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New from FOSS in 2008

Overview

The FOSS Project team at the Lawrence Hall of Science is always developing new resources to support and expand the program for existing FOSS users, as well as developing strategies to reach new districts. Most recently we developed the FOSS CA K–5 2007 program consisting of 18 modules and corresponding resources books for the California state adoption. Some modules are based on the FOSS national program, but were redesigned for California. Others are developed to meet specific California science standards and adoption criteria. You can see summaries of these modules at http://www.fossweb.com/CA/scope.html.

The adoption process is still ongoing, but as of now over 1,000 schools have made FOSS CA their science program.

In 2007, we also developed supplemental components for selected national modules as part of the New York City Department of Education Core Curriculum in Science initiative. As a result, elementary schools in New York City are now using these new and enhanced components along with the 2005 edition of FOSS. We subsequently developed those components for all of the applicable national modules and are making them available now to new and existing users as appropriate.

Here's what's new for 2008.

For Existing Users

All FOSS Teacher Preparation Videos are available online.

By popular demand, the FOSS Teacher Preparation Videos for grades K–6 are now available as Flash. You can view the teacher videos at http://lhsfoss.org/fossweb/schools/teachervideos/index.html.

In April 2008, the FOSS website will undergo reorganization. At that time you will access the teacher preparation videos by going to the module pages and clicking the teacher resources button. Look for that change in the spring.

Continued on page 2
For Existing Users
FOSS Benchmark Assessments for 16 FOSS modules grades 3–6.

The new Benchmark Assessments can be used with the 2000 and 2005 editions of FOSS and include:
- Duplication masters for the Survey/Posttest.
- Duplication masters for the I-Check assessments for each investigation.
- A Benchmark Assessment folio that includes detailed instructions for using the assessments and item-coding guides.

Through the ASK (Assessing Science Knowledge) project, funded by the National Science Foundation (2003–2008), FOSS developers, center facilitators, and teachers across the country have been developing an assessment system that will be a prominent part of the next full revision of the FOSS elementary program to be released in three to four years. (See the article “Classroom Assessment: A Tool for Learning” on page 8 of this newsletter.)

Part of that assessment system is available now to experienced FOSS users. That part involves benchmark assessments for grades 3–6, used to generate performance data throughout a FOSS module and to provide an ongoing record of student learning. Teachers and students use the assessments to identify misconceptions and misunderstandings of science concepts. Teachers use the assessment results to plan next steps of instruction. Here’s how the FOSS Benchmark Assessments are organized.
- The Module Survey/Posttest is given before instruction begins and after instruction is complete. The Survey/Posttest consists of 12–15 open response and multiple-choice items.
- An I-Check is given at the end of each investigation. Each I-Check consists of 8–10 items in multiple formats. I-Checks provide teachers with information about student achievement. I-Checks also give students the opportunity to reflect on their understanding and revise and clarify their thinking before moving on to the next investigation.

For New and Existing Users
FOSS at Home supplement.

A new four-page folio for each module called FOSS at Home describes math and science activities families can do at home to extend the FOSS classroom investigations. Each folio also includes suggestions for ways families can use FOSS Science Stories and FOSSweb (www.FOSSweb.com) at home. Printed folios can be purchased from Delta Education, and each folio can also be downloaded at www.FOSSweb.com by going to the module page, clicking on the “For Parents and Teachers” button and then the “Home/School Connection” menu item, and finally clicking “English” or “Spanish” to download the file. Each folio is available in English and Spanish.

The FOSS and ASK educators will be offering workshops on the assessment system throughout 2008. A one-day Institute will be held in conjunction with NSTA in Boston on March 26, 2008. To register for this Institute, contact Pam Frisoni (see last page of newsletter).
Engaging in science activities is one part experience with materials and two parts making sense of the experience. The effective use of science notebooks helps students with the sense-making part of the process of doing science.

FOSS staff, working with experienced FOSS educators and consultants, developed the FOSS Science Notebooks folio that describes tools and strategies for getting started with science notebooks using FOSS. The 36-page folio describes benefits of using notebooks (for both students and teachers) and issues related to format and rules of engagement when working with students in grades K–2 and grades 3–6. It discusses organization of the notebook (table of contents, page numbering, documentation, glossary/index) and describes strategies to guide students through their notebook entries (planning the investigation, data acquisition and organizations, making sense of data, reflection, and assessment, including self-assessment and using the line of learning). The folio includes a list of print and web-based references for teachers who are starting on the path of using notebooks in science.

A helpful tool for teachers and students new to FOSS is the module-specific FOSS consumable Science Notebook for grades K–6. Each bound notebook includes a prepared table of contents, all the student sheets (from the duplication masters in the teacher guide), and additional blank pages for students to record their thinking in words and pictures. The kindergarten notebooks include single writing/drawing prompts with three lines for writing words and half a page for drawing pictures. All notebooks are three-hole drilled with perforated pages and are available in English and Spanish.

Prepared notebooks can be a first step for teachers new to FOSS and can lead to student use of more free-form, autonomous science notebooks as teachers develop their instructional confidence.

The next step toward an autonomous science notebook involves using reduced versions of the FOSS student sheets and an 8 x 10-inch bound composition book. In this format, the teacher can choose which sheets to use for students and make copies accordingly. Students glue or tape the reduced sheets to the left page of a spread, leaving the right page for writing, drawing, and other documentation. This model is an efficient means for obtaining the most productive work from elementary students. These reduced versions of duplication masters for grades 3–6 modules are available for download from the FOSSweb website.

For All Users New to Science Notebooks

FOSS Science Notebooks folio for teachers.

Consomable module Science Notebooks for students.

Reduced version of FOSS student sheets for notebooks.

Photocopy the duplication master for the reduced notebook sheet, cut the two sheets apart, and give one to each student. Students use glue or tape to stick the sheet to the left-hand page in their composition books. The right-hand page is for additional writing.
Delta Education received the Pennsylvania Science Teachers Association (PSTA) Leadership in Science Education Award for 2007. Tom Guetling, Vice President of Sales and Marketing, accepted the award on behalf of Delta Education at the PSTA Annual Awards Banquet at the PSTA Convention this past December in Hershey, Pennsylvania. Delta was recognized for its involvement in classrooms, college programs, and professional development opportunities and for having a large impact on science education specifically in the elementary classroom.

A nomination letter praised Delta as follows,

*Delta Education has taken the road less traveled in providing science education resources to the masses. Instead of profits and dividends being the main force of their motivation, they have committed to research-based initiatives that are supported by data on how students learn best.*

Guetling’s response to the award was to praise the people in the banquet room (which included teachers, administrators, PSTA committee members, and other attendees) as the true leaders in science education and described Delta Education as a mere supporter of their efforts. Delta is well known for supporting PSTA by providing workshop presenters, guest speakers, and financial contributions.

Several FOSS modules and courses were highlighted at this year’s convention, which carried the theme *Science Sparks the Next Generation*. Sue Jagoda, FOSS developer, and Helen Weber, FOSS consultant, led three workshops focusing on the FOSS Earth Science Strand with selected investigations from the Pebbles, Sand, and Silt; Earth Materials; and Landforms Modules, as well as the Earth History Course for middle school. Participants engaged in grade-appropriate FOSS investigations to experience how the Earth Science content builds through the K–8 curriculum. They learned that children use the same scientific thinking processes as geologists when they encounter a new rock, although with different focus at different times in their cognitive development. During the Earth History workshop (FOSS Earth History: Grand Canyon to Pennsylvania), participants considered how to encourage students in investigating the processes and rocks that have formed the Grand Canyon to discover clues that reveal Earth’s history. Participants also began to make connections to the rocks and processes that have created Pennsylvania’s geological environment.

Bill Metz, another FOSS consultant, presented the Chemical Interactions Course. Participants received an overview of the course and were involved with several hands-on investigations.

For more information about PSTA and its activities, check out the association’s website at [http://www.pascience.org](http://www.pascience.org).
Fifteen years ago I was guest-teaching in a first-grade classroom in Oakland, California. The FOSS staff was developing the Solids and Liquids Module. We had spent several weeks exploring the properties of solid materials, followed by another several weeks investigating the properties of a number of liquids.

At the end of a liquid properties summary discussion, a young fellow raised his hand and asked. “So, what is toothpaste?” Incredulous, I asked in return, “What is toothpaste?” “Yeah,” he replied. “Is it solid or liquid?”

It took me a couple of seconds to recognize the power in this apparently simple question. And another second to formulate precisely the right answer. “I don’t know,” I responded.

So where were we? It would have been easy enough to provide a cogent answer, giving a reasoned explanation for toothpaste being a mixture of both solids and liquids, recalling the observations we had made as evidence for my conclusion. But I didn’t, because to do so would have dispatched the question with one burst of teacher gusto, bypassing student engagement altogether.

The toothpaste question started an inquiry. The question went up on the board. Students shared thoughts and opinions. They presented evidence and proposed tests. I showed interest, but remained noncommittal as students advanced their ideas.

Then it was my turn to ask a question. What happens to liquids when they are mixed with water? Students went back to their familiar liquids, added water, and observed the results. A couple of days later I asked another question. What happens to solids when they are mixed with water? Students added water to familiar solids and observed.

When we turned our attention once again to the toothpaste question, students were ready. They knew what they wanted to find out. They added a dab of toothpaste to water in a bottle. They observed carefully. They then shook the bottle and observed. They let the contents of the bottle settle and observed. They evaporated the liquid and observed. Then they drew their conclusions. Some students concluded that toothpaste is solid. Some claimed it is liquid. Still others suggested that it is both solid and liquid. Each student’s claim was supported by observations and evidence. Each student defended his or her determination with data.

The Oakland first-graders were engaged in inquiry—the process of discovering or creating answers to questions. This is quite different than answering questions, a recall process, bringing existing knowledge forward. Inquiry is an excursion into the unknown to create new knowledge about how the world works.

But was the toothpaste investigation real inquiry? Does it count as inquiry if students are answering someone else’s question? From my experience, yes. I’ve determined, to my satisfaction, that it doesn’t matter where the question comes from. What matters is how students engage the question.

A team of researchers at the Education Development Center’s (EDC) Center for Science Education tackled the question, how has inquiry science instruction impacted student outcomes? After an exhaustive literature review and consultation with experts in the field, they developed a descriptive structure for inquiry science. At the heart of the descriptive structure was what they call the Elements of the Inquiry Domain, characterized by three student behaviors: motivation, responsibility for learning, and active thinking. If students are not motivated to learn, are not taking personal responsibility for learning, or are not actively thinking about data and evidence, they are not engaged in inquiry.

This makes sense to me. This characterization of inquiry education places the emphasis on behaviors of students, not on pedagogies and methods practiced by teachers. Inquiry is not something teachers do; inquiry is something students do. Teachers can create the environment in which inquiry can happen, but cannot create inquiry itself.

Inquiry: I Can’t Define It...But I Know It When I See It

So, is FOSS an inquiry program? Do students engage in real inquiry? Absolutely. Some inquiry discussions include matrices describing levels of inquiry—guided inquiry, scaffolded inquiry, open inquiry, and so on—detailing what teachers and students do in each condition. Others describe inquiry as complete or partial. Such systems either explicitly or implicitly evaluate the quality of the inquiry based on the degree to which the student initiates the inquiry question. This suggests that students’ motivation, responsibility for learning, and critical thinking are more closely related to the source of the question than the conceptual significance and interest potential of the question. In our work designing the FOSS curriculum we strive to introduce the right questions at the right time in the learning sequence to capture students’ attention and curiosity. When the question is right and the conceptual context has been established, students adopt the question and run with it.

That’s how the toothpaste inquiry found its way into the published Solids and Liquids Module for grades 1 and 2. A generation of students has grappled with this pressing question: is toothpaste solid or liquid? And the experts in the field, the students providing answers, are divided.
Things were sprouting up all over the fifth-grade hall at Pleasant Gardens Elementary in Marion, North Carolina. I began my year with the FOSS Environments Module. Students eagerly planned their terrariums and planted their seeds. As plants grew, students read and learned about the biomes. Many students enjoyed the article about the biomes in the FOSS Science Stories Environments book.

Elijah Lawing is quoted, “Each biome is unique with its own environmental factors and range of tolerance.”

“I liked it when we worked with water tolerance. I got to see how much water seeds needed to survive,” commented Brittany Hughes. Bailey Stiwinter said, “I liked the part about the ecosystems. I learned that animals survive in different ecosystems. We did an investigation using darkling beetles and isopods. We learned which environment suited which bug.”

Investigation 2, Bugs and Beetles, was slightly out of order because we had to wait for the organisms. When they arrived, the students enjoyed holding them and testing out their hypotheses. Tom Hawkins liked learning about the producers, consumers, and decomposers from the article in Investigation 4. “I liked learning how the world’s organisms depend on each other.”

Each activity is set up in a notebook with a question, materials, procedure, observations, data, and conclusion. Each group works together to gather and record their findings and decide on how best to state their conclusions.

Perhaps the best activity according to students was working with the brine shrimp. Students were introduced to the shrimp as suggested in the teacher guide. They were asked to decide how to determine if the changes in salt levels of Lake Mono would affect the hatching of the brine shrimp eggs.

“The eggs were like a speck of dust,” says Brooke Lane. Brady Ruiz enjoyed a lot of things, but looking at the little shrimp swim through a magnifying glass was the most fun. He was surprised to learn that they can have too little and too much salt in the water. After the lesson ended our class continued with some commercial sea monkeys to see them at the adult stage. We now have seven adults and many babies!

As the fifth-grade science teacher for the past 14 years I have seen a tremendous change in the enthusiasm of students during science class. They greet me in the hall asking what we will do today. Students who have shown little interest in classwork are now eager. The FOSS Program has really made science come alive in my class and at our school.
Richmond, Kentucky, Seventh-Graders Connect with Jane Goodall

As part of the FOSS Population and Ecosystems Course, students viewed a video about the work of Jane Goodall, *Among the Wild Chimpanzees*. Students in Margaret Soto’s class at Madison Middle School in Richmond, Kentucky, were impressed by the film and Goodall’s efforts. They wrote letters to Goodall describing their reactions to the film and other questions they had about her work. Here are some examples of their letters and the reply from Jane Goodall Institute.

**Dear Dr. Jane Goodall,**

Hi, my name is Molly Dalton and I am a 7th grader at a school in Kentucky called Madison Middle. Over the last few weeks my classmates and I have been studying your work on chimpanzees. I think it is amazing how you interacted with the wild chimps so easily in 1960, when you traveled to Gombe. You showed me a new way of looking at chimps and the struggles they have to go through. They really are pretty funny animals. They can outsmart me in some ways. My teacher, Ms. Soto, says that you are the only chimp you could do work with.

You showed the world a new way everyone had always thought of chimps. You proved that chimps are more than just animals. I have visited your website and I have been amazed by the movie. I watched your documentary, “Among the Wild Chimpanzees,” and I think it is amazing how you have committed your life to saving the chimpanzees. Although you formed a family during your study in Gombe, you stayed focused and kept discovering new and exciting things. I don’t think that I could ever have the determination and drive that you have. I have heard your name mentioned on various television shows but I never realized what an inspiration to the world you are. Your discoveries are remarkable and shall never be forgotten in the mind of a young dream such as myself. I appreciate your time and patience for reading my letter.

Your newest fan,

Molly Dalton
7th grade Madison Middle
Richmond, KY

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**Dear Miss Goodall,**

My name is Danielle Chasreen and I attend Madison Middle School in Richmond, KY. Recently my class has been studying you and your wonderful discoveries. We are also studying populations and animal behavior such as chimps that you have been doing a life-long research on. Our science teacher, Ms. Soto, has shown us a video that showed us how you were working on your research. As we watched the video, in parts, for several days I was amazed at what we were watching. I was thinking to myself, “I want to do that. I want to be there studying those chimpanzees. Jane Goodall has the best job in the world!” I know you probably don’t think of it as a job, but as a way of life, I have always been in love with animals, both domestic and wild. I want to be a veterinarian when I get older, but you will always be my inspiration. I hope that everyone can be a part of that. It gives you such a great feeling to know that you have made a difference in an animal’s life, a difference in the world.

Your newest fan,

Danielle Chasreen
7th grade Madison Middle
Richmond, KY

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**Dear Miss Goodall,**

My name is Danielle Chasreen and I attended Madison Middle School in Richmond, KY. Recently my class has been studying you and your wonderful discoveries. We are also studying populations and animal behavior such as chimps that you have been doing a life-long research on. Our science teacher, Mrs. Soto, has shown us a video that showed us how you were working on your research. As we watched the video, in parts, for several days I was amazed at what we were watching. I was thinking to myself, “I want to do that. I want to be there studying those chimpanzees. Jane Goodall has the best job in the world!” I know you probably don’t think of it as a job, but as a way of life. I have always been in love with animals, both domestic and wild. I want to be a veterinarian when I get older, but you will always be my inspiration. I hope that everyone can be a part of that. It gives you such a great feeling to know that you have made a difference in an animal’s life, a difference in the world.

Your newest fan,

Danielle Chasreen
7th grade Madison Middle
Richmond, KY

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**Dear Jane Goodall,**

Hello my name is Megan Marshall I am in the seventh grade at Madison Middle School, Richmond Kentucky. I have never been to see Jane Goodall, but I have seen her a few times on the news. I have never been to the Jane Goodall Institute, but I have seen it on the news. I have never even met Dr. Jane Goodall, but I have heard her name mentioned on television. I have never been to Gombe, but I have heard about it. I have never met Dr. Jane Goodall, but I have heard her name mentioned on television.

My class has been studying populations and chimpanzees. We watched one of your videos about the chimp family. I have to say that it was a good video. I was fascinated and amazed. I also enjoyed watching the chimpanzees. I think they are so cute. I have always been interested in animals. I have always wanted to be a vet. I have always loved animals. I have always been in love with animals.

I was inspired by the movie. I was thinking to myself, “I want to do that. I want to be there studying those chimpanzees. Jane Goodall has the best job in the world!” I know you probably don’t think of it as a job, but as a way of life. I have always been in love with animals, both domestic and wild. I want to be a veterinarian when I get older, but you will always be my inspiration. I hope that everyone can be a part of that. It gives you such a great feeling to know that you have made a difference in an animal’s life, a difference in the world.

Your newest fan,

Megan Marshall
7th grade Madison Middle
Richmond, KY
When teachers first begin teaching FOSS, the learning curve can be a challenge. If teachers are making the change from a textbook to an activity-based curriculum, the first year is spent learning content, working out timing issues, preparing materials, and coming to grips with student and kit management. As teachers become comfortable with the mechanics of teaching FOSS, they may focus their creative energy on implementing science notebooks. Students use their science notebooks to record and organize data, define vocabulary words, and write conclusions drawn from investigations. By the third year of using FOSS, the logistics have been mastered, and teachers are ready to focus on student learning. That’s the point where assessment becomes an important part of the curriculum.

Through the ASK (Assessing Science Knowledge) Project, funded by the National Science Foundation (2003–2008), FOSS developers, working with teachers across the country, have been developing an assessment system that will be a prominent part of the next revision of the FOSS curriculum for grades 3–6. This article provides a preview of the assessment system that is to come, as well as some suggestions that you can try out in your classroom right now.

The ASK assessment system includes assessment tools that serve two specific purposes, both of which are called for in the National Research Council report Knowing What Students Know (2000). First, ASK provides assessments that teachers can use on a daily basis in their classrooms to improve their teaching. Second, ASK provides valid and reliable assessments, closely aligned to the curriculum, that can be used in conjunction with standardized tests (which are usually not well aligned with a specific curriculum) to monitor and qualify students’ science achievement.
The everyday, formative ASK assessments are called embedded assessments. They are used on a daily basis to diagnose strengths and weaknesses in student learning as a module develops. These assessments take the form of informal observation of student activity and work products that students complete in the process of doing the science investigations (student sheets, notebook entries, and response sheets). Teachers use these work products to determine whether or not students understand the content presented on a particular day.

The valid and reliable assessments are called benchmark assessments. These are new assessments that include a survey (pretest given before instruction begins), I-Checks (given after each investigation is completed), and a posttest (given at the end of the module). Benchmark assessments are primarily summative in nature but have powerful formative value as well. Embedded assessments are used for diagnostic purposes and are never graded, whereas benchmark assessments can be used for grading purposes as well as sources of information to improve instruction.

**Formative Assessment in the Classroom.** Teaching is a linear progression, but learning is not. Lessons are taught, one after another, with embedded assessment occurring throughout. Sometimes teachers find that their students have not learned the concepts completely. At this point they must make decisions about what next steps to take. Do I move on to the next part of the investigation and work individually with those students who need help, or do I stop and do some remediation with the whole class?

The diagram above presents a graphic representation of a flow of actions and decisions that a teacher might encounter while teaching a FOSS module. The inner circle (green) represents the typical arc of one investigation, starting with Getting Ready, followed by Guiding the Investigation and Reflection. Embedded assessment is integrated seamlessly into this process. The dashed blue line shows how assessment information may lead to a remedial activity being inserted into the instructional sequence. The outer circle (red) represents the arc of the I-Check benchmark assessment at the end of each investigation. The purple arrow represents the transition from the last part of the investigation to the I-Check benchmark assessment. This model of teaching with formative assessment has evolved over the course of the ASK Project. Detailed descriptions of each phase of the cycle follow.

*Figure 1. The ASK Formative Assessment Cycle for a FOSS Investigation*
1. Get Ready. The first step in teaching a FOSS lesson is getting ready—preparing the equipment, previewing the sequence of the activity, and choosing an embedded assessment that will be used as evidence of learning. The embedded assessment can be a student sheet, a notebook entry, or a response sheet—any piece of student work that will give you evidence that students have learned the concept on which you are focusing. Informal observation during the activity is useful for assessing an element of inquiry that occurs as part of doing the activity, but we have come to rely more on written work than observation for evidence of students’ understanding about concepts. The important thing to remember about assessment at this point is that you need to choose something for embedded assessment that you believe will give you information about the most important content being taught in the part of the investigation you are about to teach.

2. Guide the Investigation. Students participate in the active investigation outlined in the teacher guide. In the ASK Project, science notebooks are an integral part of active investigation. Students record the focus question, use notebook sheets (reduced to half size so they fit in bound composition books) to record data, and write conclusions at the end of each lesson (for example, stating a claim supported by evidence or creating a “rule” that can be applied to other situations). This is the usual routine followed by all FOSS teachers using the ©2000 or ©2005 editions with the addition of science notebooks. A new Science Notebooks folio is now available from Delta for teachers wanting to begin using science notebooks in their classrooms. (See the article titled “New from FOSS in 2008” on page 1 of this newsletter.)

3. Reflect on Student Work. At the end of each lesson, the teacher reviews the student work that will reveal whether or not students understand the content. A significant challenge for the teacher is finding the time to review the student work thoughtfully. If time is limited, we encourage teachers to spend just 10 minutes reviewing student work looking for evidence of the specific learning identified during planning. They should then take 5 minutes to reflect on how they will use their insights about student learning to guide the next step in instruction. While it is probably most helpful when teachers take the time to give each student individual feedback, this is often not possible. What’s critically important is that teachers spend some time reviewing student work and have some sense of the knowledge students have constructed so they can do something about it immediately.

4. Plan Next Steps. If students have not fully comprehended the content, then a next-step strategy (some way to clarify or remediate) is required. One next-step strategy can be as simple as moving on to the next part of the investigation, making sure to focus on the particular concept that may still be confusing to some students. This often makes sense when the next part of an investigation focuses on the same concept as the one just completed. A second next-step strategy may require no more than a few minutes of discussion at the beginning of the next class session to clarify conclusions before moving on to the next part. On rare occasions, a teacher may find it necessary to take an entire class session to reteach critical content using a new context and helping students apply what they should have already learned.

When students understand the content, it is time to move on to the next part of the investigation. The cycle represented by green arrows is repeated until all parts of the investigation have been completed, which might take two weeks.

5. Prepare for I-Check. When all of the parts of an investigation have been completed, it is time for an end-of-investigation I-Check. Before administering the I-Check, teachers may want to give their students a chance to go through their notebooks to highlight the important things that they have learned. For example, a teacher may suggest that each group work together to make a list of three VIPs (Very Important Points) they find in their notebooks for the investigation they just completed or from the beginning of the module. Doing a cumulative review can help students differentiate the “rules” they have been developing across several investigations. In the FOSS Magnetism and Electricity Module, for example, students often confuse materials that stick to magnets with materials that conduct electricity. Reviewing both rules together and discussing their similarities and differences help students clarify their thinking. Review sessions should occur at least a day before the I-Check is given, not on the same day.
6. Administer and Code the I-Check. The I-Check is administered to students just like any other test. Teachers might think about using these assessments as practice for state or district tests, following the same rules for administration. If that is not a concern, teachers should feel free to read the questions aloud for students who may have trouble reading them on their own. Teachers often ask if it’s okay for students to use their notebooks when taking the I-Check. We recommend that the students not use their notebooks when taking the test, but do use their notebooks when they are self-assessing the next day. We want to find out if students understand the content and can apply it, not just if they can give right answers.

Code the I-Check. The Benchmark Assessment folio is used to code the I-Checks. Each item has a separate coding guide and is coded as 0–2, 0–3, or 0–4. The code range is based on the complexity of the item and the range of evidence of student progress it provides. The progress map below shows how we conceptualize this continuum in the ASK Project.

If an assessment item asks students to recall the definition of a specific word or a simple statement of fact, the highest code they can receive is a 2. On the other hand, if the item is complex and requires students to apply what they have learned to a new context, the highest code for that item will be a 4. A code of 0 indicates that the student made no attempt. We expect all students to understand the content at the conceptual level.

<table>
<thead>
<tr>
<th>Code</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Strategic</td>
<td>Students have mastered the conceptual level. They are now working on applying knowledge of [module content] to new and more sophisticated contexts.</td>
</tr>
<tr>
<td>3</td>
<td>Conceptual</td>
<td>Students have essentially mastered the vocabulary and simple facts about [module content] (the recognition level). At the conceptual level, students are working on putting these pieces of knowledge together to see relationships among concepts to demonstrate a broader understanding. To get to the next level (strategic), students need to master these relationships and begin to apply them in new contexts.</td>
</tr>
<tr>
<td>2</td>
<td>Recognition</td>
<td>Students are beginning to use scientific vocabulary and know some basic facts about [module content]. To get to the next level (conceptual), they need to begin connecting pieces of knowledge to form a broader understanding.</td>
</tr>
<tr>
<td>1</td>
<td>Notions</td>
<td>Students use their everyday experiences to explain phenomena. To get to the next level (recognition), students need to use scientific vocabulary and learn some basic facts about [module content].</td>
</tr>
</tbody>
</table>

Figure 2. Progress Map with Levels and Coding Matrix

As teachers code the I-Checks, they record the codes, but not on the students’ papers. Students will get their completed I-Checks back with no teacher marks on them. The unmarked I-Checks will be used in the next step, Do Self-Assessment.

We are currently in the process of working with the Berkeley Evaluation and Assessment Research Center to develop a computer program that will make it easy for teachers to input student codes and then print reports that will describe what students know and what they still need to work on.

7. Do Self-Assessment. The usual course of action for taking next steps after the I-Check is to conduct a self-assessment session. This is an opportunity for students to check their own work. (I-Check, in fact, stands for “I check my own work.”) To get ready for the self-assessment session, the teacher reviews the notes she/he made as she/he was coding the assessments (or reviews the reports printed from the computer software) and determines which items presented problems for students. The goal is to choose an item or two that will challenge students’ thinking and provide an opportunity for them to discuss their thinking with each other.

Often self-assessment focuses on a constructed-response item. The self-assessment strategies guide students to confirm, correct, and complete their answers to the prompt. Other self-assessment strategies are used with multiple-choice questions. For example, when significant numbers of students chose different answers (A, B, C, or D), students convene in different corners of the room, As in one corner, Bs in another, and so on. Each group needs to come up with an argument that will convince students in the other corners that their answer is the correct one. If during the process students realize that a different answer might be better, they are allowed to migrate to another corner and help that group work on their argument. The key to self-assessment is that teachers are not simply reading back the correct answers to students, but students are reflecting on their understanding of the content and making necessary adjustments.

Continued on page 12
As mentioned earlier, the I-Checks are used primarily as a measure of student achievement—as a summative assessment. The major source of diagnostic information accrues from the embedded assessments. Nevertheless, the I-Check results may reveal some incorrect or incomplete student thinking that requires additional instructional attention.

8. Go on to Next Investigation. Steps 1–7 in the assessment cycle are repeated for each investigation. At the end of the last investigation there is a final benchmark assessment called the module posttest. This posttest is also used as the survey (pretest) before beginning instruction in the module.

Lessons Learned

If you’re serious about increasing student achievement in science, the most important thing you can do is look at and reflect on student work on a daily basis and then act on what you see. Understanding science is complicated, and it can be messy. It takes many experiences and discussions to get all of the pieces organized into functional, conceptually sound mental models. The FOSS curriculum provides tried-and-true strategies for teaching science well, but no curriculum can anticipate the individual prior knowledge and experiences that children bring to the table. No curriculum can totally anticipate the interactions that will occur in the classroom. The best way to counteract the unexpected is through assessment practices.

Your best source of information about student thinking is their written work—principally their science notebooks. This introduces confounding factors into the process. First, teachers tend to offer suggestions for correcting student errors. That means when they actually read the student work, the teacher is actually reading her/his thinking and not necessarily what the student was thinking. This leads to the second problem—getting a false positive reading about how well students understand the content. We all want students to succeed and do well, but we can only do that if we have the best information possible about what the students do know. We recommend that students do their own writing without teacher intervention. Teachers look over the work later and provide feedback or plan next steps accordingly. For example, at the beginning of the next session, the teacher leads a class discussion about the recently completed activity. Students draw a line of learning in their science notebook, review their work, and confirm, correct, or complete their entry based on class discussion or interaction.

We found student written work to be more reliable as evidence of students’ content learning than classroom observation. If students know the content well enough, they can usually write or draw enough about it to show their understanding. As a result, many teachers in the ASK Project have adopted a “writing-to-learn” perspective. They no longer think of writing as an obstacle that interferes with students’ thinking, but as another tool for learning. Writing can actually help students clarify their thinking. When they write, they have to organize their thoughts in new ways. By doing so, it often becomes apparent what students know and what they still need to learn. Adopting this perspective is difficult for many teachers, but it is a challenge worth taking on.

The most gratifying change we have seen in ASK classrooms is the change in culture that can occur. Assessment is no longer seen as the enemy. In fact, students have been known to ask their teachers, “Isn’t time for an I-Check so we can find out how well we are doing?” (When was the last time your students asked you if they could take a test?) Learning has become collaborative rather than competitive. It’s not a terrible thing if a student gets an answer wrong or says “I need some help.” It’s simply an indication that the student recognizes that he needs more information to reach understanding. The relationship between teacher and student changes because students take more responsibility for their own learning. And we have proof that all students can learn. Using assessment as a tool for learning has encouraged the lowest achieving students and has helped to close the achievement gap.

Look for future articles in the FOSS Newsletter on building professional learning communities around classroom assessments.

For more information about the ASK Project, please contact Kathy Long at klong@berkeley.edu.

Benchmark Assessments

As a result of the ASK Project, each grade 3–6 FOSS module has a valid and reliable benchmark assessment component, which includes the survey (pretest), investigation-specific I-Checks, and a module posttest. With the benchmark assessments, teachers have reliable interim achievement data, and even more importantly, information they can use to remedy student misconceptions or gaps in understanding. If you are an experienced FOSS user and would like to see the benchmark assessments for a particular module, contact your Delta/FOSS sales representative. Also see the article titled “New from FOSS in 2008” on page 1 of this newsletter.
Each of the FOSS Middle School Courses now includes an updated multimedia teacher guide. This resource helps you locate, download, and use the various components found online for the middle school courses. (The multimedia teacher guide shouldn’t be confused with the print teacher guide in the black and green binders.) The multimedia teacher guide includes an index containing each investigation. When you link to a particular investigation, you will find links to each part in that investigation. By clicking on a part, you will find which multimedia activities, lab notebook sheets, and transparencies you will need for that part.

For example, if you are teaching the Weather and Water Course, Investigation 3: Seasons and Sun Part 2, you can connect with the appropriate multimedia, lab notebook sheets, and transparencies you will need for that part as shown in the screenshot here. If you need the Response Sheet or transparency no. 4, Sun-Earth System, all you have to do is click on it, and it appears as a pdf ready to download, print, or project. The appropriate reading in the Student Resources book is also listed, although it is not available online at this time. Teachers who use an interactive whiteboard, such as SMART Board™ or Promethean Board™, now have easy access to resources that can be projected.

If you have any questions about the multimedia teacher guide, please contact the FOSS team at foss@berkeley.edu.
WeatherScope is an Internet application, so your computer must be connected to the Internet for the application to retrieve the data files used to build the maps. WeatherScope has the ability to update data in real-time, but also allows the user to specify the date and time of the map. This feature allows users to view the data as they become available without being concerned with manually downloading the most recent data.

Instead of generating static images on a server, the visual displays are generated on the customer's machine. Once “raw” data are located on the user's personal computer, images are created on the fly. The images can be zoomed and panned, and data levels can be turned on or off. In addition, decision makers can customize their weather maps, allowing them to determine what information is pertinent to their needs.

WeatherScope can be used for many applications in meteorology, geosciences, and geography. This tool allows the customer to produce weather maps according to individual needs, which may range from tracking severe weather using standard station plots and a loop of radar images to tracking the freezing line during a winter weather event.

Weather data can be displayed as maps or as time-series graphs in WeatherScope. The maps can include wind vectors (directional arrows with the length representing the wind speed), a color gradient, line contours, or simply the data themselves. Radar data can be displayed on the same map as other data, such as rainfall, wind, and air temperature.

Map overlays can be displayed as lines (e.g., highways, county boundaries) or points (e.g., cities, weather station locations) to provide a geographical context for the weather data. Overlays and data layers can be arranged in the legend such that a layer can be above or below another layer. Also, the user can change the translucency (or opacity) of layers. For example, radar data may cover up point data (e.g., air temperatures), but if opacity is set to less than 100%, then the point data are allowed to show through.

The previous description gives you just a glimpse of the capabilities of WeatherScope. If you would like to try creating your own WeatherScope map, you will find details on how to do so by linking to this article in the FOSS Newsletter section online at http://lhsfoss.org/newsletters/present/index.html or going to the Course Notes for the Weather and Water Course at http://www.fossweb.com/modulesMS/WeatherandWater/index.html. (Look under For Teachers and Parents/Course Notes at the bottom left of the page.)
FOSS Weather and Water Applications

The following are some suggestions from Terry Shaw, a FOSS developer, for integrating WeatherScope into the FOSS Weather and Water Course.

- When students study solar angle and beam spreading in Investigation 3, they can examine the relationship between latitude and air temperature (as an indirect indication of solar radiation).
- In Investigation 6, students can study the relationship between temperature, pressure, and altitude by overlaying these three data sets on the map, using a gradient for the elevation and numerical data for the air temperature and pressure. By looking across the same latitude, students will be able to see how elevation affects the other two variables. They can also correlate relative humidity with cloud cover (radar data) and rainfall during the past hour or three hours.
- In Investigation 7, students are able to “observe” sea breezes and land breezes at weather monitoring stations along the coasts at different times during the day.
- Students can use a real-time air pressure map, replacing one on page 53 of the Lab Notebook (Investigation 8) and then check their predicted wind direction and speed using actual wind vectors.
- One lesson students will learn by using the WeatherScope software is that relationships between weather variables are seldom simple. For example, although students will be able to notice general patterns, they will find that wind direction and speed are not determined just by air pressure differences as indicated by pressure readings from weather stations. Winds are also influenced by many other factors including topography, circulation around high- and low-pressure areas, the Coriolis effect, and prevailing winds.
- The animation feature in combination with radar data can be used to show weather movement as an extension of Investigation 9. Students can “see” fronts progress across the country and begin to make predictions based on the data on their computer screen. The archive feature allows information to be stored for later use, (e.g., to check predictions or save interesting weather patterns).

Conclusion

WeatherScope is a powerful tool for all weather enthusiasts. The next time interesting weather is headed your way, turn on your computer and build a WeatherScope map. This article only touched on a few of the features in WeatherScope, so it is suggested that you check out the online Help guide for more information. Choose WeatherScope Help from the Help menu to find out more about using WeatherScope to its full potential.

Send questions or comments about WeatherScope or weather questions to earthstorm@mesonet.org.

FOSS Weather and Water Workshop
July 21-25, 2008

The Full Option Science System (FOSS) staff from the Lawrence Hall of Science (University of California), in cooperation with the University of Oklahoma and the National Weather Service, is presenting a FOSS Weather and Water Workshop at the National Weather Center in Norman, Oklahoma, on July 21–25, 2008. The National Weather Center, opened in 2007, is the premier weather research facility in the world.

Who should apply?

- Science education leaders from universities, educational service agencies, or school districts who are responsible for facilitating the implementation of the FOSS Weather and Water Course.
- Teachers using or planning to use the FOSS Weather and Water Course in their classrooms.

What will happen at the workshop?

- Hands-on training in the FOSS Weather and Water Course including information about and examples of notebooking, assessment, inquiry instruction, and effective class discussion techniques.
- Sharing ideas for professional development and assisting teachers who are implementing the FOSS Weather and Water curriculum.
- Presentations on weather-related research and content by research meteorologists from the National Storm Prediction Center, the National Severe Storms Lab (made famous by the NOVA programs featuring their storm chasers), and the University of Oklahoma.
- Field trips to meteorology research, weather-data gathering facilities, and businesses that market weather research and weather data.
- The opportunity to learn how to locate and use local weather information using Web resources that may be unique to your geographical area.
- An introduction to weather visualization software that you can use to enhance the FOSS materials.
- Networking with other teachers and science education leaders from across the country.

For more information contact Terry Shaw at terryshaw@aol.com.
Brad Edwards, a teacher at Rahway Middle School in Rahway, New Jersey, usually spends time during his summer working in his classroom, preparing for the next academic year. But during the summer of 2006, he was asked to stay away from the school during “asbestos removal.” When he returned to Room 21 a week before classes began in September, he didn’t recognize the classroom he had left in June. The Science Channel’s “Dream Science Classroom” team and Brad’s students had transformed the space into a futuristic classroom. A SMART Board™ had replaced the chalkboard; laptops, microscopes and other wireless devices adorned the lab tables. Where once there was one sink, now there were three, one with handicapped access. A safety shower, eyewash station, expansive storage space, and a portable fume hood with a filtration system had also appeared. Ample power outlets and special remote-controlled window shades were also added.

Rebecca Deutscher, a member of the LHS FOSS team, found out about Brad’s dream classroom through the middle school multimedia survey she distributed last year. The interest of the FOSS team was piqued, and Aimée Lyon, a FOSS consultant from Bergen, New York, followed up with Brad through an e-mail interview. Brad is a Rahway, New Jersey, native, a star athlete who had earned a college scholarship, and worked as a chemist before deciding to give back to his community and begin teaching. Here are some of his answers to the questions Aimée posed.

Q How long were you an industrial chemist, and what brought you to teaching?
A I worked as a chemist for a little over a year. I was asked to be the guest speaker at the Sideliner’s (Rahway’s Booster Club) Annual dinner, and a few of my former teachers/coaches/administrators asked if I had ever considered teaching. At the time, I was beginning to think about other career options because, for lack of a better phrase, I was becoming married to my pager. Don’t get me wrong. I loved the work I was doing. I just could not get used to being on call 24 hours a day and sometimes putting in 12–15 hour days. Family and my other interests were suffering and that was not a viable option for my life.

Q How long now have you been a classroom teacher, and what grade levels have you taught?
A I have been a classroom teacher since 1999. I started as a long-term substitute teaching high school biology. In 2000, I began teaching 7th-grade science and have been ever since.

Q How did your district decide to nominate you for the Dream Teacher award?
A The NSTA (National Science Teachers Association) and Discovery Networks conceived the idea of the Dream Science Classroom. From what I understand, over a period of several months, they had visited schools in the region to select the recipient of the classroom. I was selected to receive the Dream Science Classroom. Here’s the catch. I was not aware of any of this. I was told that I was being featured with several other teachers for a documentary about the evolution of science education and how science classrooms need technological improvement. In June of 2006, a camera crew followed me for a day and documented a typical day in my teaching life, including all the extracurricular activities I am involved in. Throughout the day, I was asked numerous questions about the types of things I would need to improve my classroom. The producers said what they may do in the documentary was have an artist render what my ideal classroom would look like, and I would receive a poster of it.

What I did not know was that there was someone keeping track of everything that I said and that I was not “one of several teachers”—my classroom was the only one chosen for renovation. During that summer, our school’s second and third floors were closed for “asbestos remediation.” That was not true. The floors were closed while the construction of the Dream Science Classroom was taking place. I had no idea. From the beginning, I was told that they wanted to film me setting up my classroom for the year. So I walked in expecting to see my old room, but instead I walked into a new state-of-the-art classroom and was welcomed by the classroom designer, school officials, the students who gave up their summer to help, and representatives from all the companies who contributed to the project. I was told the price tag on the classroom is $250,000. Then the Dream Classroom program aired in late 2006.
Q **Do you currently teach FOSS?**

A I teach two FOSS courses during the year. We began using it in 2000. We start the year with the **Planetary Science Course**. Our other course is **Populations and Ecosystems**. I was one of the National Trial Teachers for the Pop/Eco course along with my 7th-grade teaching partner. Each year when we start the course we make sure to point out our names in the resources book. We have received extensive professional development related to the kits because our district is a part of a consortium with the Merck Institute for Science Education. I have also facilitated professional development related to the courses.

Q **How has the award enhanced your teaching/your students’ love of science?**

A The classroom was specifically designed to support my curriculum. The SMART Board allows me limitless freedom to design lessons. There is a Classroom Performance System manufactured by eInstruction. Each student receives a remote pad for answering questions anonymously to each other but not anonymously to me. This helps me know what students are learning so that I am not leaving anyone behind. The lab stations designed by Diversified Woodcrafts are roomy and ensure that all students face forward. Discovery has provided me with online resources and classroom resources to supplement my curriculum. VWR Education donated countless other classroom resources including microscopes, a planetarium, and supplemental lab kits that are easy to integrate into what I teach. Vernier donated USB-compatible sensors and software for data collection and graphing during experiments. The ceiling is designed to look like a dig site, with numerous fossils for the students to observe. There is absolutely nothing that cannot be done in the Dream Science Classroom, especially with the wireless network and laptops.

Q **How has your new Dream Teacher Classroom enhanced your teaching of FOSS?**

A The Dream Science Classroom allows me to use the FOSS materials more effectively. For example, I can find video clips to supplement most of the readings in the resource books. It is much easier to work with the FOSS multimedia on the SMART Board. I can even scan things to use during lessons. Assessment is much easier using the CPS system. I can create other assessments. Students have more than enough room to work so they are more efficient. Data collection is easier so we can spend more time discussing results at higher levels. If students are having trouble with a concept, we can quickly find supplemental activities in the classroom to bolster their understanding. All in all, the classroom allows students to address their needs uniquely. Its myriad of resources allows me to differentiate instruction and take advantage of the teacher friendly and well-structured design of the FOSS courses.

Congratulations to Brad and his students on their new science lab. We look forward to hearing more about how FOSS instruction is enhanced by this new facility.

**Brad’s new science classroom includes roomy lab stations, microscopes, a planetarium, and other resources that help him teach the FOSS courses.**
T
his issue's Wordsmiths is offered by
Ann Moriarty, FOSS developer at the
Lawrence Hall of Science, UC Berkeley.

Welcome. And congratulations.
I am delighted that you could
make it. Getting here wasn’t easy,
I know. In fact, I suspect it was a
little tougher than you realize….

New from the Wordsmiths

So begins Bill Bryson’s delightful
engagement with the history of the
universe, of Earth, of life, and of
science in his book, A Short History
of Nearly Everything.

Bryson writes from the layman’s
perspective. Because of this, A Short
History is accessible, with some guidance,
to middle-school students as well adults.
Humorous anecdotes enliven what might
otherwise be considered dull stuff. Consider
the story Bryson includes regarding the
transition from alchemy to chemistry:

_hennig brand in 1675…became
convinced that gold could
somehow be distilled from human
urine. He assembled 50 buckets
of human urine, which he kept
for months in his cellar. By various
recondite processes, he converted
the urine first into a noxious paste
and then into a translucent waxy
substance. None of it yielded
gold, of course, but a strange and
interesting thing did happen. After
a time, the substance began to
glow. Moreover, when exposed to
air, it often spontaneously burst
into flame._

Now what middle­schooler wouldn’t
want to know more about the discovery
of phosphorus?

_A Short History_ offers insight into the
inner workings of science itself. How
many discoveries were purely accidental?
How many now­accepted theories
were brought up before their time,
discarded by the scientific community,
and then returned to at much later
dates, often after the original proponent
was dead? How much do we still not
understand? And finally, how amazing
is it that life actually evolved on Earth?
Bryson’s sense of wonder is vividly
communicated to his audience.

Now, how do we guide middle­schoolers
to read this book? One way is to offer
chapters or sections of the book that are
relevant to the FOSS course that they
are studying at the time. Even a cursory
read opens that door into the suggestions
listed in the following correlation chart.
The chapter references in the chart are to
Bryson’s book.

<table>
<thead>
<tr>
<th>Course / Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planetary Science</strong></td>
</tr>
<tr>
<td><strong>Earth History</strong></td>
</tr>
<tr>
<td><strong>Chemical Interactions</strong></td>
</tr>
<tr>
<td><strong>Weather and Water</strong></td>
</tr>
<tr>
<td>16. The Lonely Planet; 17. Into the Troposphere</td>
</tr>
<tr>
<td><strong>Diversity of Life</strong></td>
</tr>
<tr>
<td><strong>Populations and Ecosystems</strong></td>
</tr>
</tbody>
</table>

The final four chapters address the
evolution of humans and our increasing
responsibility towards life on Earth.
Bryson concludes:

_If this book has a lesson, it is
that we are awfully lucky to be
here — and by ‘we’ I mean every
living thing. To attain any kind of
life in this universe of ours appears
to be quite an achievement._

This in itself is a profound lesson
for all of us. There is greatness in this
universe and particularly on Earth—
how can we do our part to ensure life
continues? Consider that question with
your students!

_A Short History of Nearly Everything_, by Bill Bryson.
**FOSS Institutes**

Delta Education will host a one-day FOSS Institute on March 26, 2008, in conjunction with the 2008 NSTA Boston National Conference. 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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Phone: 1.800.258.1302 ext. 503  
Fax: 603.579.3504

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**NSTA 2008 NATIONAL CONFERENCE**

Boston, MA  March 27–30, 2008

**FOSS WORKSHOPS IN THE NSTA PROGRAM**  
(no preregistration necessary except for the Short Course)

**THURSDAY, March 27**

8:00–11:00  Short Course SC:2 Integrating Outdoor Teaching into Kit-Based Science in Boston Public Schools (FOSS activity outdoors)

8:30–10:30  Populations and Ecosystems Course for Middle School

11:30–1:00  FOSS Assessment—Valuing Academic Progress in Grades 3–6 (ASK)

2:00–4:30  FOSS Chemical Interactions Course for Middle School Students

3:30–4:30  FHL Pathway Session: Science Writing “in the Field”: How Using the Outdoors to Teach the Core Science Curriculum Improves Students Science Writing (FOSS activity outdoors)

**FRIDAY, March 28**

8:00–11:00  Using Science Notebooks with FOSS Modules K–6

8:00–12:30  Field Trip: Outdoor Classrooms in the Schoolyard: Linking Science Instruction, Learning, Facilities Design, and Fun (FOSS activity outdoors)

11:30–1:00  FOSS in Boston Public Schools—A Science-Education Leadership Story

2:00–4:30  Using Science Notebooks Featuring FOSS Middle School

3:30–4:30  FHL Pathway Session: Science Writing “in the Field”: How Using the Outdoors to Teach the Core Science Curriculum Improves Students Science Writing (FOSS activity outdoors)

5:00–6:00  FHL Pathway Session: Outdoor Writers Workshop: How Using the Outdoors to Teach Writing Enhances Students’ Interest in Science and Reinforces Science Concepts (FOSS activity outdoors)

**Other FOSS Workshops**

July 21–25  Weather and Water Workshop, Norman, Oklahoma (see announcement on page 15).

July 21–25  Chemical Interactions Workshop, Berkeley, or July 28–California (final date TBD)

August 1

August 4–5  Force and Motion Workshop, Berkeley, California

August 6–10  Populations and Ecosystems Workshop, Berkeley, California

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, 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
FOSS Newsletter
Lawrence Hall of Science
University of California
Berkeley, CA 94720-5200

The deadline for submissions to the next issue is June 13, 2008. We’re waiting to hear from you.

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.deltaeducation.com/foss
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See you at the NSTA National Conference in Boston, MA!

New FOSS materials now available! See the article starting on page 1.