Start the Year Connecting to Your Local Biodiversity
By Joanna Snyder, FOSS Curriculum Specialist/OBIS Co-Director

Across the country, the fall season often offers exciting opportunities to experience biodiversity. Fall often produces easily observable, measurable seasonal changes. What better way to start the year than by integrating outdoor activities that take advantage of your schoolyard?

To help teachers extend learning into local environments, FOSS has launched a new outdoor initiative. The FOSS Outdoors Initiative is our commitment to connecting children to nature and environment by

- resurrecting and modernizing a traditional outdoor education resource, the Outdoor Biology Instructional Strategies (OBIS) program; and
- offering a Web-based middle school photo challenge network called Planet FOSS.

Here are several simple ways to start the school year off connecting to your schoolyard and your students.

Conduct parts of some FOSS investigations in your schoolyard.
As a result of a partnership with the Boston Schoolyard Initiative (profiled in the Fall 2008 Newsletter), supplemental guides are available to help you go outside. These supplemental guides are available on www.FOSSweb.com for 12 modules.

To download a Science in the Schoolyard supplemental guide, go to FOSSweb. Navigate to one of the 12 modules listed. Go to For Parents and Teachers/Teacher Resources and click on the Taking Science Outdoors backpack icon. You can download the BSI guide as PDFs.

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Your Local Biodiversity continued

Check out the free OBIS activities at www.outdoorbiology.com.
Outdoor Biology Instructional Strategies (OBIS) is an outdoor program that offers young people fun and rewarding opportunities to investigate ecological relationships in their local environment. Here are three activities to get your class started outdoors.

1. In **Plant Hunt**, students work in groups to collect a leaf sample from as many species as possible in a defined area. Together as a class they sort samples to determine how many species of plants grow in the activity site.

2. In **Litter Critters**, students observe and collect organisms that live in leaf litter and under trees and shrubs.

3. In **Animal Diversity**, students use sweep nets to sample and compare the insects living in a managed grassland (lawn) and an unmanaged (weedy) area. Included in the OBIS activity folio are simple instructions to make your own sweep nets.

These are just a few of the 97 activities available at no cost online. The website also offers suggestions for activities that connect specifically with many of the FOSS modules.

Join us for **Taking FOSS Outdoors K–8, Regional NSTA full-day workshops**. Register to join us on the Wednesday before each 2010 Regional NSTA Conference this fall as we model simple and effective strategies for using the schoolyard and the local outdoor environment when teaching FOSS and OBIS. You will experience firsthand, the power of opening the classroom door and stepping outside. Using the schoolyard is an extremely effective means to reinforce, extend, and apply student classroom learning.

We will discuss current research that documents the value of outdoor teaching. In addition, you will receive resources that describe how the outdoors can serve as a resource to enhance your teaching and enrich your school community.

Time outdoors during the school day is beneficial for student learning. Students who are exposed to hands-on experiences in their local environment often become enthusiastic, self-motivated learners and academically outperform their peers who do not have these learning opportunities (Liebermann and Hoody, 1998). What better way to start the year than with a strong, motivated group of students? Take your class outdoors and explore the biodiversity of your schoolyard; we promise you won’t be disappointed.

Students collect and sort leaf samples to determine how many species of plants grow in the activity site in the **Plant Hunt** activity.

**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.

For information about the development of the FOSS program, contact:

Larry Malone or Linda De Lucchi
FOSS Program
Lawrence Hall of Science
University of California
Berkeley, CA 94720
Phone: 510.642.8941
Fax: 510.642.7387

FOSS National
E-mail: foss@berkeley.edu
www.FOSSweb.com
lhsfoss.org

FOSS California
E-mail: fossca@berkeley.edu
www.FOSSweb.com/CA

FOSS NYC
E-mail: fossnyc@berkeley.edu
www.FOSSweb.com/NYC
Studies have shown that students who participate in outdoor instruction report they enjoy school more in general and feel more supported and trusted by their teacher than they did prior to the outdoor experiences (Shaw and Terrance, 1981).

References


Notes from the Field...

Family Science Night
Building a Community of Support for Science
By Cathy Klinesteker, Co-Director, FOSS California Professional Development

Seven great science teachers in the Coachella Unified School District developed and delivered a plan to bring family science nights to their schools. They sold food, invited a magician to close the evening program, and opened their classrooms to hundreds of families who built electric circuits, explored the properties of oobleck, built ramps for rolling marbles, engineered amazing structures made of wildly whimsical solid objects, experimented with mixtures and solutions to their hearts’ content, and engaged in many more wonderful science activities. Excitement, joy, and sharing across generations was the order of the evening!

They were all teaching FOSS in their classrooms and wanted to showcase that kind of hands-on science excitement for their students’ families. They used FOSS activities, FOSS extensions, or related hands-on activities that parents and children of all ages could do together. Classrooms were designated for a specific grade level, but siblings also participated. When children finished the activity at their own grade level, often showing parents how it worked if they had prior experience with it in class, they visited other grade levels as time allowed.

Many parents didn’t speak English, and most had very little experience with science in school. But amazing things happened. One father was so excited that he brought his family to the next family science night in the district, at a school across town from his children’s school, to do it all again with more understanding and more family members! A mom with several small children in tow wrote down the recipe for oobleck to do at home with her children and their neighborhood friends. A grandpa watched and smiled as his confident grandson built a circuit, and then, tentatively at first, but with growing enthusiasm, built his own circuit under the loving direction of his grandson. Three kindergarten girls focused intently on building castles for the princess stories in their minds and hearts.

Everyone got raffle tickets for every activity, for helping someone, and for anything else the teacher leaders deemed worthy. The raffle and the magician provided impetus to move families from the activity rooms to the multi-purpose room where treasures from the FOSS publisher (Delta Education),

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Family Science Night continued

local merchants, families, and a variety of other sources were raffled. Even with these motivators, it took gentle, persistent reminders to encourage people to draw an end to their “science-ing” and move on—a fabulous testament to the wonder of science!

They taught in many different schools throughout the district but decided it would be easier to work together to plan one event. They put together a box of everything needed for that event, had each team member be the leader of one room with several activities (including at least one thing that people would make and take home with them), and then took the show on the road.

The night started with a short welcome and introduction in the multi-purpose room where the principal told families about how the evening was organized, where activities were located, and about the show and raffle at the end of the evening. Food was sold throughout the evening to make money for the science program, allowing parents to come straight from work, if necessary, and have dinner available for the family. The introduction took about 15 minutes, activities in rooms lasted about an hour, and the closing was about 30 minutes. The entire event lasted just under two hours.

Each activity room was set up as a series of centers with Center Instruction Cards to guide the activity. The teacher leader in the room created some of the cards, and some were simply copied (or modified slightly) from FOSS Center Instruction Cards in the FOSS Teacher Guide. The teacher leader rotated between centers and/or stayed at any center that required more supervision. It was a noisy, sharing, discovering science family time!

These family science nights are a wonderful way of celebrating the good news of the world with families throughout the district, of building public understanding and support for the fun and value of science, and of strengthening the partnership of the leadership team as they work to develop and promote the FOSS district science program. With everyone working together, preparation was streamlined to manageable levels and took on the mood of a shared joyful event, contributing to the strength of their schools. Family science night: should we or shouldn’t we? Unequivocally, YES!

**All these liquids and family science night: so much fun! (Solids and Liquids Module)**

**Construction or electrical engineer? We’ll try both! (Solids and Liquids and Magnetism and Electricity Modules)**

**Concentration and practice make a Zoomer expert. (Balance and Motion Module)**

**Here’s how this circuit works, Mom. (Magnetism and Electricity Module)**

**Now I know oobleck is Newtonian fluid, but it’s still messy! (Mixtures and Solutions Module)**
F OSS enjoys a significant degree of success across the country. Our success can be attributed at least in part to our ability to keep pace with and anticipate issues, trends, and policies in science education. The FOSS success has allowed us to grow. New staff members with varied backgrounds and experience have been added to the FOSS team. They have brought new intelligence to the conversation about the future of FOSS.

I used to think I knew everything I needed to know to develop the best elementary science program in the world. Since the last major revision, the 2000 edition, I have learned a few things. My colleagues have helped me understand that there is a positive correlation between language development and thinking. And in order for us to realize our first FOSS goal—scientific literacy for all students—we need to provide students with the ability to think critically about how natural systems operate and to be strong-minded when the time comes to make good decisions about the application of scientific knowledge in large contexts. The latter requires that students think actively, freely, and effectively. Language is one medium of cognitive processing, probably the most important one. And language is the medium of communication, between minds for the purpose of sharing experiences and within minds for developing complex intellectual constructs. The topic of language arts integration into FOSS used to send me running for the door. But I now have a new vision for how important language is to the development of scientific thinking and a better understanding of how the FOSS curriculum can facilitate language development. Here are some of the new directions for the FOSS program.

We are incorporating student science notebooks into the FOSS instructional design. Students in grades K–8 will keep detailed records of their investigations (observations and data), as well as generate a continuous narrative description of their understanding of the science as it develops. And we are incorporating both formative and summative assessments seamlessly into the FOSS instructional design. The assessments are based in large part on written language. Additional attention is being focused on fundamental language development concerns, such as vocabulary development techniques incorporated into the FOSS instructional design. Why have we become advocates of language skills integration? There are two important reasons. First, better language development and language skills will result in better science learning. Secondly, in the current educational policy environment, with schooling dominated by NCLB testing, language arts performance takes priority. If we are to advance our goal of more teaching of science, we can’t afford to have the language arts advocates as adversaries. We have to demonstrate that the work we do in science contributes to academic growth in everyone’s area of primary concern.

Some trends in science education are exciting, and we join the momentum eagerly. One such issue that has entered the national science education conversation is environmental education. What is FOSS doing about it? We are incorporating outdoor activities into every investigation in every FOSS module. And we are developing new curriculum materials that are separate, but compatible with, the FOSS program.

The day I decided on the topic for this column was April 22, Earth Day. I was feeling some pangs of nostalgia for my planet. Most learned folks agree that the most pressing societal issues before all of us concern the overall health of our planet. We have not done an exemplary job as custodians of the Earth’s atmosphere (air), hydrosphere (water), lithosphere (rock), and biosphere (ecosystems). If we don’t reach the tipping point in planetary degradation that will lapse into unstoppable environmental decline leading to collapse in our lifetimes, it will certainly be part of the experience of the students in our classrooms today. When those students assume the mantle of leadership, they must be prepared to slam the machinery into reverse in order to avert disaster. Preparation for that responsibility is a tricky business.

Earth was a considerably different place to grow up when, as an 11-year old, I first reached down and touched its surface with purpose and appreciation. The place where I made first contact with my planet is just about the same today as it was 55 years ago when I became infatuated. Not exactly the same, but pretty much the same. I fell in love with Earth at Charlotte Lake in the Sierra Nevada Mountain wilderness in central California. And true to any worthwhile long-term love affair, I faithfully return to Earth’s gritty embrace every year. I spend a week or two walking among the nearby lakes, streams, and meadows. The physical place is always a little different, but the sense of place is the same. My connection to my planet is a defining characteristic of who I am. And so it must be with our children. In the

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Due to an invigorating new collaboration, the 2009–2010 school year was a productive year for implementing FOSS in nine Chicago Public School District elementary schools. The Early Elementary Science Partnership (E2SP) began this last year between the Chicago Public Schools, The Field Museum, Lincoln Park Zoo, Chicago Children’s Museum, The Peggy Notebaert Nature Museum, Northwestern University, and the University of Chicago (as evaluator).

E2SP aspires to take FOSS teaching beyond the first level of just using FOSS materials. The groups involved are working together to build a superior cadre of leaders by training teachers in intensive science teaching methods. At the same time, with connections to Chicago community science, cultural, and educational resources, students and teachers receive extended science experiences with FOSS content during trainings, school visits, and field trips. This innovative partnership has just completed its first year of work, generously supported by the Searle Funds at The Chicago Community Trust and the Polk Bros. Foundation. Building on last year’s success, the partnership will continue its work with the first cohort of schools in the 2010–2011 school year while planning for scale-up in the third year.

Linda Carter, Chicago Public Schools Citywide Science Facilitator/K–5 Science Specialist, explained that the pilot project has nine schools engaged in the program, involving all K–3 teachers per site. Over the school year, teachers attended museum and in-school trainings to further develop their FOSS teaching abilities, science content knowledge, and ability to use informal learning resources.
various exhibitions and also examined the properties of minerals in The Field Museum's Grainger Hall of Gems.

Darrell Jones, E2SP educator from the Chicago Children's Museum, supported the implementation of the FOSS Balance and Motion Module. At school, students built spinning tops, learned about tops from around the world, and predicted how long various tops would spin. On the field trip to the museum, students acted as “Force Detectives” by completing a treasure hunt in the WaterWays and Inventing Lab exhibitions where they identified and sketched examples of push, pull, and balance.

Lynn Arcuri, E2SP educator at The Peggy Notebaert Nature Museum, supported the FOSS New Plants Module. After students investigated the parts of a seed in class, they developed questions to be answered while exploring the museum’s Elizabeth Plotnick Prairie and examined how seeds are dispersed.

The E2SP program meets the partner institutions’ mission to improve science teaching and integrate informal learning with formal learning, as well as helps expand their visitorship. Each classroom participates in two field trips per year, structured to enhance the FOSS modules they’re studying. For some students

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To enhance each school’s capacity for teaching FOSS, one teacher at each site was selected to study in a leadership certificate program at Northwestern University. Through partial scholarships from Northwestern University and E2SP, teachers pay a reduced tuition. During the teacher-leaders’ two-year commitment, they attend university classes to unpack the state science standards and learn science inquiry methods and apply them to FOSS modules. To develop their leadership capabilities, teachers participate in various trainings in which they practice their skills. In order to examine their teaching practices and student learning from a deeper perspective, they record their own teaching in the classroom with flipcams to review and discuss with colleagues at the trainings.

The partnership between the project staff, school administrators, teachers, and students must be nurtured at many levels. The project staff from each partner institution meets every week to keep up involvement and to review and discuss project activities. Each partner museum developed lessons to cover two FOSS modules for grades K–3. Then museum educators collaborate with individual teachers and schools to help teach those units and support student learning.

Katie Murray, E2SP educator from Lincoln Park Zoo, supported the FOSS Animals Two by Two and the Structures of Life Modules. The Lincoln Park Zoo educator modeled and reviewed lessons with teachers to solve any problems related to working with living organisms. Then she visited the classroom to help implement parts of the FOSS investigations and brought special biomaterials from the zoo into the classroom, like animal pelts, to enhance students’ learning experience. When students visited the zoo, they used an ethogram, which is a tool zoo scientists use to study animal behavior.

Anne Marie Fayen, E2SP educator from The Field Museum, supported the implementation of the Earth Materials Module by providing teachers with additional geology samples and instructional support during the FOSS investigations. When students investigated in class, she helped them conduct tests to determine the properties of rocks and minerals. During The Field Museum field trip, students identified earth materials in
this is their first field trip experience visiting a local cultural/educational institution. E2SP funds pay for field trip buses for students. To inform families about learning opportunities in their local museums and zoo, E2SP distributes a flyer to highlight free museum days and upcoming programs.

Another integral part of the collaboration is the evaluation team from the University of Chicago’s Center for Elementary Mathematics and Science Education, who develop evaluation methods to measure the programs integrity. At the completion of the two-year pilot, the partners will use evaluation documentation and project reporting to share success with other area schools that might want to participate in the E2SP program.

The Early Elementary Science Partnership collaborators have already observed successes in the program. E2SP teachers are improving their science knowledge and comfort with teaching FOSS. E2SP teachers now know how to utilize the city’s cultural and science resources, strengthening the science teaching in their classrooms. E2SP students are thrilled about doing science and have enjoyed their field trips. Some students involved in the program were so excited about what they’ve been learning in science that they held a science celebration, where students toured other classrooms at the school to share their investigations. When teachers initiate that kind of happening on their own, that is also a measure of success.

For further information about the project, contact Sandra Aponte at saponte@fieldmuseum.org.

FOSS Collaboration continued

A teacher and students investigate an exhibit at Field Museum Gems Hall.

Observations continued

sage words of David Sobel, “If we want children to flourish, to become truly empowered, then let us allow them to love the earth before we ask them to save it.” (David Sobel, Beyond Ecophobia).

And save it they must. They will not achieve the necessary commitment to global rescue by being preached to or scared with portentous scenarios. The commitment to sacrifice and action on behalf of a planet compatible with human life will have to come from the hearts and minds of the players. So what are we doing about it?

We’re using FOSS as the medium to broker an introduction that may grow into a torrid love affair between students and Earth. And why are we doing it? We are doing it because it is part of our responsibility to act in the interest of all Americans. In 1988 the National Science Foundation provided money to start developing FOSS based on our commitment to develop a science curriculum that would provide a meaningful science education appropriate for the needs of the 21st century. Our reasons are a little selfish as well. We FOSSers have children and grandchildren and descendents yet unborn who we feel are entitled to a place in the sun and a patch of clean sand or green grass upon which to sit to marvel at the wonder of a planet replete with outlandish possibilities—a happy fruitful planet.

So we continue to labor over our curriculum products with the hope and expectation that when we get them right—that they speak to teachers in a profound way providing access to the natural world for children across the land. When the experience is right, it can transform classroom culture—that is, redefine the rules of engagement for teaching and learning. The encounters between students and natural phenomena are designed to stimulate young brains. The stimulus naturally proceeds to thinking. Student thinking is the Holy Grail of FOSS, that which we hold in the highest esteem. Thinking produces two desired outcomes. First, it motivates discourse—the active exchange of ideas that is critically important in the process of constructing knowledge. And, second, the final product of thinking is knowledge. Knowledge is the coherent, reasoned compilation of experience and possibility. Knowledge allows us to act with purpose and confidence in the natural world. My responsibility at FOSS is to guide and reinvent the natural world experience of the next generation of citizens.
FOSStering the Craft of Questioning
By John Cafarella, FOSS Consultant

Have you ever asked yourself, “How many questions do I ask in a day?” Then, “How many questions do I ask in my classroom during a day?” Extensive research indicates that the answer to both is “a lot.” As Jos Elstgeest says in Primary Science...Taking the Plunge: How to Teach Primary Science More Effectively, “There are many kinds of questions and their varying effect on children is striking.”

Given good research-based science materials and content, questions are the engines that drive a lesson and using them well is a craft. Here are some general categories in the form of questions to help you with question placement during a lesson.

Which child did you ask? Answers will vary. Do you ask the child anxiously waving his or her hand around to respond, or the shy child who you’re pretty sure knows the answer but needs some encouragement?

When do you ask it (place in the lesson, time of day, day of week)? We know afternoons are different from mornings, and all bets are off on a Friday afternoon in May.

What do you ask? Was it content based? Skill-based? Recall?

Why do you ask it? Summary point? Returning a student to task? Move on to the next step? Stir the pot?

How do you ask it? Teacher tone can affect the student’s answer. Did they know a question was coming?

Where are you when you ask it? Standing next to a student or at the far end of the room so everyone can hear the answer?

How long will the answer take? How long do you wait for a response? How long does it take the student to provide the response? Do you interrupt to speed things along?

In the FOSS Overview Folio, in each Teacher Guide, take a look at Encouraging Discourse. Keep in mind that questions are assessment, so you should also review the Assessing Progress section located in the Overview Folio. In the K–2 Teacher Guides, you should look at classroom discussions in the Science for Young Children section of the Overview Folio. Best practice research indicates that good questions posed by the teacher can enhance discourse by contributing to the development of concepts and vocabulary. Good questions help students connect ideas among the sciences. Thoughtfully presented questions promote thinking and draw students into sharing observations, communicating ideas, and uncovering relationships. (Note: “Does everyone understand?” is not a thoughtfully presented question.)

Write out some questions when planning the lesson. You can even write them on a transparency for the overhead, the white or chalk board, or on a Smartboard. Teachers seldom write down their questions while lesson planning; instead they tend to formulate them during the lesson. This practice can lead to vague questions that do not engage students in deep, high-quality thinking. Consequently things can turn ugly with unengaged learners who may misbehave out of confusion or boredom.

Sometimes when preparing a lesson, especially the first time you teach that lesson, your concerns are materials management, classroom management, timing, and pacing. You don’t have time to script the questions, and you’re not really sure what the questions may be. It’s nice to know that you’ll find questions waiting for you, in italics, in the Guiding the Investigation section of a FOSS Investigation. FOSS questions include...

Open-ended Questions, which encourage creative speculative thinking;

Valuing Questions, which allow students to reflect on the subject based on their own value structure; and

Feeling Questions, which invite students to share their personal feelings about aspects of the topic investigated.

You may wish to look at the following types of questions and integrate them into the “lesson engine” with your goals in mind.

If you want to help students build confidence and rely on their own understanding, you might ask (expect longer wait times):

- How did you reach that conclusion?
- Can you make a model to show that?
- FOSS Weather and Water Course—Is this the kind of weather you would expect to happen everywhere on Earth today? Explain your answer.

To help students learn to reason scientifically, you might ask:

- Is that true for all cases? Explain
- How would you prove that?

FOSS Levers and Pulleys Module—When you are trying to lift the lid off a can of paint, there is no metal cube to be lifted. Where is the load, and what direction is the load acting?

To assess student progress, you might ask:

- Can you explain what you have done so far?
- Why did you decide to use this method?
- What evidence supports your conclusions?
- Can you think of another method that might have worked?

FOSS Solids and Liquids Module—What if you needed to build a small bridge? Which solids would make a good bridge?

To engage all students and helping them make sense of science, you might ask:

- What do you think about what ___ said?
- Do you agree? Why or why not?

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Problem solving is essential and can be promoted by asking:

• What do you need to find out?
• What information do you have?
• What strategies are you going to use?
• What tools/materials will you need?

FOSS Food and Nutrition Module—Challenge students to design a method for testing the sugar content of liquids, such as sodas and fruit juices. Test the same citrus fruits used in the acid test.

If you wish to encourage student conjecture, you might ask:

• What would happen if ___?
• Do you see a pattern? Can you explain the pattern?
• What decision do you think he/she should make?

FOSS Populations and Ecosystems Course—What adaptations do the organisms featured in the video have that help them to survive and reproduce?

Problem solving is essential and can be promoted by asking:

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• What strategies are you going to use?
• What tools/materials will you need?

FOSS Mixtures and Solutions—How can these three mixtures be separated?

Sometimes students get “stuck,” they don’t know what to do next, things aren’t working, and they are getting frustrated. Ask:

• How would you describe the problem in your own words?
• What do you know that is not stated in the problem?
• Have you seen similar problems? What did you do with them?
• Would it help to create a diagram or draw a picture?
• Have you compared your work with anyone else?
• FOSS—These types of questions can be used during Choosing Your Own Investigation.

Questions can lead to connecting ideas among applications or disciplines.

• How does this relate to ___?
• What ideas or procedures have we learned that were useful in solving the problem?


During reflection, the learning takes place and the memories are created. Reflection can be encouraged by asking:

• Does your answer seem reasonable? Why or why not?
• What if you had started with ___ rather than ___?
• What have you learned or found out today? When did you learn it?
• What are the “key points” or “big ideas”?

FOSS Insects Module—What do caterpillars need to live?

The most powerful learning occurs during reflection, whether thinking about the conversation, or a book you read, or a completed investigation.

That’s a lot of questions. Should they all be asked every day? Yes they should, but only if you have eight hours for each lesson. If you live in the world where we are limited by time, you should select questions according to your goals and objectives. Teachers can script, write down some key questions and use them when appropriate. A good curriculum (like FOSS), provides teachers with many of these key questions.

Another lens for viewing questions is based on Bloom’s taxonomy. Questioning “à la Bloom” clarifies questions and results. Level one focuses on knowledge questions (the most frequently asked), recalling facts, terms, basic concepts and definitions. There are also comprehension, application, analysis, synthesis, and evaluation questions. Other than knowledge, all are open-ended, and they reveal student thinking as well as those nasty little misconceptions that students hide so well.

The most common kind of classroom question, quick recall, (knowledge) elicits the lowest level of intellectual engagement. Examples are “What is the definition of mass?” and “What is the name of the ninth planet from the Sun?” (a trick question since the demotion of Pluto). Faced with such questions, students can either be “right” or “wrong,” but you don’t really know why they are right or wrong. To paraphrase Alexander Pope in “An Essay on Criticism,” too much knowledge (questioning) can be a dangerous thing. Recall questions don’t assess your students’ comprehension and abilities to apply, analyze, synthesize, and evaluate. The following are some sample questions found in the FOSS investigations that illustrate questions that support the Bloom approach.

Knowledge/Comprehension: Student exhibits learned material by recalling facts, terms, basic concepts, and answers.

Magnetism and Electricity Module: Can the force of magnetism act through materials?

Comprehension: Student exhibits understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.

Air and Weather Module: Do you see anything that tells you air is moving?

Application: Students solves problems by applying acquired knowledge, facts, techniques, and rules in a different way.

Variables Module: If you had a piece of fishing line could you get your plane to fly the entire length of the line?

Air and Weather Module: Does it take more or less wind to fly a kite than to move a bubble? Than to spin a pinwheel? Why?

Synthesis: Student compiles information in a different way by combining elements in a new pattern or proposing alternative solutions.

Chemical Interactions Course: If we wanted to study the gas in greater detail to find out, for instance, how much is produced by the reaction, what would you suggest we do?

Evaluation: Student presents and defends opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.

Human Body Module: Which tasks were the most difficult? What made them hard?
To pace a class with questioning, we need to slow the rate of conversation to encourage discourse. Students must learn to sit quietly and give the questioned student time to reflect. They must also learn when to support another student with a suggestion or an answer.

To summarize, questions should be scripted. Put them in the lesson plan. Keep in mind using the right question at the right time. Questions encourage thinking and discourse. Questions are not a teacher to student one-way street. Questions should come from students, too. That includes questioning each other. Questions form the engine that keeps your lesson moving and focused. Questioning is a craft. You need to keep working at it to remain proficient.


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FOSS Tech Corner for K-6 Modules

**FOSS K-6 Teacher Preparation Videos Now With Closed Captioning on FOSSweb**

FOSS K-6 teacher preparation videos on FOSSweb now feature a new video player with closed captioning. This new video player has English captions that can be toggled on or off by selecting the “CC” button in the lower right portion of the player. Closed captioning will be available for all online teacher prep videos by fall 2010.

The teacher preparation videos can be accessed at the following location: http://lhsfoss.org/FOSSweb/schools/teachervideos/index.html. You can also find the teacher preparation videos by going to www.FOSSweb.com and selecting your grade level. Then select your module from the list of FOSS module titles. From the module homepage select “Teacher Resources” from the “Teacher and Parent Info” column on the left side of the page. Then select the “Teacher Prep Videos” icon. To view the teacher preparation videos you will need Adobe Flash Player 9 or higher. Adobe Flash can be downloaded for free at www.adobe.com/downloads/.

**FOSS National K-6 Science Stories Now on iTunes U**

Teachers and students who wish to download audio files of the FOSS Science Stories for computers or MP3 players can now do so using iTunes U. Links to the audio stories in iTunes U can be found on the module home pages on FOSSweb. From the FOSSweb welcome page, select your grade level. Click on the icon representing your module to go to the module homepage. On the module homepage, select the “Media” button on the left side of the page. Then click the “Audio Stories” icon. On the audio story page you will find a link to the audio story in iTunes U. Clicking this link will launch iTunes U and will bring you to the module in iTunes U. To listen to a track in iTunes, double click on a chapter name. To download the file to your computer, click the “Get” button under the “Price” column in iTunes. All the audio files are free of cost.

The FOSS National audio stories can also be directly accessed through the following browser link: http://deimos3.apple.com/WebObjects/Core.woa/Browse/lawrencehallofscience.org.3443263813.

iTunes version 7 or higher is required for users who wish to play or download MP3 compatible audio stories. Mac users must have system 10.3.9 or higher to download and install iTunes.

**FOSS California Teacher iTunes U for K-5 Modules**

FOSS California teachers can find audio versions of the California FOSS Science Resources books as well as teacher preparation videos for download on iTunes U. From the FOSS CA homepage (www.FOSSweb.com/CA) select the “For Science Resource Specialists” link (www.FOSSweb.com/CA/srt.html). Select your grade level from the top of the page. In the table locate your module. You will find direct links to iTunes U for both the science resource book audio files and the teacher preparation videos.

The FOSS CA iTunes U Channel can also be directly accessed through the following browser link: http://deimos3.apple.com/WebObjects/Core.woa/Browse/lawrencehallofscience.org.3342365393.
The FOSS staff is excited about using the schoolyard to teach science. We’re not alone. Last fall’s NSTA workshops about Taking Science Outdoors overflowed with educators interested in using their schoolyards. Not only does it feel good and is fun both for students and teachers, but, according to research, it works!¹

If you want to begin heading outdoors with your students but need a little support, you may want to check out one of these books. And check out the OBIS (Outdoor Biological Instructional Strategies) website for more information about extending FOSS into the outdoors. http://www.outdoorbiology.com/

This issue’s books were reviewed by Erica Beck Spencer, FOSS Developer/OBIS Co-Director.

**Outdoor Inquiries: Taking Science Investigations Outside the Classroom**

The pool of expert outdoor educators and naturalists who influenced this book is surprisingly deep—we’re talking get-your-life-jacket-on deep! You can trust that everything you read in this book has been thoroughly tested with students in a variety of settings through a variety of seasons across the country. *Outdoor Inquiries* will help you structure your outdoor work to help students become “inquiring naturalists.” The book is written for formal and informal educators who teach students in upper elementary and middle school. Woven throughout the book are great techniques and strategies for improving learning effectiveness with students.

**Ten-Minute Field Trips: A Teacher’s Guide to Using the Schoolgrounds for Environmental Studies (3rd edition)**

Don’t let the fact that this book was originally published in 1973 fool you into skipping it; it is quite timely for today’s teacher. The economy has drained the once available funding for field trips. Ten-minute field trips are something you have time for and can afford! This book is brimming with ideas for things to try and observe right outside the classroom door. Russell embraces the use of the schoolyard no matter where your school is located; many of the mini field trips described in this book can be performed on the asphalt of an urban schoolyard. Russell presents straightforward background knowledge for you and thoughtful inquiry questions for your students.

**Schoolyard-Enhanced Learning: Using the Outdoors as an Instructional Tool, K-8**

This is a great book that incorporates the most recent research from experts who are working to connect children to...
the outdoor world. It is well-researched, exciting to read, and grounded in the realities of today's school experiences. Broda writes, "Although there are many good reasons for taking students outside—educational, social, aesthetic, recreational—I have to admit that one of my most compelling reasons is to provide opportunities for kids to experience that sense of wonder . . . The more we take children outside for learning activities, the greater the probability for moments of awe and insight." This book gives you everything you need to start using the schoolyard.

**Creating Outdoor Classrooms: Schoolyard Habitats and Gardens for the Southwest**


If you're designing an outdoor classroom anywhere in the country, you will collect valuable information from this sophisticated book, despite the fact that it is specifically written for schoolyard habitats in the Southwest. Johnson writes, "Schoolyards can be developed as outdoor classrooms that are spirited and interactive places for integrated and place-based learning. Children can play a major role in the design and implementation of the place. Characterized by natural, cultural, and artistic features, schoolyard outdoor classrooms can be dynamic . . . " The book is packed with information about design, design features (including shade structures—which are important to consider all over the country), community building, maintenance, art features, and great ways to include students in the design process.

**Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder**


Today's wired generation is the focus of this work linking the absence of nature in today's children to trends in obesity, attention disorders, and depression. Louv uses recent research to suggest that direct exposure to nature is essential for healthy childhood development. This book should bring about challenging discussion about how "nature deficit" affects students in your classroom.

**Beyond Ecophobia: Reclaiming the Heart of Nature Education**


If you teach, or feel you should teach, about environmental issues to students in grades K–8, then it is essential that you read this book. Sobel's primary argument is that well-intentioned educators often dive into issues about how humans are destroying Earth (rain forests are burning, polar bears are dying, oil is killing everything) at too young of an age. He writes, "What's important is that children have an opportunity to bond with the natural world, to learn to love it, before being ask to heal its wounds." He proposes three phases of environmental curricula, "In early childhood, activities should center on enhancing the developmental tendency toward empathy with the natural world; in middle childhood, exploration should take precedence; and in the early adolescence, social action should assume a more central role."

If you would like to read more from David Sobel see his article "Climate Change Meets Ecophobia." Connect® Vol. 21, No. 2, Nov./Dec. 2007. [http://www.synergylearning.org/cf/displayarticle.cfm?selectedarticle=683](http://www.synergylearning.org/cf/displayarticle.cfm?selectedarticle=683)

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Texas A & M University, in conjunction with the Texas Education Agency, conducted a meta-analysis to identify and rank effective instructional methods for science education. The highest ranked teaching strategy was Enhanced Context Strategies, which includes using the schoolyard for lessons.


Link to the full report online. [http://www3.science.tamu.edu/cmse/tsi/](http://www3.science.tamu.edu/cmse/tsi/)

For questions or comments regarding this research, contact:

Carolyn Schroeder
Center for Mathematics and Science Education
Texas A&M University -- Mail Stop 3257
College Station, TX 77843-3257
e-mail: cschroeder@science.tamu.edu
979.458.4550
Since the Deepwater Horizon explosion the night of April 20, 2010, we are all exposed to news about the oil spill in the Gulf of Mexico in the newspaper, on TV, and on the radio. It is difficult for young and old alike to comprehend the extent of this disaster, especially when we are miles away from its direct effects. It is a complicated and even scary situation, especially for children.

There are many resources online that you can use with your students to begin talking about the oil spill and to help them understand and cope with this and future environmental problems. Here are just a few sites you might review as you decide how to present the situation to your students, keeping in mind the grade level with which you are working.

**How to Talk with Kids About the Gulf Oil Spill: A Guide for Parents and Teachers**

This Ranger Rick website includes a number of great resources for students, teachers and parents. It provides a number of ideas to help adults provide developmentally-appropriate background information for the young people in their lives, including information about the effects on animals and the landscapes in and around the Gulf.

**National Wildlife Federation**
http://www.nwf.org/Oil-Spill.aspx

This site includes information, multimedia and ideas for getting actively involved in the recovery of the Gulf.

**Restore the Gulf**
http://www.restorethegulf.gov/

RestoretheGulf.gov is the official federal portal for the Deepwater BP oil spill response and recovery. This site provides the public with information on the response, current operations, news and updates, how to file a claim and obtain other assistance, and links to federal, state and local partners.

**NOAA Office of Response and Restoration**
http://response.restoration.noaa.gov/

Current information about the extent of the oil slick is available from the Office of Response and Restoration at the National Oceanic and Atmosphere Administration. Go to Information for Students and Teachers > Oil Floats and Spreads. Here you will find an experiment, designed for elementary school students, that shows how oil behaves in water and an extension activity that demonstrates the procedure for caring for wildlife affected by the oil.

**U.S. Fish and Wildlife Service**
**FWS Oil Spill Response**
http://www.fws.gov/home/dhoilspill/index.html

This site includes information about the impact of the oil slick on wildlife.

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**Music About Science: Here Comes Science from They Might Be Giants**
By David Lippman, FOSS Project Specialist

Science is Real / From the Big Bang to DNA … begins the first track on *Here Comes Science*, a family album from Brooklyn-based band, They Might Be Giants (TMBG). The band has been making music for more than 20 years, and their last family album, *Here Come the 123s*, won the 2009 Grammy for Best Children’s Album (Music).

While drawing on the wonderful pop-stylings of their previous family albums, *Here Comes Science* is not simply an album for younger kids. Young students will enjoy the album for what it is, a fun, well-produced family album, while older students may actually glean some small understandings of science from songs like “Roy G. Biv” (R is for red / O is for orange / Y is for yellow etc.) and “Photosynthesis” (Chlorophyll cells take in carbon dioxide / Now that’s the air that we breathe out).

TMBG took making this album seriously. They worked with Eric Siegel, director and chief content officer of the New York Hall of Science, on the album’s science content. “Why Does the Sun Shine?”, a song the band has been performing for years, makes the cut, but a revised version, “Why Does the Sun Really Shine?”, with updated content, immediately follows.

This won’t be an album you design curriculum around, or even incorporate into a module. But it’s great to have such a catchy album about science, and it may make a great musical background during a free time period.

(NOTE: The *Here Comes Science* album is available online from a number of music outlets or at the They Might Be Giants [TMBG] website: http://www.theymightbegiants.com/.)
FOSS Institute

Delta Education will host a one-day FOSS Institute on March 9, 2011, before the NSTA National Conference in San Francisco, California. This Institute will be for educators from districts that have implemented FOSS for at least a year. The Institute will focus on *Using Science Notebooks*. This Institute is designed for experienced FOSS 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 write, fax, or e-mail:

Pam Frisoni  
Delta Education  
80 Northwest Boulevard  
Nashua, NH 03061  
pam.frisoni@schoolspecialty.com  
Fax: 603.579.3504

FOSS CA Newsletter E-blasts

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

NSTA 2010 FALL AREA CONFERENCES

K–8 Commercial Workshop Schedule

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

**THURSDAY (Oct. 28, Nov. 11, Dec. 2)**

- 8:00–10:00  Using Science Notebooks with FOSS Middle School
- 11:00–1:30  A Sneak Preview of the New Planetary Science Middle School Course from FOSS
- 2:30–4:30  Using Science Notebooks with FOSS K–6

**FRIDAY (Oct. 29, Nov. 12, Dec. 3)**

- 8:00–10:30  Using Middle School Science Notebooks to Assess Learning with FOSS (For Experienced Users)
- 11:30–1:30  Taking Science Outdoors with FOSS K–8
- 2:00–4:30  Using Elementary Science Notebooks for Formative Assessment with FOSS (For Experienced Users)

About This Newsletter...

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

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

Sue Jagoda, Editor (skjagoda@berkeley.edu)
FOSS Newsletter
Lawrence Hall of Science
University of California
Berkeley, CA 94720-5200

The deadline for submissions to the next issue is December 10, 2010. We’re waiting to hear from you.

See you at the NSTA Area Conferences this fall!

Look for the Taking FOSS Outdoors Folio at www.FOSSweb.com!