Announcing Planet FOSS

Science happens in the real world! Can you picture it? In the fall of 2008, FOSSweb will have a new middle-school activity that asks students to look at the world through a new lens. Planet FOSS is a photo-sharing site where students are challenged to represent examples of scientific concepts in their local environment through digital photography. The site poses photo challenges specific to FOSS Middle School Courses. Once they obtain parental consent, students capture and upload photographs to the Planet FOSS website. These student photographs are viewable on the Planet FOSS website as a resource for other students throughout the country.

Research has shown that digital photography has enormous possibilities in the teaching and learning of science. With the decreasing cost of digital cameras, students have more opportunities to represent the world as they see it through digital images. This has made it possible for web-based resources like Flickr™ and Picasa™ to create a new culture of photo-sharing. But these sites require students to sift through an overabundance of information—a frequent problem in this age of user-generated content and Web 2.0. Teachers who use these sites run the risk of violating students’ privacy. And there are advertisements, which pose unwanted distractions. In fact, many schools have firewalls to prevent students from accessing such sites.

Planet FOSS is streamlined and focused. Each Middle School Course has a page on Planet FOSS that contains photo challenges asking students to think critically about real-world examples and applications of the science concepts developed in the FOSS investigations. For example, the Chemical Interactions Planet FOSS photo challenge invites students to “take a picture that shows evidence of a chemical reaction or a chemical reaction in process.” For Populations and Ecosystems, the photo challenge prompts students to “take a picture of an abiotic factor in an ecosystem.”

In order for the picture to appear on the Planet FOSS website, students must tag the image with an appropriate concept. The uploading process prompts students to analyze their photograph and explain to the viewers what science concept their photo depicts. Photos on Planet FOSS are also “geotagged,” that is, associated with the zip code of the person who uploaded the image. In the interest of security, images with faces are not permitted.

Continued on page 2
In May and June 2008, FOSS conducted a pilot study of the Planet FOSS activities for the Populations and Ecosystems and Chemical Interactions Courses with teachers in Scottsdale, Arizona; Avon Lake, Ohio; and Boston, Massachusetts. The students in Boston were struck by how different the environment was in Arizona; they were particularly fascinated by the images of snakes and cacti taken by the Scottsdale students. But the contrasts were not the only things that stood out. The fact that some of the pictures in Avon Lake looked like they could have been taken in the Boston area lead to the question: What is it about Ohio that is like Boston?

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Endnotes
5 Editor’s Note: Web 2.0 is a term describing the use of Web technology to enhance creativity, information sharing, and collaboration among users. These concepts have led to the development and evolution of World Wide Web-based communities, hosted services, social-networking sites, wikis, blogs, and folksonomies.
Four Poems About Plants
By James Wilson, E.L. Haynes Public Charter School, Washington, DC

We received the following poems this past February via foss@berkeley.edu. Jim wrote the poems when he was teaching the New Plants Module to his second graders. The FOSS staff enjoyed them and hope that you will, too.

The Humble Brassica
A fleck, a speck—
This seed would lie so lonely on a plate.
A spot, a dot—
It only takes two days to germinate.
A root, a shoot—
This cousin to the radish wastes no time.
A leaf! Relief—
The stem will stretch and slowly start to climb.
Two, four—then more—
The pairs of leaves line up to lap the light.
A bead, a bud—
Atop the stem they swell, then overnight...
Kaboom! A bloom—
A yellow crown to advertise to bees
The need for seed—
So won’t you come and pollinate me, please?

Lawn in a Cup
A plastic cup with holes punched in the bottom,
A scoop of soil that’s damp but not too wet,
A pinch of seed—two pinches if you’ve got ‘em,
A week, a sunny windowsill—you’re set.

You’ve grown a lawn four inches square, and green.
Now all that’s left to do is somehow buy
A lawnmower no bigger than a bean
And pushed by a determined dragonfly.

Alfalfa
All heifers fully favor
Filling up on some alfalfa.
The sprouts are full of flavor—
Try falafel with alfalfa.
It follows that a fluffy
Furry bunny loves alfalfa.
Don’t laugh, or get so huffy!
Try alfalfa for yourselfa.

The Onion
This doorknob looking for a door!
I can’t imagine what it’s for.
It’s waiting for a friend to pour
Some water on, and then some more.

Up through the roots the waters flow
And then a slender shoot will grow—
On warm days fast, on cool days slow
And soon enough we all will know.

For when it grows ten inches high,
Just take a snip and give a try—
Your monster breath! Your burning eye!
It’s all enough to make you cry.

Far better to have sliced the things
Into a pile of ivory rings,
Battered, dropped in oil that sings—
An onion feast for onion kings.

If your creative juices start to flow (and/or those of your students) while you’re teaching FOSS, we would love to see the results of your efforts. You can e-mail them to us at foss@berkeley.edu.
Science teachers in Boston Public Schools (BPS) are getting kids outside on a regular basis, despite teaching in an urban district, in a high-stakes testing environment, and in a typically pressure-packed 21st-century public school. These outdoor explorations are an integral part of teaching with the elementary FOSS modules. Through Science in the Schoolyard (SSY), a project of the Boston Schoolyard Initiative (BSI) in conjunction with the BPS Science Department, teachers use the schoolyard to help students apply science concepts to the “real world.”

Science in the Schoolyard: Guides To Taking FOSS Outdoors helps teachers make these connections by providing detailed information about when and how to take students outdoors for each FOSS module used in Boston. The guides were co-developed and piloted by BPS teachers.
The BPS Science Department distributes the SSY guides through FOSS module trainings, other professional development events, and in the kits themselves. Peer-led professional development workshops and in-service courses also help teachers develop the skills and understanding to teach successfully outdoors.

How Going Outside Extends Science Learning

Why take students outside as part of a FOSS investigation? There are many reasons. At the most basic level, using the schoolyard to extend science investigations reinforces students' understanding that the properties of materials and the relationships between organisms, structures, and behaviors they are studying in science class are also found all around them outdoors every day. Wood is everywhere, air is moving, seeds are germinating, and magnets stick to some things but not others.

The schoolyard can also become a laboratory for messy investigations, allowing students to spread out and more freely explore their materials. Outdoors, students can observe organisms in their natural habitat (e.g., snails, insects, isopods, plants) and compare their structures and behaviors to the organisms studied in the classroom. Students can also experience how concepts they explored in the classroom have application in the outdoor environment, such as the movement of water on a slope, levers and pulleys at work, and erosion. And by using the schoolyard students gain access to elements unavailable in the classroom—winter cold and ice, air currents, weather, and living ecosystems.

Perhaps most important is the opportunity the schoolyard offers for students to view changes over time—the germination and growth of seedlings, the life cycle of a plant, the impact of erosion, and seasonal variations in air and soil temperature.

Example: Water on a Slope

Water on a Slope (from the FOSS Water Module, Investigation 1, Part 3), as an example, shows how an outdoor activity can reinforce and deepen students' understanding of a science concept covered by the module. During the indoor lesson, students use a plastic lunch tray covered by wax paper with various sized drops of water at one end of the tray. Students gradually tilt the tray to create a slope and then observe what happens.

In the SSY guide, students explore the behavior of water on a slope by pouring two liters of water on a variety of slopes and surfaces in the schoolyard. They begin with the seemingly “flat” paved schoolyard surface (about 15 meters from the schoolyard drain). After observing the flow for a few minutes, students realize the stream is moving toward the drain. Students often start to cheer on the water when it starts to move more slowly, chanting in unison, “Go. Go. Go.” Students notice many things during this lesson including:

- Water picks up and moves sediment as it flows down the slope.
- Many small streams turn into one or two larger streams.
- The water is not absorbed by the pavement.
- The pavement, their schoolyard, is indeed a slope.

The rest of the lesson, which continues over an entire class period, directs students to pour two liters of water onto three other surfaces with varying degrees of slope.

During the outdoor part of the lesson, teachers consistently find that children produce more advanced writing and thinking when recording their observations. Students write more in their science notebooks and use richer descriptive vocabulary to capture the myriad real-world details they see, including accurately sequencing the steps of the experiment. They ask follow-up questions and contribute additional ideas including other slope investigations to try. Finally, students refer back to the schoolyard lesson at a later date.

One student at The Edward Everett School in Dorchester was investigating slope in the FOSS Landforms Module in fifth grade. He enthusiastically said, “Ms. Beck, this reminds me of when we did the water activity outside in third grade.”

For students who have traditionally been reluctant writers, studying science outdoors can be a transformative experience. Words come

“We had the good fortune of finding ladybug pupae and larvae in our schoolyard. Students have been bringing in mosquito larvae and grubs now that they know what to look for. Now they really understand that insects take different forms.”

Teresa Strong, Science Specialist
more easily, and they are able to express their thoughts with a degree of clarity that often surprises them.

Many Boston educators notice that after doing the FOSS lessons outside, students really begin to own the new vocabulary. After the indoor and outdoor Water on a Slope activities, students appreciate that there is a lot to notice in science and become invested in speaking and writing about their learning.

**Tips and Tricks**

Based on their experiences, many Boston teachers have developed tips and tricks that help students stay focused when learning outdoors. A few of them are listed below:

- Establish clear routines and rules at the outset and stick to them. When students break a rule, as a result of overenthusiasm or conscious testing (and they will), return directly to the classroom. They will be disappointed, but the activity may be resumed later.

- Details make the difference! Bring extra pencils and other materials so the outdoor experience will not be interrupted.

- Students should always have something in hand: a clipboard with their science notebooks, a magnifying glass, a vial for collecting invertebrates—every child should carry something. This gives the student a sense of purpose and the feeling of being a professional scientist.

- Go out a different door than the one students use at recess. That recess door tends to evoke a feeling of freedom and sheer glee that is hard to override.

- Take students outside regularly. The more often they go outside, the more accustomed students become to outdoor routines. After the novelty of going outdoors is forgotten, students are more able to focus on learning.

“*At first students were unsure of what to look for but soon they were able to find evidence of insects all over the schoolyard.***

*Eric Meuse, Science Specialist*

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**Boston Schoolyard Initiative**

The Boston Schoolyard Initiative (BSI) is a public private partnership between the City of Boston, Boston Public Schools, and local private funders. Launched in 1995, the BSI sought to reverse years of neglect and disinvestment in the public schoolyards—broken pavements, torn fences, compacted soil, and hazardous play equipment—all contributing to a sense of malaise and urban blight throughout the city. Over the past 13 years, the BSI transformed 71 schoolyards into active centers of learning and play, with another 18 in the pipeline. These improved schoolyards serve as valuable educational resources and contribute to neighborhood beautification and revitalization.

In addition to renovating schoolyards, resources are being developed that help teachers and students use the multifaceted assets of the schoolyard to support teaching and learning. Science in the Schoolyard and Outdoor Writers Workshop represent two key programs. Over the past four years, there has been increased attention on designing and constructing outdoor classrooms in public schoolyards. Nine have been constructed, and by the fall of 2010, at least 27 will have been built. More information about these can be found at schoolyards.org. Educators and landscape designers work closely together to develop and test different designs. To date, the results are very promising.
Teachers’ Enthusiasm
The Science in the Schoolyard workshops and courses have attracted a colorful cross-section of BPS teachers. Some came prepared to work outside; others, who came initially for the course credit, had doubts about taking their students outside. But a course requirement was that all participants would take their students outside and report back. After venturing outdoors with their students, teachers became enthusiastic about this approach to teaching and learning. Many spoke about their experience as transforming the way they think about and approach teaching. Almost without exception, these teachers have been impressed by how engaged their students are, by how much enthusiasm they have for the activity, by how well behaved they are, and by how working outdoors contributes to students’ vocabulary development and science understanding.

Here are some typical comments heard from teachers:
“Students who are most antsy in the classroom tend to do best outdoors.”

“My kids have been kicked out of two assemblies in the past two weeks and I have very low expectations of their behavior. I was shocked at how well they did outside.”

Teachers often remark that taking the students outside reinforced concepts by showing them real-world examples. Special needs and English language learners are among those who benefit the most from outdoor learning.

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Potential for National Schoolyard Support
While the Boston Schoolyard Initiative (BSI) continues its work locally, we are considering how we can best support the growing schoolyard movement around the country. We receive regular inquiries from schools, municipalities, community organizations, and foundations seeking information about our work in Boston. In response, we have begun to explore the development of a national schoolyard institute to provide training, consulting, and technical assistance; workshops and conferences; curricula support materials; and evaluation information about the impact of schoolyards on teaching and learning, health, and social-emotional development. The institute would also serve as a clearinghouse for information about schoolyard improvement projects and use of schoolyards to support academic learning.

We would very much appreciate your feedback and advice about this idea through a five-minute online survey. Your participation in this survey will provide important data as we move forward. Please go to the BSI website (schoolyards.org) and click on “Institute Survey.”
Science in the Schoolyard: Guides to Teaching FOSS Outdoors

Six SSY guides are available online as pdfs at www.fossweb.com. Go to the specific module page and click the “Taking Science Outdoors” icon in the Teacher Resources section.

- Animals Two by Two (K)
- Air and Weather (1–2)
- Insects (1–2)
- Pebbles, Sand, and Silt (1–2)
- Water (3–4)
- Magnetism and Electricity (3–4)

Check the “News” section of FOSSweb for information about the availability of other SSY guides as well as the introductory video that will be available online in 2009.

The guides are available in print from Delta Education. For more information about obtaining the print versions, contact Delta Education at 800.258.1302.

District-Wide Implementation

SSY has become an important element in science instruction in the BPS. Marilyn Decker, Assistant Superintendent for Curriculum and Instruction, says, “We are seeing teachers who have not been involved with the science curriculum participate in the SSY training and then get excited about being trained in the kit-based curriculum in order to best teach their kids. Conducting science instruction outside has stimulated new interest and energy among teachers and students. It also provides new grounds for curiosity and inquiry.”

According to Bev Nadeau, Materials Specialist for the BPS Science Department, “BSI and Science in the Schoolyard brought a breath of fresh air to the science program. It gave teachers a new opportunity to make the learning more interesting and real. Teachers who were reluctant to teach science found that this was a way to engage children in learning and provide an authentic learning environment.”

She continues, “The program has been a very successful component for getting the curriculum taught. It has brought the inner-city child outdoors to experience things they would never see without this initiative. It links the basic science curriculum with the outdoors and makes learning very exciting.”

With strong support from the BPS leadership, including the Superintendent, the BSI will be expanding SSY training in the Boston Public Schools in the 2008–09 school year. With a growing cohort of highly skilled teacher-leaders, more frequent trainings will be offered, reaching more teachers. Specialized SSY trainings for special education classes and English language learners are being developed, as well as more advanced SSY courses for teachers who have taken the basic-level course. A teacher-training video that shows BPS teachers engaged in SSY activities is in the works; this will serve as another useful tool for professional development.

The BSI’s Science in the Schoolyard program is amplifying the impacts of using FOSS kits and is helping to make science come alive for hundreds of teachers and thousands of students in Boston.

“I hate bugs and dirt but I care about science and I see how much they learn when they go out. Students in the city see science as a classroom activity, not as something they are actually living within. Teaching outside is so enlightening for them.”

Rose Reeves Harris, Classroom Teacher

Erica Beck Spencer (ericab@indigoinventions.com) was a classroom teacher in Cambridge, Massachusetts, and a science specialist in Boston, Massachusetts, public schools. Her consulting work has included co-writing the SSY guides and teaching teachers about how to use their schoolyards to enhance the science curriculum and how to use the FOSS modules.

Kristen Metz (kristinmetz@schoolyards.org) is Director of Education for the Boston Schoolyard Initiative, working over the past 10 years to turn Boston schoolyards into “open space” actively used by the school and community. Her work focuses on developing curriculum support and professional development materials to help teachers in Boston Public Schools use the outdoors (schoolyard) to support teaching and learning in BPS. These materials include Science in the Schoolyard Guides to the BPS FOSS and STC modules.
Did you know that NIMAS files are available for FOSS grades K–8 student print materials? Maybe you’ve heard of NIMAS, but you’re unsure of what it is or how to access the files. Here’s a brief overview of the basics.

What are NIMAS files?
NIMAS is an acronym that stands for “National Instructional Materials Accessibility Standard.” NIMAS files are xml-based source files that can be used to produce alternatives to standard print—braille, large print, and digital and audio books—for students who are blind or have other print disabilities.

NIMAS files are not intended for distribution as-is to classrooms, schools, or districts because the xml files require additional enhancements to make them accessible and student-ready. Typically a third party, such as the American Printing House for the Blind, a regional/state conversion organization, or braille transcription service, produces the student-ready resources required for classroom use.

Where can I find NIMAS files?
NIMAS files are stored in a national repository called NIMAC (National Instructional Materials Accessibility Center) at www.nimac.us. The NIMAC contains all NIMAS files for a publisher’s student print instructional materials. For FOSS, this includes all the FOSS Science Stories (grades K–6), the California Edition © 2007 FOSS Science Resources books (grades K–5), and the FOSS Middle School Resources books (grades 6–8). In addition, the NIMAC has NIMAS files for all FOSS student duplication masters, lab notebooks, and assessment masters from the Teacher Guides (grades K–8).

The overall purpose of NIMAS and the NIMAC is to have a consistent national standard of high-quality source files available through one central location to improve the quality and delivery of required specialized formats.

How do I search for NIMAS files?
As a teacher, you can search the NIMAC to see what files are available. To do this, go to www.nimac.us, click “Enter the NIMAC Repository,” and then click “Search the NIMAC.” You can search the NIMAC in a variety of ways—by title, series, author, publisher, edition, ISBN, subject, or grade level.

To retrieve the complete alphabetical listing of FOSS NIMAS files, select “Delta Education” from the drop-down menu in the publisher field and click “Search.”
A search for a specific title, such as FOSS Weather and Water Resources book, yields the following result:

- Title: Weather and Water Resources: Images, Data, and Readings
- Identifier: 1583564322NIMAS
- Author: Lawrence Hall of Science, University of California at Berkeley
- Publisher: Delta Education
- State Edition: NA
- Grade Level: Grade 6
- ISBN: 1583564322
- File Size: 83032 KB

How do I download and obtain NIMAS files?
You can obtain NIMAS files from your state or local education agency’s authorized user(s). Authorized users are those individuals designated by the state or local education agency to have access to the NIMAC database and are the only ones that can download NIMAS files in accordance with a signed Limitation of Use Agreement.

You can find out who the authorized users in your state are by visiting the following website: http://nimas.cast.org/about/resources/nimas_nimac_contacts.html. Here you will find a comprehensive list of the authorized users organized by state, as well as their telephone number and email address.

One important note: It is not mandated that every state coordinates with the NIMAC. However, states are required to provide instructional materials to blind students or those with other print disabilities in a timely manner. As of this printing, only Pennsylvania and Virginia have opted not to coordinate through the NIMAC. For the latest information, you can visit http://www.ed.gov/policy/speced/guid/idea/monitor/nimac.html.

The information in this article came from the CAST NIMAS Center website. You can visit http://nimas.cast.org for more detailed information. You can also visit the NIMAC’s home page for teachers, parents, and students at http://www.nimac.us/teachers.html.
Notes from the Field...

That’s My Baby! (A Life Cycle Unit Using FOSS Structures of Life)
By Tena Brown, Wengert Elementary School, Las Vegas, Nevada

“Mine is 13 centimeters!” exclaimed one girl. “It’s grown three centimeters!”

“Mine has a flower!” shouted a boy.

“There’s a bug on mine!” yelled another student.

These were just a few of the remarks I overheard from my third-grade students as they examined and measured their bean plants during our life cycle investigations as part of the FOSS Structures of Life Module. They sounded like parents of toddlers as they bragged about and compared their plants with others before documenting the growth and development.

“What’s this green stuff on my roots?”

“Do I need to add more water?”

“Can I eat the bean?”

Students had many questions as they watched the changes that took place in their plants.

Someone observing my class (without looking at my lesson plans) may have thought we were studying only science all day, but reading, writing, and math were integrated into the Structures of Life study. This module takes my class at least six weeks to complete. I use our science book during our reading block, we maintain a science journal as part of our writing, and we make various measurements to reinforce our math. The unit culminates with a 6- to 12-page report on one of the three life forms we study, which contributes to a grade for science, reading, and writing. We predict how long it will take for the seeds to sprout, and students are always surprised at how soon the tiny roots appear. I grew up in the country and love to garden, but the Las Vegas environment is not favorable for backyard gardens. It warms the cockles of my heart to watch children become excited about plants bursting forth from their small, hard enclosures.

I want my students to witness the entire life cycle of a plant. We document the properties and record group observations in our science journals. There are hydroponic containers in the Structures of Life Module, one for each group of four. I decided I wanted each student to have his or her own inexpensive hydroponic container. I use two-liter soda bottles for many projects in my class, so it wasn’t long before I realized that I could cut the top portion off, craft a piece of Styrofoam plate to fit inside as a float, and thus provide all of the students with their own container, all with recycled materials.

I encourage students to analyze the parts of the FOSS hydroponics container that provide for successful plant growth as I help them design their individual containers. By looking at the features of the container that were necessary for success (clear plastic, holds water, enough depth so the plants have enough water) and discussing what available materials have the same features, the students soon suggest the two-liter bottles.

I make a short cut from the shoulder of the bottle down to the bottle’s label. Students complete the job of cutting the top off and
removing the label. They also cut a slice of Styrofoam plate so that it would fit inside the bottle, poke a hole in the center of the piece of plate with a pencil tip, and make a cut to the hole. They fill the container half full with water and set the sprout inside. A piece of masking tape on the side for a label ensures that each student always examines his or her own plant.

The sprouts are usually ready for the containers about one week after they germinate, when they have enough stem to slide into the Styrofoam. The sprouts have a better chance of surviving if I place them in the Styrofoam so that the stem just above the roots is held firmly. I have tried to raise the corn, pea, and sunflower plants hydroponically, but only the beans work well.

Students start documenting the growth as soon as their sprout is in its container. I have modified the student sheet to provide more room for students to write. Students know that it is important to always record the date, the height, and changes and to make a drawing. The plants are kept under a grow light between observations. Students make their second entry two or three days later. It always amazes students to see how much change happens in the first two days. We discuss the shapes of the leaves and the difference between the first two leaves and those that follow. I encourage students to draw pictures as accurately as possible. Students use magnifying lenses to observe the hairs on the leaves and their veins. They are often tempted to lift the plants out of the water, but I try to discourage them from doing this. I encourage students to use correct vocabulary when writing about their seedlings and labeling their drawings.

Students watch their plant go through the four stages of life: birth (germination), growth and development, reproduction, and death. I always hope that the last stage won’t happen until after they take their plant home, but it is an inevitable stage of the process. As the bean plant grows taller, it will need to be staked. I roll a sheet of recycled newspaper into a tight roll, securely taping it to the side of the container, and use yarn to tie the plant to the stake when necessary. The FOSS kit contains a packet of nutrient powder to provide nitrogen and other water-soluble nutrients for the plants. After diluting the powder, I usually add a “blop” to each student’s container. I expect each student to record the addition of the nutrients and their purpose in their documentation.

One of the great things about growing the plants in a clear container is that the roots are clearly visible. It won’t take long before blossoms appear; followed by the tiny bean as the blossom dries and drops off. This is a good time to look at the parts of a flower and how different flowers’ pistils and stamens look. Students love the chance to take a flower apart and examine the interior. Because not all plants reproduce from seeds, I bring in a potato, an onion, and a strawberry to discuss how plants can grow from tubers, bulbs, and runners.

My students write a report on the eggs, crayfish, silkworms, or their bean plants. Their reports include photos and illustrations, graphs showing rate of growth, and a section of research. The cover page and outline are computer-generated; the rest of the report is handwritten. Besides the science, I grade the reports for language. I have had students and parents tell me years later that those reports are still cherished. This is their first major report, a milestone for third grade.

Tena Brown taught at Wengert Elementary School in Las Vegas, Nevada, when she conducted these investigations with her third-graders. You can contact Tena at Tbrownena@aol.com.
Observations by Larry...Teaching in Circles

“Does your program use the learning cycle?”

This question frequently enters the discussion when issues related to FOSS curriculum design and instructional practice are bandied about. But what is the questioner really asking? Some emphasize the learning cycle, implying that it's understood that there is one agreed-upon set of procedures that describes a process that is essential for learning. This definition suggests that the learning cycle is something that happens in the mind of the learner. Others, when pressed, describe the learning cycle as teacher centered—a sequence of instructional strategies planned and organized in the mind of the teacher. Still others think of the learning cycle as a set of steps in a lesson, a kind of template for instructional design.

The asker may or may not have a learning-cycle model in mind. When I was just a pup in the science curriculum game, working at LHS as a staff member on the Science Curriculum Instructional Strategies Project (SCIS), Dr. Robert Karplus was codifying the first systematic approach to elementary science instruction. After working at it for a decade, he coined the term “learning cycle” around 1970. It recognized three phases of intellectual engagement with scientific phenomena—Exploration, Invention, and Discovery.

These three phases were the result of a great deal of reflection on both the nature of science and research from the fields of educational psychology and learning theory. Exploration honored the need for experiential learning as the basis for understanding. Exploration provided direct sensory data and trial-and-error information about a focused topic in science. Invention was the phase where the teacher introduced conventional scientific schemas to help students make sense of their observations. These explanations provided a structure or framework around which students could construct concepts—personal explanatory models. Discovery provided the opportunity for students to use their new concepts in new situations. Concepts gain power when they are practiced and applied under novel circumstances.

A couple of decades later, the learning cycle was reconceived by Rodger Bybee and the curriculum group at Biological Science Curriculum Study (BSCS) as a series of five phases of intellectual involvement with scientific phenomena, known by convenient reduction as the 5Es: Engage, Explore, Explain, Elaborate, Evaluate. This model book-ended the original Karplus model by starting the inquiry process with engagement (stimulating interest and activating prior knowledge) and ending with evaluation (confirming, correcting, and reflecting on understanding). The central three phases (Explore, Explain, Elaborate) are barely distinguishable from the original Exploration, Invention, and Discovery.

The intelligence incorporated into the learning-cycle design is informative in that it delineates many of the elements of comprehensive and thoughtful instruction, but the implied rigor has always disturbed me a bit. The most strident followers of learning cycles assert that if an instructional sequence doesn't follow the design faithfully, the effort will be fruitless. I don’t agree. I don’t think engagement with every idea in science should or can be efficiently and effectively accomplished with a single sequential, formulaic approach.

My experience is that there are science domains that lend themselves to a more structured instructional design and some that don’t. Physics often does. An inquiry, however, into life cycle, or fieldwork on trophic interactions, may yield best results from different, more holistic approaches to obtaining knowledge of the natural world.

There is also the problem of helping educators, particularly tyros, understand that a learning cycle is not a blueprint for instruction, but rather a way to think about how to engage a major concept...a coherent chunk of curriculum. The cycle may take days or weeks to complete a revolution...and at the same time a second cycle may be in motion, but at a different point in its rotation. The bridges between the “cycles” are sometimes the most important connections we can help students discover.

And why a cycle? I would hope that you don’t return to your starting point after a thoughtful excursion into the wonders of the natural world. The starting and ending points should be significantly remote in terms of learning. How about thinking of a coherent learning episode as having an arc rather than a cycle. And any one learning arc may be quite different from the next one. Here is one possible arc: Engage, Explore, Evaluate, Explain, Elaborate, Evaluate (an inquiry into metric measurement of mass). Here’s another: Engage, Explore, Engage, Explore, Engage. Explore, Explain, Elaborate (an inquiry into life cycle).

The important message about learning cycle is not remembering the names of the stages in the cycle, but understanding that each name is a placeholder for a body of knowledge that relates to the kinds of cognitive engagement we want students to experience as they move incrementally toward an understanding of the things we want them to know. This is what Karplus and Bybee had to struggle with and understand before they could guide student inquiry effectively toward understanding.

In FOSS we have resisted the temptation to apply a formula to our curriculum design, feeling that the natural world is too complex, diverse, and wondrous to be embraced with a codified one-approach-fits-all design. And this is why you will not find a concise learning cycle that describes the FOSS instructional philosophy in the front matter of the teacher guides. But rest assured that the body of foundational knowledge that informs learning-cycle thinking has been incorporated seamlessly and invisibly into the FOSS curriculum design.

That’s my position and I’m sticking to it. I’m ready to Engage anyone on the subject, Explore the nuance of the subject in depth, Explain my rationale thoroughly, Elaborate on the ramifications of my position, and Evaluate the merits of the arguments lodged on both sides. And, if necessary, reluctantly Embrace a new point of view on the whole subject.
FOSS in L.A.: The First Year
By Heinrich Sartin, Elementary Science Specialist, Local District 2, Los Angeles Unified School District

It’s March of 2008, and I’m watching and listening to 4th-grade students shake granite chunks inside clear plastic jars. The clattering, rhythmic sounds rise and fall for several minutes until Ms. Elliot finally gives the signal to stop. Then ten seconds of near silence follow as students watch the clouds of granite dust slowly settle inside their jars. Finally, students are given the go-ahead to unscrew the lids of their jars and examine their weathered chunks of granite. Did the pieces break apart? Did their rough edges smooth away? The inquiring minds in Ms. Elliot’s classroom are eager to find out.

Scenes like this are becoming more and more common across K–5 classrooms in the Los Angeles Unified School District (LAUSD) as teachers engage students in hands-on, inquiry-based FOSS science lessons. On visits to elementary classrooms across the district, the ubiquity of the new, black-and-white-speckled FOSS Modules would be hard to miss. And, if you happen to walk into a teacher’s classroom during science time, you’ll see students more engaged in learning science than ever before.

Now let’s flashback to May 2007. News of LAUSD’s K–5 FOSS adoption is just beginning to spread throughout the district. After having spent countless hours poring over science materials from five state-approved publishers, a committee of LAUSD teachers in grades K–5 selected FOSS as the district’s new science program. By choosing FOSS over these other science programs, the district’s instructional materials selection committee made a commitment to continue LAUSD’s direction of student-centered science teaching and learning, which aligned with FOSS’s approach. In the months that followed, district science and school personnel mobilized a massive effort to order, receive, and unpack thousands of newly-adopted science materials—FOSS 2007 California Edition Modules.

Before the FOSS adoption, 4th- and 5th-grade teachers like Ms. Elliot were accustomed to using a textbook-driven science program that was only partly aligned to California science standards. But, given the relatively small time allotment for teaching science in elementary grades—as compared to English language arts and math—teachers didn’t have the luxury of teaching science lessons that were not aligned to the standards. To help solve this problem, the district created 4th- and 5th-grade Elementary Science Instructional Guides (ESIGs) in 2004–2005 that teachers would use as a roadmap and instructional blueprint for teaching science. The ESIGs contained science lessons, strategies for teaching science to English learners, recommended page number references from the adopted science text, and a wealth of other science resources for teachers.

Ms. Elliot teaches 4th-grade at Fair Avenue Elementary School in North Hollywood, a lower middle-class community in the east San Fernando Valley area of Los Angeles. Fair Avenue is one of about a dozen multi-track schools in Local District 2, which is one of eight Local Districts that make up the greater LAUSD. With more than half of the school’s 1,300 students designated as English learners, teachers at Fair Avenue must overcome language barriers that might otherwise leave students at risk. Could the hands-on, inquiry-based approaches of the FOSS K–5 science program be one of the answers to meeting these challenges? Only time will tell.

With less than a full year of science data to examine, it’s still a little too early to make any formal judgments about whether FOSS has made a positive impact on science achievement in LAUSD. In May 2008 teachers administered the 5th-grade Science California Standards Test (CST), but results won’t be available until August 2008. In the meantime, the district is looking at results from its own earth, physical, and life science periodic assessments, which 4th- and 5th-grade students take about every ten weeks. So far, 4th- and 5th-grade science achievement is up. The question on the minds of district science staff is whether there will be a significant boost in performance in this FOSS adoption year and in the years to come. Unfortunately, answering this question may prove difficult because student performance on 4th- and 5th-grade district science periodic assessments had already been on the rise since the inception of the district’s Science Initiative, back in the fall of 2004.

The district’s Science Initiative began four years ago as an ambitious plan to restructure the LAUSD’s Elementary Science Branch. Resources and personnel were devoted to the central and local district offices in an effort to improve teacher science content knowledge and pedagogy skills in grades 4 and 5. At its core, the district’s Science Initiative has four major structural components:

1. Central and local district science instructional leadership staff
2. Science Lead Teachers (SLTs), 2–3 per school
3. Periodic Assessments, 3 per year
4. 4th- and 5th-grade Elementary Science Instructional Guides (ESIGs)

The one thing that the Science Initiative lacked was support for science in grades K–3. Science instructional materials for these grades came in large part from the district’s elementary reading program, which was deemed adequate in meeting the needs of

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students in the lower elementary grades. But soon after the district’s Science Initiative was under way, a growing number of teachers in grades K–3 began calling for equity and access to science materials and support. In fact, even 4th- and 5th-grade teachers were wondering why there was virtually no support for science in the primary grades. They all knew how foundational the K–3 grades were in building students’ science content knowledge and developing science process skills.

Then, at the beginning of the 2005–2006 school year, some consolation came for K–3 teachers at Title I elementary schools in the form of a small supply of K–3 FOSS Modules—three per grade level. While not nearly enough for some of the district’s larger schools, this offering provided at least some of the district’s teachers with the means to engage students in inquiry-based science.

On top of all these efforts, the district, through a National Science Foundation grant, began collaborating with several university partners, most notably the University of Wisconsin, Madison. The goal of these partnerships was to develop high-quality, standards-based science materials that emphasized inquiry-based approaches. After careful examination of district science data, two areas of weakness in student science understanding were identified—4th-grade life science and 5th-grade earth science—for which science “immersion units” were developed. These science immersion units are extended, eight- to ten-week units of study that allow students to act like scientists as they pursue answers to their own questions about standards-based science content. To support these immersion units, the NSF grant provided funding for five-day summer immersion unit institutes for teachers.

All of these structures taken together combined to provide a welcoming environment in 2007 for the new FOSS CA program. But how does one simply “fit” a new science program into the second largest school district in the United States? Without a doubt, LAUSD is huge. With student enrollment at just under 700,000, LAUSD trails only New York City Schools. Management and support for the district’s 436 elementary schools is conducted through eight local districts. A central office science administrative team provides tactical support for the local districts. And in each of its eight local districts, LAUSD has employed the talents of elementary science specialists who collaborate with the central office science team and work directly with 4th- and 5th-grade Science Lead Teachers (SLTs). Ms. Elliot, whose students were learning the finer points of rock weathering, is one of these SLTs. In her four-year tenure as an SLT, Ms. Elliot has attended more than a dozen inquiry-based science professional development sessions.

The district’s SLTs are 4th- and 5th-grade classroom teachers who were selected based on their interest and desire to support the district’s Science Initiative at their schools. Numbering over 800 across the eight local districts, they are on the front lines, helping teachers at their schools make a successful transition to the new state-adopted science curriculum, the FOSS program.

In addition to their regular salaries as classroom teachers, SLTs receive a stipend of $600 for each semester of service. Their responsibilities include implementing, modeling, and supporting the management of FOSS modules, serving as the liaison between schools and local district staff, and supporting the use of district science periodic assessments.

Professional Development and Support Strategies

Even before the monumental task of ordering and shipping FOSS modules to the district’s elementary schools was completed, the district was busy planning a strategy for professional development and support. As a first step, training the district’s existing cadre of 4th- and 5th-grade SLTs seemed the most logical choice. This year, Ms. Elliot and hundreds of other SLTs from around the district attended several one-day professional development sessions on the new FOSS 2007 California Edition grade-level modules.

The professional development that was created for SLTs was designed to prepare them for their roles as school site support for the FOSS program. But before they could support the program, they needed to have an understanding of the FOSS curriculum. So the training for SLTs included time to experience the FOSS investigations as learners, and time to reflect on these lessons as science instructional leaders at their schools. The outcomes for SLTs at this year’s professional development sessions included:

- Understanding how the new FOSS curriculum is designed and organized
- Becoming familiar with at least two of the three grade-level FOSS modules
- Identifying strategies that support learning for diverse learners, i.e., English learners, standard English learners, students with special needs, and GATE students
In practice, the FOSS professional development for SLTs was a collaborative effort between FOSS consultants and LAUSD science staff. At each of the professional development sessions, FOSS consultants took the lead on FOSS content, pedagogy, and management of materials, while local district science staff took the lead on district priorities, such as the focus on strategies to meet the needs of diverse learners.

Rather than going with the standard, off-the-shelf FOSS professional development, LAUSD’s local and central district science team developed a model that was tailored to meet the needs of its teachers. The tailoring was designed to make the most out of each one-day FOSS professional development. If SLTs were going to receive only one day of professional development on each grade-level module, then the training had to cover the breadth of all the investigations in a given FOSS module, while allowing time for them to “go deep” as learners on one or two of the more challenging investigations.

Take the FOSS Water Planet Module, for example. Fifth-grade California earth science standards are packed full of abstract and complicated concepts—many of which are notoriously difficult to teach and challenging to model in the classroom. The list of concepts includes planetary motion, the water cycle, air pressure, uneven heating of the Earth's surface, and weather. In addition, the 5th-grade California science standards require that students be able to recognize the independent, dependent, and controlled variables in an investigation and be able to develop a testable question. Granted, the Grade 5 FOSS Water Planet Module puts all of these concepts together in a thoughtful, comprehensive package for students, but in a one-day FOSS professional development session for teachers, there isn’t enough time to cover all of these investigations in depth. So, rather than arbitrarily choosing which investigations to cover in depth and which to move through more quickly, the district created a document for the training facilitators called the FOSS Professional Development Addendum, which clarifies the depth of coverage for each investigation in the FOSS modules for grades 4 and 5.

In addition to the funding for the FOSS professional development for 4th- and 5th-grade SLTs, the district central office provided each local district with a small, one-time allocation of funds to provide FOSS professional development sessions for a limited number of its 4th- and 5th-grade teachers. In addition, the district, with funding from a California Math and Science Partnership (CaMSP) grant, has been training about 100 teachers a year at a weeklong residential program at The Thacher School in Ojai, California. Funding has been extended this year, so that 100 more 4th- and 5th-grade teachers will be trained on FOSS this summer at Thacher. In these uncertain times of budget cutbacks, the district elementary science team has already developed plans for three-day FOSS salary point classes for grades K–5, which will be piloted this summer.

In a perfect world, each teacher would have his or her own set of FOSS Earth Science, Physical Science, and Life Science materials. But costs and school/classroom storage issues prohibited this arrangement for the LAUSD adoption. Instead, the district purchased FOSS science materials at a ratio of three FOSS modules for every three teachers. This ratio allows teachers to share modules and rotate them at predetermined intervals—every ten weeks, for example. In the interest of providing teachers with materials to plan instruction throughout the year, the district did purchase a full set of three FOSS Teacher Guides for each teacher. This way, teachers could annotate their own copies without having to share them with grade-level colleagues throughout the year.

The district also purchased sets of Living Material Cards for each teacher, which were shipped at the beginning of the school year in conspicuous, white-and-green-striped envelopes. Oversight of these cards at each school was handled in a variety of ways, but in many cases SLTs were charged with managing the distribution of them. In this first year of the FOSS adoption, the whole process of ordering and receiving live organisms was entirely novel for schools. However, within a few months of the adoption, many school front offices quickly became accustomed to receiving live organism deliveries and made sure that teachers received them in a timely manner. Establishing an effective communication system between teachers and the office staff was critical to ensuring that the live organisms made it safely to their new classroom habitats.

One of the supports that comes with a school district science adoption is the professional development provided by the publisher. The district science team has regular opportunities to work directly with FOSS Co-Directors, Larry Malone and Linda De Lucchi from the Lawrence Hall of Science at the University of California at Berkeley. Larry and Linda regularly leave their offices to fly down to L.A. to work with the district’s central and local district science staff. At these meetings, the district science team is treated to a “behind the scenes” look at the thinking that went into the development of FOSS investigations. These insights have proved invaluable in helping the district science team develop its professional development plans and put them into motion.

Occasionally, science colleagues from outside of LAUSD ask me, “How’s the FOSS adoption going in L.A.?” In answering this question, I always have many positive things to say and stories to relate about teachers like Ms. Elliot who are implementing at a very high level. But are all teachers in the district on board? Honestly, I don’t think we’re at 100 percent yet. The first year of any curricular adoption is always going to be most challenging. At the end of this first year of our FOSS adoption, many LAUSD teachers are just starting to get their feet wet. In the local district that I serve, my goal is to support teachers in implementing the lessons from FOSS so that all students are engaged in inquiry-based FOSS science investigations and having rich discussions about science content. We’re off to a good start. In the years ahead, we’ll need to keep this momentum going by providing ongoing science instructional support for teachers so that they, in turn, can continue to enrich the lives of our students.

Heinrich Sartin is a Local District Elementary Science Specialist for the Los Angeles Unified School District. In this position, he works with Elementary Science Lead Teachers and K–5 teachers to promote effective methods of teaching science. He has worked at several schools in Los Angeles as an elementary school teacher and helped infuse technology into K–12 instruction as an Instructional Technology Facilitator for the Los Angeles Unified School District. Heinrich also currently teaches a course titled Elementary Science Methods for pre-service teachers at California State University, Northridge.
With the celebration of NASA’s 50th anniversary this year, this issue’s book reviews focus on some out-of-this-world topics, including travel to the Moon and Mars and the view of Earth from above. You can find more information about NASA’s 50th anniversary at http://www.nasa.gov/50th/home/index.html. The books reviewed here are good additions to many FOSS modules and courses and provide the opportunity to celebrate.

If you have found a book that you think other FOSS users should know about, please send the reference to foss@berkeley.edu, including author, title, ISBN, and a short annotation.

Apollo Moonwalks: The Amazing Lunar Missions

The first human to walk on the Moon was Neil Armstrong, and it happened almost 40 years ago on July 11, 1969, a piece of “ancient” history to your students. The story of the six Apollo missions that landed on the Moon and
how the astronauts prepared for and survived their adventures should get their attention. Beginning with a detailed account of Apollo 11 mission and through Apollo 17 (only Apollo 13 is missing, but that’s another story), the book describes the preparations the astronauts and the support staff had to make before leaving Earth, the rock collecting and other experiments the astronauts accomplished, as well as the problems they faced in mounting such an adventure. More than 300,000 people worked together to make the Apollo program such a success. Color photographs bring the story to life. The book includes an “Apollo Moon Landing Mission Summary,” which includes the dates, the crew, the lander’s name, and the location of the Moon landing for each mission, as well as the types of samples collected. A glossary, index, and resource section are also part of the book.

Max Goes to Mars: A Science Adventure with Max the Dog

The sequel to Max Goes to the Moon takes Max the dog on the first human mission to Mars. Max travels in his own specially designed spacesuit and helps the astronauts sniff for signs of microscopic life. While on Mars, Max and Tori, his young owner, consider how beautiful and fragile their own planet, Earth, is. Sidebars include scientific information and data concerning the moons of Mars, the history of Martian fantasies, the length of the trip, and features of Mars like volcanoes and dust storms. An activity is also included that deals with the spatial relationship between Mars and Earth.

Gravity is explained as Max plays with a plastic flying disk on the Moon. Colorful illustrations as well as sidebars with scientific facts and data and a Moon phase activity make this a valuable addition to FOSS modules and courses, particularly the Sun, Moon, and Stars Module and Planetary Science Course.

Over the Mountains: An Aerial View of Geology

Some of you might remember the amazing aerial photographs in the book entitled Geology Illustrated authored by John S. Shelton over 30 years ago. This new book begins with a foreward by Shelton who reflects on the efforts he made to produce his book and the richness and beauty of the photos contained in Collier’s book. The book includes fabulous aerial photographs of real-world landscapes, such as the San Andreas Fault, the Grand Tetons, Capitol Reef, Shenandoah, and many more. The photos illustrate Earth processes such as erosion, deposition, and mountain-building, and provide wonderful opportunities for students to observe and inquire about the various landforms. They can compare the features they observe on Earth to images from the Moon and Mars and consider the similarities and differences between planetary surfaces. This book will be of particular interest to students involved in the FOSS Landforms Module and the Earth History and Planetary Science Courses.
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ireflies are just one of the signs that summer has arrived, at least here in Ohio. I’ve always been fascinated by these amazing insects with their flickering glow, but until recently when I heard a short story on a local news station, I hadn’t thought about their relationship to some of the insects explored in various FOSS modules and courses. But once I heard that the glow worm was one stage in the firefly life cycle, my attention was caught. Here’s some of what I’ve learned about fireflies (aka lightning bugs) since then.

Fireflies are soft-bodied, winged beetles. There are about 2,000 difference species of fireflies. Firefly adults are a little more than 1 cm long and live for about two months. There are more male fireflies than females by about fifty to one. After they mate, the female lays her eggs on or under the soil. About four weeks later the eggs hatch. The eggs and larvae of some species can glow. That’s where the term “glow worm” originates. The larvae feed until the end of summer. The larvae survive the winter by burrowing underground or finding safe places on or under tree bark. They become active in the spring and begin feeding once more. After several weeks of eating, they pupate and emerge as adults. The larval diet varies from one species to another and includes other larvae, terrestrial snails and slugs, and possibly pollen and nectar.

Fireflies produce “cold light,” that’s light containing no ultraviolet or infrared rays. The color of light can be pale red, yellow, or green. The light is due to bioluminescence, a chemical reaction that occurs in specialized light-emitting organs. Luciferin, a heat resistant substance located inside the firefly’s abdomen, is the source of light. The trigger is Luciferase, an enzyme also located in the abdomen. ATP (adenosine triphosphate), a common compound found in plant and animal cells, provides the energy that causes the luciferin-luciferase mixture to light up.

In adults, bioluminescence is used primarily to locate mates. Many species have unique courtship flash patterns emitted by flying males in search of females. The females generally don’t fly, but give off a flash response to attract males of their own species. It’s interesting to note that some 90% of the energy a firefly uses to create light is actually converted into visible light. Compare that to an incandescent electric bulb that converts only 10% of its total energy into visible light and the rest into heat.

Some other tidbits of firefly information:

- Fireflies were part of ancient Mayan mythology and were associated with the stars and Mayan gods.
- The ancient Chinese sometimes captured fireflies in transparent containers and used them as lanterns. They thought fireflies came from burning grass.
- Pennsylvania’s state insect is the Pennsylvania Firefly (Photuris pennsylvanica), and the Common Eastern Firefly (Photinus pyralis) is one of the state insects of Tennessee.
- The synchronized flashing of fireflies along the Selangor River in Kampong Kuantan, Malaysia, is a major tourist attraction and contributes considerable revenue to the local economy.
- In European legend, a lightning bug flying in the window was a warning that someone was going to die.

You can easily see and maybe catch male fireflies about one hour before the Sun goes down. Stand in a grassy spot, and watch for small flickering lights hovering in the air. You can carefully cup your hands around a firefly, making sure you don’t squeeze. You may be able to get the firefly to stick around until it sees a flash from a local female that it can’t resist. When I was a kid growing up in Michigan, we used to pretend that we wearing firefly jewelry, like lapel pins.

If you or your students have now become fascinated by fireflies, try doing an Internet search. One site I found particularly interesting was at the Ohio Department of Natural Resources/Ohio State Parks/Park Pals/Firefly Activities (http://www.dnr.state.oh.us/parks/kids/kidsintro/tabid/19445/Default.aspx). The firefly was their July 2008 Park Pals choice, and the site includes games and other activities, such as the Firefly Code Game.
FOSS Institutes

Delta Education will host a one-day FOSS Institute before each of the 2008 NSTA Area Conferences. This institute will be for educators from districts that have implemented FOSS for at least a year. The topic will be using formative assessment to improve teaching and learning. The focus will be on new assessment tools and strategies designed specifically for FOSS modules grades 3–6. This Institute is designed for FOSS experienced educators—lead teachers, administrators, curriculum coordinators, professional developers, and university methods instructors.

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

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FOSS Newsletter

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NSTA 2008 FALL AREA CONFERENCES

Charlotte, NC    October 30–November 1, 2008 (Thur, Fri, Sat)
Portland, OR     November 20–22, 2008
Cincinnati, OH    December 4–6, 2008

FOSS WORKSHOPS IN THE NSTA PROGRAM
(no preregistration necessary)

THURSDAY (10/30; 11/20; 12/4)
8:30–11:30  Using Science Notebooks Featuring FOSS
            Middle School
12:30–2:30  FOSS Chemical Interactions Course for
            Middle School
3:30–4:30   What’s New in FOSS?

FRIDAY (11/31; 11/21; 12/5)
8:00–11:00  Using Science Notebooks with FOSS
            Modules K–6
12:00–2:00  FOSS Assessment—Valuing Academic
            Progress in Grades 3–6
            Presenters: Kathy Long, Brian Campbell, and Larry
            Malone, ASK Project, Lawrence Hall of Science
3:00–4:00   Introduction to Planet FOSS for Middle
            School

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:

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The deadline for submissions to the next issue is December 12, 2008. We’re waiting to hear from you.