

Alert the school office. If organisms will be arriving to school by mail, let the office personnel know to look out for packages with “Living Organisms” stamped on the outside. It is best to get them into their tank or container immediately instead of spending the weekend in the corner of the office!

Keep cool and moist. A good rule to remember is “keep ‘em cool and damp.” Find a place in your room that doesn’t get direct sunlight and isn’t by the heater. A constant damp moisture level is also helpful to keep organisms healthy. And remind your students, damp is better than wet or dry. Have a water mister available for daily misting if necessary. Mealworms and milkweed bugs are the exception to this, as they don’t live in moist environments.

Rinse without soap. If students are handling the organisms, make sure their hands are clean of food residue, lotions or soap. Before handling, students can rinse their hands, but remind them not to use soap. After handling organisms, students can wash their hands with soap or use a disinfectant wipe. Cups and other containers to hold organisms should also not be washed with soap.

Be gentle and respectful. All living things should be treated with respect and handled gently. It is always good to remind students that although mealworms, crayfish, pill bugs, and earthworms are small, active creatures, we are much bigger and can harm them if we aren’t careful. Emphasize being respectful observers by remembering not to poke, squeeze, or drop the animals. We can often learn more from these organisms by observing their behaviors with our eyes and ears rather than with rough hands or loud voices.

See the article on page 3 to read about how FOSS is working with the Oregon State Sea Grant Extension invasive species project to educate teachers on invasive organisms that can enter the classroom and ultimately create serious problems for the environment and native species if released into the wild.
In November 2009, FOSS and the Oregon State Sea Grant Extension invasive species project hosted a focus group of teachers at the Lawrence Hall of Science to discuss environmental issues related to invasive species. The Sea Grant project is conducting research in several states to review teachers’ perceptions about the growing issue of invasive species and the use of organisms in the classroom. An invasive species is a non-native organism that competes with native species for food resources and may also spread disease to native organisms. Teachers may not realize that a species they are using in the classroom may be invasive.

The teachers in attendance at the focus group were very enthusiastic about the value of students working with living organisms. Their students are excited about having live creatures in the classroom, which makes the students more motivated observers. While learning about plants and animals, students exercise responsible behavior in caring for living organisms. They have the opportunity to experience life cycles firsthand. By providing food and shelter, students learn to appreciate the factors necessary to maintain a viable habitat. One teacher brought up the importance of discussing with students the clear purposes for why live organisms are utilized in science investigations.

The issue that the focus group was most concerned with was making sure that classroom instructors understand that after completing their classroom work with live organisms, they need to maintain the organisms in their classroom, share them with other classes, or dispose of them properly. Currently some organisms used in FOSS investigations—for example land snails, crayfish, and Elodea (anacharis)—have important warnings about disposal. In the future, all K–6 modules will incorporate more specifics about reminding teachers not to release organisms, as well as suggesting other alternatives for disposal. The FOSS Plant and Animal Policy endorses the NSTA Guidelines for Responsible Use of Animals in the Classroom.

When receiving organisms from Delta, FOSS provides a booklet about care and disposal, with instructions for each organism. Page one of this booklet explicitly states “Caution: Do Not Release this living material into your local environment!” Additionally, teachers need to stress the importance of non-release to parents and students if organisms go home with the students. Following some simple guidelines with living organisms will enable you to enjoy observing and caring for fascinating creatures with your students!

If you would like more information about invasive species, visit the following websites.

http://seagrant.oregonstate.edu/themes/invasives/toolkit/index.html
You can review the FOSS Plant and Animal Policy at the website below.

http://lawrencehallofscience.org/foss/fossweb/teachers/materials/plantanimal/ethics.html
Creating a Science Room
By Kimi Housome and Don McKenney, FOSS Developers

Allendale Elementary School, Oakland, California
Walking into room 20, there is no question that science is happening here and not just sometimes, but ALL the time. Plants, fish, crayfish tanks, terrariums, and microscopes line the shelves and counters. Numerous FOSS kits peek out from under side tables. Plates with rocks, gravel, and hand lenses are organized on a cart. Eight round tables with chairs are labeled with a colorful organism card. Science books, notebooks, charts, student-created posters, and other interesting “stuff” are evident on walls and tabletops. A solar system rug is positioned in front of a whiteboard. On the board is a poster of rocks and minerals and pocket charts with science words. In the corner of the board is a piece of handmade/recycled paper. The three words written on it clearly describe the spirit of the room: I Love Science!

This is Laura Prival’s room at Allendale Elementary School in Oakland, California. Laura is the science teacher. Her role is to make science an integral part of every classroom. Science is going on in individual classrooms with teachers and their students, as well as in room 20 with Laura. She supports the teachers, guiding them through planning lessons and organizing materials. Laura is usually here teaching FOSS with 4–5 classes a day. Her room is very organized and inviting. With only 10–15 minutes between classes, materials are prepped in advance, and work/discussion areas are designed for kindergarteners one hour and for fifth graders the next. We asked Laura to describe the thinking behind her classroom set-up.

The Environment
It’s important that the room is a place that welcomes both students and teachers. In the corner of the board is a piece of handmade/recycled paper. The three words written on it clearly describe the spirit of the room: I Love Science!

Community Building
Having behavior norms for students is a key to creating a science room that functions well. The behavior norms apply to how individuals behave and how students relate to one another. How students relate to the science room and its contents is also important. Four posters on the front wall describe these norms.

1. Mutual respect (for people, plants, animals, and materials).
2. Attentive listening.
3. Appreciations (no put-downs).
4. Everyone participates. (Students should push themselves to engage, but also take responsibility for including and encouraging others to engage, by not laughing at what someone offers, for example.)

In her first four lessons with a class, Laura will focus on one of the four norms per lesson. Students learn that each norm also has a hand signal. The hand signal can be used at any time during a
science lesson to remind students of a norm, identify a norm for focus, or to appreciate students following a norm. Positive reinforcement is very important in establishing working norms.

Tables and Chairs
Round tables that seat groups of four students are ideal. Students can work together in any combination of partners or as a group. No one’s back is to the teacher. The circular orientation encourages a sense of community in the group. Posters on the four walls show the cardinal directions, north, south, east, and west. Students know their relative orientations at their tables, allowing all jobs and roles to be assigned by the teacher simply by calling out a direction. One of the main goals in establishing this sense of community, particularly in the upper grades, is to have students operate independently in sharing jobs and roles in the investigation when materials arrive at the table. For example, Laura encourages sharing by saying that she would like to hear students saying to each other, “Would you like to go first?” She has fun with the kids doing this, making a game of it on occasion, by suggesting they respond, “No, no, you go first!” or, “You go first this time, and then I’ll start with the materials next.”

Management is also made easier when each table group has a name. The names are related to the FOSS modules. In the past she has used the FOSS organism card sets found in the FOSS California Plants, and Animals, and Environments kits. At the beginning of the year, each table gets a set of organism cards for a different environment. Laura lets each group look over the organisms for that environment, note their attributes, and choose one for their table’s name. Depending on the FOSS module they start the year with, she may also let them choose an element, rock, or mineral for their table name. For younger students, an organism card is attached to a tented piece of paper and placed in the middle of the table. Students are directed from the rug to their table by saying, “Carlos, Tanya, Lauren, and Michael can go to the Pond Turtle table.”

Selecting the right chairs is important for many reasons, including comfort. Laura recommends a mid-weight chair design that will be stable when placed upside down on the tables at the end of the day and aren’t too heavy for students to lift into place.

Sink Counter
Counter space around the sink area is essential to handle the substantial amount of materials that need to be rinsed and dried. She suggests having a drying rack for small items like vials, cups, and utensils. Rubber gloves are a must for whoever is doing the washing so that hands don’t end up looking like dried fruit at the end of the day! Sponges and dishtowels help students assist with cleanup. Also good to have on hand are a hard bristle scrub brush with a handle and a bottlebrush. Laura suggests using labels stating “no soap” (except on human hands). Materials used with live organisms should be well rinsed, but never with soap.

Laura has thoughtfully considered every space and material in room 20 based on her work with the Allendale students and teachers. The following lists provide more details to think about when creating a science room. And, as Laura will state, it’s an ongoing evolution of organization, management, and community-building systems that make the room a rich and nurturing place for inquiry-based learning.

Shelves, Storage, Containers, and Space
- Set-up space for materials and for prepping materials
- Shelf space for student work-in-progress
- Lots of shelves and cabinets, even shelves under work spaces
- Boxes or tubs for class science notebooks for easy access
- Science center space for K–2 classes, with center instruction cards
- Areas for activity tubs that students can choose from for self-guided free-time exploration

Continued on page 6
Creating a Science Room continued

Materials and Equipment

- A good library organized by topic, relevant to FOSS content, and coded for reading level (colored sticky dots)
- Boxes of interesting materials organized for students to explore independently or in small groups (materials are relevant to a particular science topic and include books for further study)
- Rock and mineral collections
- Life-size skeleton and torso/organ system models
- Outdoor area adjacent to science room for gardening, composting, and worm bin
- Wall space for displaying student work, projects, science posters, and photos of students doing science or on field trips
- Space for hanging charts and sentence frames that support student science notebook writing
- Storage cabinets should include large multiple drawers for flat items like posters and charts, so they can be easily available as needed
- Document and LCD projectors are particularly useful for teaching students how to make illustrations, drawings, organizational tables, and graphs. They also allow for showing Internet activities, slide shows, and images that support classroom investigations.
- Multiple sets of specific materials that are needed when doing investigations with more than one class: terrariums, aquariums, and tubs for live organisms that are studied over extended periods
- Microscopes and microscope slides

Lincoln Elementary School, Oakland, California

Across town at Lincoln Elementary School is Connie Branson’s science room. Connie’s room is lined with large tanks and cages with chinchillas, rabbits, snakes, geckos, fish, and giant millipedes. There are students holding animals, working on science investigations, reading books, or writing in their science notebooks. Posters, charts, and word banks hang on the walls. Balances, cups, and gram pieces are ready for use on a side counter. Next to them, eight basins contain other materials for the FOSS lesson coming up. FOSS kits are positioned under counters for easy access. Eight sturdy tables are ready for the teams of students who will work together on an investigation. Yes, it’s science business as usual in Connie’s room, except for one big difference. The room is brand-spanking-new! After years of being in a portable, Connie has a permanent classroom that she helped design. We asked her to comment on her ideas for a perfect science room.

The Environment

Think like a kid! What would invite students into the room and make them want to engage in science exploration? Materials should be easy for students to access and appropriate for their interests and abilities. The science room should contain the science “stuff” for students to interact with. Connie stresses a student-friendly environment where students can work independently, as well as collaboratively as a team. Everyone respects each other, the materials, and living creatures in the room.

The Materials

Beyond the FOSS kits and materials in the room, Connie has collected her science materials over many, many years. Let the school families and community know what’s needed in the room, and donations will be made. Visit a local resource for recycled materials, and get cups, containers, paper, and more.

How the Science Room is Used

Connie uses an indirect approach to draw teachers into using the science room and to engage teachers in a hands-on inquiry approach to teaching science. At the beginning of the school year she opens up the science room to teachers and schedules a time for each teacher to visit with their class. Connie introduces the room, its resources, and demonstrates a FOSS lesson.

Connie works closely with new teachers, teachers new to a grade level, or teachers new to FOSS. She schedules them into the science room and co-presents
FOSS with teachers and their students for half of the school year. Thus, teachers can get their “feet wet” learning the pedagogy and management of inquiry science teaching in a supportive environment.

As teachers become comfortable teaching FOSS in their own classrooms, the science room can be requested by teachers when they want to use the space for a specific lesson and have Connie available to assist with the lesson. For example, stream-table activities in the FOSS Solid Earth Module are always done on tables located outside the science room with Connie available to assist.

Live organisms are a central focus of the science room. Each live organism can be adopted by students in grades K–2. Each K–2 class has a designated time to visit during the week at recess. Students in grades 3–5 can come individually by choice.

Connie also manages the school Student Council program, and when the K–2 classes visit the science room, student council members introduce them to the room and the various animals.

Students who choose to take care of an animal must fill out an Animal Care application, attend an interview session with Connie at an assigned time, and bring a recommendation from their teacher. Every student who applies is assigned to care for a particular animal once a day for the semester. Each animal has a care-sheet log. There is a formal procedure if a student wishes to borrow an animal for their class for the semester. The care-sheet log accompanies the animal to the class, and the student who checks it out will instruct his or her class in its care.

Connie’s vision for using the science room encourages students to engage in doing science, develop a scientific habit of mind, become experienced science resources in their classrooms, and become part of a school-wide science community. Her room is an important extension of the classroom, and through shared experiences with live organisms and science inquiry, students gain a sense of being part of a family.

More Suggestions from Connie on Organization and Logistics
- Organize all materials to be available for students to use.
- Use a cart on rollers with clear plastic boxes for holding materials required for lessons and investigations.
- Have a lot of open shelving.
- Include shallow drawers for holding flat posters and papers.
- Provide space for microscopes (and other technology) to be out and plugged in, ready for use.
- Use round tables for students seated in groups. Round tables help foster communication and encourage discussion. Students can be directed to discuss topics with “face partners” or “shoulder partners.”
- Use colored dots on the tables for assigning tasks (Getters, Recorders, Reporters).
- Include small cubbies or shelves under the tabletops so science notebooks are accessible but protected from water damage.
- Lots of counter space for student work, investigation centers, and live organisms. Make sure plants and organisms that require sunlight have counter space by windows.
- Allow space for students to interact with engaging materials in an environment that encourages inquiry. Connie encourages learning through students’ own explorations and discoveries.
- Use prepped table boxes with materials and basic tools (hand lenses, rulers, scissors, glue sticks) for specific investigations.
Good teaching and learning are fostered through reflection. In Tacoma Public Schools, when reflecting upon the effectiveness of our summer school program, the data showed us a lack of attendance and poor results. In recent years, the summer school program had focused on math due to low math achievement on the state test. The questions became, “How can children be motivated to use math in context? How can the neediest students be served without making them feel like they are missing out on summer fun? Could hands-on science provide the lens for effective math instruction?”

Tacoma School District is a large urban district about 20 miles south of Seattle in the Puget Sound Region of Washington state. There are about 30,000 K–12 students; district-wide there is a high poverty rate with almost 60% of students qualifying for free and reduced lunch. There are 37 elementary schools that serve 15,000 students with a slightly higher poverty rate at just over 60%.

The Summer of 2008

In the spring of 2008 work began on Science Camp. The students targeted were the incoming fourth graders who were low performing in math. That determination was made based on data from our district math assessment. The tests are given five times per year, and the students who were at a level one or two (at 50% or below) were invited to attend Science Camp. The FOSS Structures of Life Module was chosen to extend into the summer program. Approximately 450 students were targeted to participate, and teachers were hired and trained to teach the program.

A 12-day program was developed to run over a period of three weeks. Science Camp met Monday through Thursday from 8:30 a.m. to 12:30 p.m. The program was three hours, but an extra hour was built in for students to take advantage of breakfast and
lunch served daily. As a big shift from our previous offerings, Science Camp was offered in August rather than July. The program was meant to provide children with a jumpstart to the school year. Also, with the Title I funding, busing was provided.

Third-grade students experience the FOSS Structures of Life Module as part of the school-year curriculum—students sprout seeds and study crayfish and land snails. Although all of the Science Camp lessons were directly connected to the Structures of Life Module, there was very little repetition of the school-year experiences. For example, when doing Origin of Seeds during the summer, rather than using a variety of fruits, apples are used. Also a Root-Vue Farm® was purchased for every Science Camp classroom. Root-Vues give students the ability to study the entire structure of plants and track growth over time. Part of the reason Structures of Life worked so well with the Science Camp model was because of the optional bess beetle investigation. This became a focus of the summer activities.

In math, basic facts and graphing were the targeted skills and concepts. The students took a pre- and post-test in order to measure their academic growth. That data was placed on a report card along with their attendance. For lesson plans, teachers were given a very detailed daily structure (see example on page 10). They were also shown how to group and manage their students. These management tips particularly helped teachers who were less comfortable with hands-on learning. It was important to have teachers who felt confident with the science lessons, the materials, and critters, in order to best make connections to math.

As a culminating activity, students participated in a field trip to the Point Defiance Zoo & Aquarium. The Science Camp program connected to the zoo trip by focusing on animal adaptation as students made observations when they toured the zoo. After submitting an application, the zoo granted a scholarship for the cost of admission for all students, parents, and teachers. Because the zoo was such an enticing opportunity, the field trip was directly connected to student attendance. If students did not attend Science Camp, they could not go to the zoo.

At the end of the program, teachers, parents, and students gave us overwhelmingly positive feedback. In a letter to the Director of Title I, three Science Camp teachers wrote, “The program was exceptionally well organized and geared to engage students who otherwise would lose interest in coming to school.

Continued on page 10

Summer School: A brief overview of each day.

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Monday</th>
<th>Tuesday</th>
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<th>Thursday</th>
</tr>
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<tbody>
<tr>
<td>Create an Insect</td>
<td>Create an Insect</td>
<td>Open House or Zoo</td>
<td>Open House or Zoo</td>
<td></td>
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</table>
in August. We never would have believed we ourselves could have so much fun with bess beetles!”

When visiting some of the sites, teachers shared how impressed they were by student attendance. They also talked about parents being curious about what their children were experiencing. It was those conversations among parents, teachers, and students that demonstrate the richness of this program. It was impressive to witness the impact of self-motivated learning. When children wanted to know about the growth of the plants over time because they were curious, it no longer felt like an isolated math lesson to them. The math gave students the power to explain their observations and defend their predictions through the lens of science.

Students completed their work within the context of science notebooks. This gave students a strategy to track the data and review the investigative processes. As a district, the use of science notebooks by students is encouraged throughout the school year. It has proven to be an excellent way to capture evidence of student thinking and science content knowledge. During Science Camp, the notebooking model was very effective because of the focused time and subject matter. Students did not want to give up their notebooks at the end of their 12 days!

The Summer of 2009

In the summer of 2009, Tacoma School District was able to provide not only the fourth-grade Structures of Life Module, but also add a program for incoming fifth graders. This meant essentially doubling the teachers, students, sites, and other support.

The FOSS Variables Module was used as the basis for the summer program for the fifth graders. The Plane Sense investigation became the focus of the curriculum and led to the entire program being based around flight. Since Tacoma is in the Pacific Northwest, the community has strong connections to Boeing, the aerospace and aircraft company, and multiple

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<tr>
<th>Area of Focus</th>
<th>Explanation</th>
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<tr>
<td>Goal</td>
<td>Day 7 is about understanding the parts of an organism and their functions. Students think and discuss the structure of the bess beetle, then compare it to their own structure. Students also conduct continued observations of the sprouting seeds and Root-Vue Farms. In addition, students will hear a story about the bess beetle and finish the story in their notebooks.</td>
</tr>
<tr>
<td>Science/Math</td>
<td>○ Ask students to observe any changes to the seeds in their mini-sprouters. (Don’t forget to rinse them.) ○ Have a pre-selected group do the Root-Vue observation. Make sure everyone is tracking the class observation chart in their notebooks. ○ After all the Getters bring the beetles back to the groups, look closely at the structures of the beetles. • First students add to their observation chart about the beetles. • Make a T-chart showing the structure and its function(s). • Talk about structures people have. • Have students make a Venn Diagram in their notebooks comparing a person (could be themselves) to a bess beetle. Students should be developing an understanding of the function of our parts (e.g., how we are similar as organisms). • Vocabulary. ■ Function—how a structure works or how it is used by an animal. ○ Make a graph (class and in notebooks) with the number of parts of a beetle (review from yesterday). • Compare the number of legs vs. antennae vs. body parts (head, thorax, and abdomen) as a bar graph. • Focus on the scale, title, labeling, and placement of data. ○ Learn a new math strategy for math facts. ○ Practice math with flashcards.</td>
</tr>
<tr>
<td>Reading</td>
<td>Read aloud The Life of a Bess Beetle. ○ Have students finish the story in their notebooks. ○ Choose a few to share out loud. Read FOSS Science Stories: The Food Web. ○ Use strategies—read aloud, chorus read, read in partners, or they read a paragraph then you read aloud and discuss. ○ Discuss the interdependence themes from the story: where do plants and the bess beetles fit into this concept?</td>
</tr>
</tbody>
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Wednesday, August 13th, 2008—Week 2, Day 7

WORKING WITH BESS BEETLES: EXAMPLE OF A DAILY PLAN.
military bases. The richness of the local area was used to help make the experience relevant for Tacoma students. As the culminating activity, Air Force pilots dressed in uniform visited each site and conducted an interactive presentation. The pilots were very impressed by the students’ knowledge and how well the students articulated the basic principles of flight.

For the additional fifth-grade offering, we used the general framework of the 12-day program. We increased the rigor of the math to reflect the needs of this year’s students and to address the teacher feedback from 2008. In addition, the new state math and science standards were incorporated into the program design. After much collaborative effort, the additional Science Camp program was developed.

Again, there was very positive feedback. A fifth-grade teacher who visited a Summer Camp classroom sent an e-mail, “I was so impressed with the knowledge base the students had from the curriculum this summer. Students had a more solid understanding of manipulated and controlled variables—a hard concept to grasp!”

With the addition of students entering fifth grade, expectations increased for notebooking and mathematical concepts. Calculators were occasionally used, and students really enjoyed the various experiences with flight. As part of the unit, parachute activities were pulled from our first-grade FOSS Air and Weather Module. Because it was used as a simple hands-on representation of a difficult concept, it was naturally engaging. By being intentional with the concepts and skills, students began to make mathematical connections on their own. Students used data and referred to the graphs and tables in their notebooks to demonstrate the validity of predictions.

It became clear that gathering multiple pieces of data at the close of Science Camp 2009 would provide an evaluative tool for the program. One of the most telling pieces of information was the student attendance. By doubling the number of students in attendance, we were able to increase our impact on student achievement. The hands-on science brought the students in and kept them coming.

The most rewarding bit of feedback has been around mathematical achievement. However powerful, anecdotal feedback from teachers about their observations is not sufficient data needed to continue this type of program. As a district currently in Step 2 of Annual Yearly Progress (AYP), every expenditure needs to be clearly evaluated and justified. For this program to be effective, there needed to be clear growth in mathematics achievement. Would Science Camp students really have a jumpstart to their year? Would we move any students from a level one or two?

**The Cost Breakdown**

In education, whenever an innovative idea or program is discussed, cost is always a factor. Funding for Science Camp came from Title I and Learning Assistance Program (LAP) budgets. However, additional materials were borrowed from the science kits, which are kept in the Science Materials Resource Center through the summer. As a Curriculum and Instruction department working with the Title I department, all the training and logistics...
were covered. Through collaborative efforts and creativity, teachers were provided with almost every material needed.

For the teachers of Science Camp, the training was one day. Half of that day was spent on the logistics of summer school, busing, serving breakfast and lunch, and medical issues. The curriculum training was the other half of the day. Teachers were given an overview of each day and had opportunities to handle materials, be it harnessing bess beetles or building planes.

Teachers enjoyed the trainings and were pleased with the continued support as the program developed. A letter written by three Science Camp teachers to the Director of Title I reads, “We were amazed that every small supply we needed to teach this summer unit was included in our kit. We all leave this experience in science camp feeling that each of our students had a positive summer experience in addition to gaining academic skills.”

In addition to the training day, teachers were paid an extra hour daily, which allowed them time to serve breakfast and lunch to all the students. There were also three administrators who rotated through the numerous sites supporting the program.

**Some Things to Consider for the Future**

When planning for a program of this scale, it is important to seek out donations of materials from different sources. Make connections to local resources like the Point Defiance Zoo & Aquarium and let the staff know what they can provide. Unfortunately, our attempts to secure donations of green beans and apples were unsuccessful because of the large quantities needed. Many places would have donated small amounts. If donations need to be a large part of a program, begin the process early and ask often.

Most of the time spent in developing this program went into connecting and extending our science kits. It was important to consider how it would affect the students if they had already experienced the Structures of Life or Variables kit in their classroom or would do so the next year. Many hours were also spent with our state standards and making logical connections to the mathematical skills that were being targeted. Because low-performing students were targeted using specific math assessment data, the skills and mathematical concepts were easier to narrow and target. Once that was decided, the program was built. Math was at the forefront of the planning, and it showed in the results.

For the summers of 2008 and 2009, an effective Science Camp program was provided to the students in Tacoma. The impact on teachers who have delivered the program is powerful as well. They want more opportunities to provide this type of learning experience for children. As teachers, Science Camp has impacted their thinking as they plan lessons and deliver instruction during the school year. “It brings the passion back into their teaching,” as one principal commented. As the planning begins for the summer of 2010, teacher feedback and student data will help guide the review and further development of the Science Camp model.

It is through the communication and effectiveness of the team working on this project that it has been successful. Struggling students are having rich, hands-on math and science experiences they may not otherwise have. The most powerful outcome has been the reward of an intrinsically motivated child.

In Tacoma School District, Science Camp has only begun the process of channeling what is already present in every child. When you place something in their hands, be it a bug, dirt, seeds, planes, or parachutes, they will ask questions, make predictions, measure it, track it over time, compare it, and draw conclusions. Now, hundreds of low-achieving math students begin the journey to becoming scientists and mathematicians.

The Tacoma Public Schools team who helped the development of the Science Camp program:

- Dan Herforth, Elementary Math Facilitator
- Teresa Christianson, Title I Facilitator
- Lisa Reaugh, Title I Facilitator
- Michelle Morrison, Math & Science Instructional Coach
- Mary Kokich Boer, Fifth-Grade Teacher
- Marty Higgins, Science Materials Technician

Graphs in this article were developed by Lisa Reaugh, Title I Facilitator.
NASA’s Kepler space telescope, designed to find Earth-sized planets in the habitable zone of Sun-like stars, was launched March 6, 2009, just as the new investigations for the revised FOSS Planetary Science Course were being tested at schools around the country. As of January 2010, Kepler has discovered its first five new exoplanets (planets beyond our solar system). They have been named Kepler 4b, 5b, 6b, 7b, and 8b. The discoveries are based on approximately six weeks’ worth of data collected since science operations began on May 12, 2009.

Kepler has a large photometer (light sensor) that is so highly sensitive, it can detect a drop in star brightness less than 0.01%. That is how much a Sun-sized star would dim if an Earth-sized planet passed in front of it. One of the new investigations in the Planetary Science Course explores this fascinating technique for finding exoplanets. Alan Gould, one of the developers of the new FOSS Planetary Science activities, is a Co-Investigator with the Kepler mission and was present when the first Kepler exoplanet discoveries were announced on January 4 by the Kepler science team at the American Astronomical Society meeting in Washington, D.C.

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The Kepler instrument is working extremely well, and indications are that Kepler will meet all its science goals. The first five discovered planets are mostly “hot Jupiters”—planets with high masses and extreme temperatures. They range from Neptune-sized to larger than Jupiter. They orbit their stars very fast, with periods ranging from 3.3 to 4.9 days. Estimated temperatures are from 1,204 to 1,649 °C (2,200 to 3,000 °F), hotter than molten lava, and much too hot for life as we know it. One of the most surprising things about the larger planets is that they have masses and sizes that indicate they have very low density. The least dense planet has a density comparable to Styrofoam!

A preview workshop will be offered at the NSTA National Conference. See page 19 for details.

FOSS Middle School Science Notebook Folio

The middle school Science Notebook Folio is here! The FOSS Middle School team spent months reviewing the research about how to best support student learning through notebook use. Working closely with the elementary notebook team, they developed a guide that supports FOSS users in understanding how best to implement notebooks with the FOSS program. Download the folio for free at www.FOSSweb.com. Go to the middle school index page and click on a course. Click on For Teachers and Parents: Teacher Resources, and then on the Science Notebook icon. The notebook will be the focus of two workshops at the NSTA National Conference in Philadelphia. See the calendar on page 19 for details.

In the News:
NASA’s Kepler Space Telescope Mission

The life zone, or habitable zone, of a star is the region around a star where there may be planets that could have liquid water and support life. The distance of that zone from the star depends on how big and hot the star is.

You can find more details about these planets on the Kepler website http://kepler.nasa.gov. Look under Mission, then go to Discoveries. You’ll also find a lot of educational material in the education section, as well as insights into the Kepler team in the Mission, then Team section.

Continued Kepler observations should lead to discoveries of smaller planets with longer period orbits, coming closer and closer to the discovery of the first Earth analog. Kepler mission continuously and simultaneously observes more than 150,000 stars and already has measured hundreds of possible planet signatures that are being analyzed. Kepler will continue science operations until at least November 2012 when it should have enough data to find planets as small as Earth, including those that orbit stars in a warm habitable zone where liquid water could exist on the surface of the planet. Kepler Principal Investigator, Bill Borucki said, “The Kepler observations will tell us whether there are many stars with planets that could harbor life or whether we might be alone in our galaxy.”
Erin L. Flynn
John D. Philbrick Elementary School, Boston, Massachusetts

By Erica Beck Spencer, FOSS Developer/OBIS Codirector

Erin L. Flynn has been awarded the prestigious Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST)—the highest possible honor in K–12 science teaching—for her work as an expert educator in Boston. She works as a K–5 science specialist at the John D. Philbrick Elementary School, part of the Boston Public Schools (BPS).

Pam Pelletier, a past award winner and Senior Program Director for Science in the Boston Public Schools “knows what it means to receive the PAEMST, both personally and professionally. Candidates must convince the committee that they know their content and how to teach it. They must explain how they go about making tough decisions, how they utilize assessment of students throughout the teaching process, how they reflect on their practice, how they keep current through professional development, how they determine what they need, how they support colleagues, and how they support kids beyond the classroom.” She continues, “Erin values teaching and learning to her core. She earned this honor and deserves this award.”

What makes a teacher worthy of such an award? In Erin’s words, “I don’t think there are any secrets to good teaching; it is a lot of hard work.” Although many might disagree with the concept that there aren’t any secrets to excellent teaching, nobody can disagree with the fact that Erin has put a lot of hard work into her career over the years. She inspires children and gets them really excited about science. She says, “The FOSS lessons are so much fun. The kids are excited about coming to science class. The kids are always excited to see me.” She adds, “I love how the simplest things will surprise them and make them wonder.”

In addition to inspiring hundreds of students daily, she has taught dozens of workshops to educators throughout the district. Her workshop repertoire includes day-long workshops about how to teach the FOSS modules—Insects, New Plants, and Pebbles, Sand and Silt—and many workshops linking science and literacy, which she has taught to teachers at her school and throughout the district. Her influence across the district also includes the creation of curriculum materials for a mini-unit, titled Rocks and Minerals, designed to fill a gap in the BPS science curriculum and support the required state standards.

About her FOSS workshops she says, “Sometimes you have teachers who really don’t want to be there and are not excited to teach science. Regardless of how they felt when they came in, many of these teachers leave saying ‘my kids are going to love this.’ I think about the kids and think, ‘they’ll get more science.’ The teachers I work with leave feeling confident about implementing [FOSS] into their classrooms.”

Beverly Nadeau, the elementary science specialist for BPS says, “Erin has become a master science teacher in the Boston Public Schools. She is a dynamic teacher and her thirst for knowledge spills out into her elementary classroom as well as her peer workshops.”

Erin speaks fondly of Stephen Zrike, the first principal she worked with at the Philbrick. Together they were awarded a $7,500 grant from the Dewing Foundation for a project connecting science and literacy. Stephen says, “Even though science was not her background, she immersed herself in the content, participated in extensive professional development, and took advantage of our partnership with the nature center. She deserves a great deal of credit for deepening her content knowledge. She creates a learning environment where students excel at all grades! Erin is an outstanding teacher!”

After graduating from Colgate University, she worked for Teach for America (TFA). Following five weeks of training during the summer, she was placed in a low-income school in Atlanta, Georgia. As a first-grade teacher at this huge elementary school consisting of 99% low-income students, she had to deal with an administrator who started the year by saying, “You won't make it until December.” Clearly this administrator underestimated Erin’s commitment and perseverance. Despite a rocky start, Erin had a great TFA experience and in the end left Atlanta committed to urban education.

When asked if FOSS has impacted her teaching she says, “FOSS has great guiding questions. The lessons are hands-on and inquiry-based. Even if you just follow the Teacher Guide instructions, you’re guaranteed to have a great lesson. I have extensions I do and things I do to tweak the lessons, but it is amazing to start with the base of FOSS. I get to spend my time fine-tuning it, rather than starting from scratch. Having all the materials makes teaching science manageable—especially teaching six grade levels.”

As for her future plans, “I plan to stay where I am. I love it at the Philbrick. I love being a teacher.” She added, “I am really lucky to work with a team of really talented and dedicated teachers. It is rare to find a team that works so well together. Our families are so supportive too—which is also rare in many urban public schools. Most families show up for Science Showcase. It makes me feel so supported when they come to see what their kids are studying. I always feel appreciated at the Philbrick.”

The entire FOSS staff congratulates Erin on this phenomenal honor. In January, she traveled to Washington, D.C. and received her award.
Teacher Preparation Video Transcripts
The transcripts for all of our Teacher Preparation Videos are now available on FOSSweb and FOSSweb California. The transcripts provide text of all the audio from each video. They are downloadable as PDF files. You can access the transcripts from the Teacher Preparation Video page for each module or by going to the list of all Teacher Preparation Videos in the For Schools and Districts section of FOSSweb.

FOSS Social Media Networks
FOSS is pleased to announce that we are now on Facebook and Twitter! The FOSS social media networks are an easy way for FOSS users to get the latest news from FOSS, including teaching tips, FOSSweb updates, professional development opportunities, articles about good educational practices, and science news articles relevant to FOSS modules. Stay connected and join in conversations with FOSS developers and FOSS teachers from across the country!

If you are a Facebook user, you can become a fan of FOSS at http://www.facebook.com/FOSSscience.

Twitter users can follow FOSS updates at http://www.twitter.com/FOSSscience.

Planet FOSS Updates
In the spring of 2010, new features will be coming to Planet FOSS, a website devoted to sharing students’ digital photographs. First released in the fall of 2008, Planet FOSS has continued to expand as students around the world (as far as Lagos, Nigeria) have contributed digital photographs of science concepts observed in local environments. The new Planet FOSS updates will improve usability for teachers and students using Planet FOSS inside and outside the science classroom.

Since the launch of Planet FOSS, a number of remarkable photographs have been uploaded to the site! Planet FOSS was designed to focus students’ observations of science in the world outside the classroom. The newest feature to be added to Planet FOSS will allow users to view exemplary photographs that demonstrate the concepts in the Planet FOSS photo challenges. Exemplary photographs will be selected by Planet FOSS staff.

Students and teachers can now provide feedback on the photographs posted on Planet FOSS. A new commenting system will allow users to select from a pre-defined pool of comments designed to encourage students and facilitate conversations about the photographs.

Planet FOSS was designed to allow students to upload geographic information with photos. The newest version of Planet FOSS will allow students to enter more precise location information about where their photographs were taken. Students can then view a photo’s location on a Google Maps satellite image, as well as in the photo’s description.

For users who would like to browse through the photographs for all of the courses, a new universal view page has been created. This page will be accessed in the top bar navigation on each page.

To view the new features and contribute your own photographs of science in the real world, come visit Planet FOSS! http://www.fossweb.com/planetfoss
Children are bombarded with information about problematic issues relating to global climate change from many well-intentioned sources. They hear about it on television, from parents and teachers, in magazines written for children, in advertisements, and many other places as well. Earth is in crisis, and people who care want to do something about it. What is the job of an elementary educator with regards to teaching about global climate change?

Decidedly, kindergarteners through fourth graders are not developmentally ready for the abstract conceptual thinking required to understand global climate science. The research is conclusive: it is detrimental to a child’s long-term perspective to teach abstract problems at too young of an age. Thus, many books on the subject, while written for younger children, are not developmentally appropriate. It is also debatable whether fifth and sixth graders are ready for this burden-laden topic. However, if your fifth- and sixth-grade students are asking for more information about climate issues, consider using the books we’ve reviewed in this article. The authors focus on tangible information that fifth and sixth graders can understand. Once you embark upon the subject, carefully monitor the level of despair that your class is experiencing and make sure you focus on solutions to problems rather than on the dying polar bears. Whenever possible, in addition to reading about the issue, try to do something about the problem so that students are empowered rather than discouraged and disheartened.

If you decide that your fifth and sixth graders are ready, here are a few books we have reviewed that will help you tackle this difficult subject.

**How We Know What We Know About Our Changing Climate: Scientists and Kids Explore Global Warming**


If you had to purchase one book on global warming for your classroom, this is the one we recommend. You can trust this award winner to educate and inspire your students. As the title implies, kids are actually featured engaged in issues and inquiry about global warming. The book succinctly presents how diverse scientific research topics contribute to evidence pointing toward climate change.

Students will also read about individual researchers studying amphibian populations, tree rings, penguin and krill, ice caps and glaciers, sea levels, CO₂, and mud and ice cores, as well as scientists who compile data from diverse sources to model climate change.

Have your students heard about citizen scientists? The book features research scientists who actually work with citizens to acquire data to cover broader territory and gain a greater understanding about climate change. These active citizen scientists are documenting “phenology,” how nature changes with the seasons. Citizens collect data like bird migration, flower blooming, and butterfly appearances. They provide data to clearinghouse organizations such as the Thousand Eyes Project and BirdWatch.

The book, and the wonderful collection of classroom learning resources at its conclusion, will give students a strong understanding of the basics of climate change.
The Down-to-Earth Guide to Global Warming

X-Games pictures, quotes by Jennifer Garner and Leonardo DiCaprio, details about how Coldplay produced a carbon neutral album, chapter titles such as “CO2: The Big Kahuna,” and ridiculous jokes are some of the ways this book entertains and educates fifth– to eighth–grade readers on the science of global warming. Winner of the Green Earth Book Award, it is factually accurate, visually appealing, and most importantly, inspires action with realistic things students can do to make a difference. It is written in a way that fifth and sixth graders are totally going to get into.

Global Warming (Protect Our Planet)

Do you have struggling readers in your class? This book, with its simplified text, could be the missing piece for some of your fifth and sixth graders, allowing all of your students to read independently. Royston wisely dedicates about half of the book to solutions that students can feel good about or take part in.

This Is My Planet: The Kids’ Guide to Global Warming

Need a variety of sources on global climate change? Jan Thornhill has produced a book to help students understand the global warming conflict in a non-alarmist manner. This intelligent and developmentally appropriate book succeeds at not scaring students but instead generates hope. Filled with interesting images and clear headings with easy-to-understand information students will walk away better informed and ready to make small changes.

How the Earth Was Made
A History Channel Series
By Sue Jagoda, FOSS Developer

Beginning in the fall of 2008, the History Channel began broadcasting a series entitled How the Earth Was Made. I got hooked on the show and tried to make it my Tuesday night television destination. Each episode focuses on a question about Earth’s history and looks for evidence to answer the question at various intriguing geologic sites around the world. The findings of well-known scientists help provide the latest answers to the questions. The producers of the show have done a good job of showing the process of science, from asking questions to searching for and using evidence to answer questions, as well as critiquing new ideas and stimulating new questions.

For example, one episode focuses on the Great Lakes, the largest expanses of fresh water on the planet. Geologists continue to search for clues to explain how they were formed, and the episode suggests that the Lakes’ evolution is far from over. The Alps were the subject of another episode. The Alps span seven countries and are Europe’s most important natural landmark. The question is posed, “How did marine fossils get into the rocks that form the Alps seven thousand feet above sea level?”

The photography, special effects, and animations are amazing and provide important visual images to help you understand many of the concepts in geology that are hard to interpret through just the written word.

A website is also available that includes a photo gallery and clips from several episodes, http://www.history.com/content/how-the-earth-was-made.

The complete Season 1 DVD set is now available for purchase via the History Channel website and other online stores. The second season is in progress and includes topics like Grand Canyon, Yosemite, the Ring of Fire, and the Sahara. You might want to particularly encourage your students studying the FOSS Landforms Module and Earth History Course to watch the new episodes as they become available. You can find the schedule online at www.history.com.

If you would like to contact Erica or Karen by e-mail, here are their addresses:
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erica@indigoinventions.com
Karen Mendelow Nelson
karenmn@berkeley.edu
Notes from the Field...

Here's a tip for keeping Mock Rocks breakable, even in very arid conditions. Our thanks to Wendy Swandal from Chief Joseph Elementary School in Great Falls, Montana, for the question and her efforts to remedy a dry situation.

On January 14, 2010, Wendy sent this e-mail to foss@berkeley.edu.

I am currently teaching Investigation 1, Mock Rocks, in Earth Materials. I made the rocks seven days prior to the lesson and the rocks were as hard as bricks. The third graders could barely break them in half. Then they struggled breaking apart the gray material. What did I do wrong? Thanks for your help.

Hi,

Is the air fairly dry there in Montana right now? If it’s anything like where I am in Ohio, we are really arid right now. So I don’t think it’s anything you did wrong. I think the dry air was probably the culprit. Next time, when the rocks reach the desirable dryness, you might want to pack them into a zip bag so they don’t lose any more moisture and turn into real rocks.

If you want to use this batch of rocks with your students, put them in a zip bag, spray lightly with some water, close the bag up overnight, and see if they’re more breakable the next day. (Let me know if that works; if so we’ll make sure to add a note in the Teacher Notes on FOSSweb.)

Thanks for your question.
Sue Jagoda
FOSS Developer (in Avon Lake, Ohio)

Good Morning! Yes, putting the rocks in a Ziploc baggie with water worked well. I did get too much water on a couple of pieces causing them to get soggy. I appreciate your help. Have a super Friday!

Wendy Swandal

Kit Management Program
Available from Delta Education

FOSS users can take advantage of a kit scheduling and replenishment service called the Delta Science Resource ServiceSM. Delta Education will pick up your used kits and deliver replenished kits to your school based on a predetermined teaching and rotation schedule. The “teacher-ready” kits will arrive with many materials already prepped, many teacher-provided items included, and living material shipments automatically scheduled. Teachers receive email alerts to notify them of scheduled kit pick-up and delivery dates. To learn more, contact your Delta Education professional or visit www.deltaeducation.com/dsrs where you can view an introduction video that provides an overview of the service.

The Delta Science Resource Service will be featured at a kit refurbishment/material management workshop at the NSTA National Conference. Join us to learn how DSRS can benefit your science program. See page 19 for details and for a complete list of NSTA workshops.

FOSS Chemical Interactions Course Workshop
July 19-23, 2010
Lawrence Berkeley National Laboratory
and Lawrence Hall of Science UC Berkeley

The FOSS staff at the Lawrence Hall of Science, along with the Center for Science and Engineering Education at Lawrence Berkeley National Laboratory and Delta Education, are planning a weeklong workshop for users of the FOSS Chemical Interactions Course for middle school. The workshop will include:

- In-depth experience with all of the investigations in the FOSS Chemical Interactions Course for grades 7–8.
- Tour of the Lawrence Berkeley National Laboratory research facilities, including The Advanced Light Source, the Molecular Foundry, and the Berkeley Center for Structural Biology.
- Presentations by leading researchers and master teachers in chemical sciences at the lab.

The workshop will be lead by FOSS curriculum developers and is designed for curriculum coordinators, FOSS consultants involved in professional development of middle school teachers, and grades 7–8 teachers planning to use the Chemical Interactions Course in their classrooms. We will discuss the FOSS teaching strategies, learning needs of middle level students and teachers, and the use of science notebooks and assessment as they relate to this FOSS Chemical Interactions Course. Each participant will receive a set of the teacher and student print materials. For workshop details and to register, go to www.FOSSweb.com and click on the FOSS Professional Development Calendar.

For additional information, contact
Jessica Penchos
FOSS Project
Lawrence Hall of Science
UC Berkeley
Berkeley, CA 94720
e-mail: jessica_penchos@berkeley.edu
or call the FOSS office at 510.642.8941
**FOSS Institute**

Delta Education will host two one-day Institutes before each of the three Regional Conferences in Kansas City, Missouri (10/27); Baltimore, Maryland (11/10); and Nashville, Tennessee (12/2). These Institutes will be for educators from districts that have implemented FOSS for at least a year. The focus of one Institute will be Taking FOSS Outdoors. The second Institute will focus on Using Science Notebooks. These Institutes are designed for FOSS experienced educators—lead teachers, administrators, curriculum coordinators, professional developers, and university methods instructors.

The Institutes are free, but you must register in advance to attend. To secure your spot at the Institutes, please write, fax, or e-mail:

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**FOSS CA Newsletter E-blasts**

Are you a teacher using the California edition of FOSS? Sign up to receive the FOSS CA newsletter e-blasts today! The FOSS CA newsletter e-blasts will be delivered biannually to your e-mail inbox and feature content specific to the FOSS California edition. To sign up for the newsletter, visit www.FOSSweb.com/CA and click on the e-blasts button.

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**FoSS Newsletter**

Would you like to receive the FOSS Newsletter electronically? Simply sign-up at www.deltaeducation.com/science/foss/newsletter.aspx or send your request to tara.isaacs@schoolspecialty.com. Include your name, title, school, and e-mail address. You can also view both the recent and previous issues of the FOSS Newsletter, as well as archived articles, at www.lhsfoss.org/newsletters.

If you’d like to be added to the mailing list to receive this newsletter by mail, please send your name and address to:

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**NSTA NATIONAL CONFERENCE**

Philadelphia, PA  
March 18–21, 2010

**THURSDAY, March 18**

8:30–10:30  Using Science Notebooks with FOSS Middle School  
12:30–3:00  FOSS Chemical Interactions for Middle School Students  
4:00–5:00  Beyond the Classroom Walls with FOSS

**FRIDAY, March 19**

8:30–11:00  Using Student Science Notebooks to Assess Student Learning in Middle School (for experienced users)  
12:00–2:00  Taking Science Outdoors with FOSS K–8  
3:00–4:30  A Sneak Preview of the FOSS 2010 Planetary Science Middle School Course  
3:00–4:30  FOSS and DSM Kit Refurbishment/Materials Management

**SATURDAY, March 20**

8:00–10:30  Introducing Science Notebooks with FOSS K–6  
11:00–1:00  FOSS Assessment—Valuing Academic Progress in Grades 3–6  
1:30–4:00  Making Sense of Science Notebooks with FOSS 3–6 (for experienced users)

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**NSTA REGIONAL FALL CONFERENCES**

Kansas City, MO  
October 28–30, 2010  
Baltimore, MD  
November 11–13  
Nashville, TN  
December 2–4

For more information about these workshops and other professional development opportunities, visit the FOSS Professional Development calendar at http://www.FOSSweb.com/news/calendar.php.
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 Internet with FOSS. Send your contributions to:

Sue Jagoda, Editor (skjagoda@berkeley.edu)
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The deadline for submissions to the next issue is June 14, 2010. We’re waiting to hear from you.

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See you at the NSTA National Conference in Philadelphia this March!

Look for the middle school Science Notebook Folio at www.FOSSweb.com!

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