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Announcing Chemical Interactions

A typical day presents us with countless opportunities to wonder. I wonder what this bagel is made of. What happens to water when it freezes? Where does sugar go when I put it in iced tea? Why do bubbles form when I mix vinegar and baking soda? How does cocoa get hot on the stove, and how does orange juice get cold in the refrigerator? These are all interesting questions.

You and your students will pursue answers to these questions in the Chemical Interactions Course for grades 7–8. Students design and conduct investigations, gather, organize, and analyze data, and develop models and explanations to express their understanding of mundane, but provocative, everyday events and experiences. Multimedia animations and simulations enhance students’ concept development, and their ideas are reinforced and extended through readings developed specifically for this course.

The Chemical Interactions Course provides students with their first engagement with a number of fundamental, highly abstract concepts, which are essential for grappling with the two big questions in chemistry: What is common matter composed of? In what ways does matter change and under what conditions?

As the course unfolds, students develop these understandings.

❖ Matter is made of particles called atoms. Ninety different kinds of atoms, each representing an element, occur naturally on Earth.
❖ A substance is a unique form of matter. The basic particles

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of the millions of substances on Earth are combinations of the 90 naturally occurring kinds of atoms.

- The particles in substances are in constant motion. Particles in motion have kinetic energy. There is only space between particles.
- The kinetic energy of particles is related to heat. The greater the kinetic energy, the greater the heat.
- Energy transfers from one particle to another when they collide. Energy transfer by contact is conduction.
- When particles acquire energy, they move faster and hit other particles harder. This pushes particles farther apart, causing expansion.
- Energy transfer (to and from particles in a substance) causes phase change.
- A solution occurs when one substance breaks down into individual particles (dissolves) and becomes distributed uniformly among the particles of another substance.
- During a chemical reaction, starting substances transform into new substances when the atoms in particles of the starting substances rearrange to form new particles.

The Chemical Interactions Course is not a simplified high school chemistry course. Students are not introduced to atomic structure—proton, neutron, electron orbitals—and the electrical properties of atoms that predict their reactivity. Bonds are mentioned only in passing as the attractive forces that hold atoms together in particles. The content of the Chemical Interactions Course stays focused on four big ideas: particulate theory of matter; combination and recombination of atoms to form substances; kinetic theory of particle interaction; and the effects of energy transfer. These ideas are prerequisite to the more advanced, increasingly mathematical concepts that students will encounter in a few years. We believe the content of this course provides the conceptual foundation on which students can build the more rigorous, intellectually demanding concepts they will encounter in high school.

The design of the Chemical Interactions Course also agrees with guidelines set forth in the soon-to-be-released major report from the National Research Council, Taking Science to School—Learning and Teaching Science in Grades K–8. The report describes a recommended learning progression for chemistry education, identifying the following concepts as appropriate for students in the seventh and eighth grades.

- Matter is composed of discrete particles (atoms).
- There is empty space (vacuum) between particles.
- Each atom takes up space, has mass, and is in constant motion.
- Over 100 different kinds of atoms exist; each kind has distinctive properties, including its mass and the way it combines with other atoms or molecules.
- Atoms can be joined (in different proportions) to form molecules and networks—a process that involves forming chemical bonds between atoms.
- Molecules have different characteristic properties than the atoms from which they are composed.

So, what is the most common element in our Solar System, and which element is most common on Earth? In the atmosphere? In you? What is temperature? Why does steel expand when it gets hot? How can water evaporate from a pan that is well below the boiling temperature? Why does a cup of hot cocoa cool down? What causes butter to melt? If you are not sure, ask your middle school students after they have traveled the FOSS Chemical Interactions path. They’ll know the answers. ☺️
Imagine being a primary teacher surrounded by emergent readers. You want to provide your students with opportunities to practice reading in the content areas. You have the books supplied with the FOSS kits, but the vocabulary is a little bit challenging for some of your readers. What do you do?

Thanks to the staff of the Math and Science Kit (MASK) Center at Educational Service District 113 in Olympia, Washington, you can have your students listen to audio files of the books as they follow along in the student books. The books are expertly read by Zachary Blanton, a second grader at Hanson Elementary School in Olympia. Zachary’s pleasing voice is sure to appeal to readers in the primary grades.

The audio files were the brainchild of Deborah R. Hale, director of the MASK Center. “I had been learning about podcasting and thought about the FOSS books,” said Hale. “I know that reading along with a fluent reader is a way to increase fluency and comprehension in young readers. I knew that Zachary was perfect for the job, because he is an excellent reader and has such a charming voice.” Cindy Jouper and Lynne Forbush assisted Hale in producing the audio files. The files are now available on the FOSS website at http://lhsfoss.org/fossweb/teachers/audio/index.html.

Zachary is currently a third grader and is excited to share his love of reading and science with other students who are using the FOSS materials.

Zachary was the reader for the audio versions of FOSS Science Stories for grades K–2.

Distance Learning for Teachers in Rural Washington

What’s it like to be a teacher new to the FOSS curriculum and living in a remote and rural area of southwest Washington state? How do you obtain staff development? This conundrum was on the mind of Deborah Hale, Math and Science Kit Center (MASK/ESD 113) in Olympia, Washington. She sought to expand their center’s outreach to teachers new to FOSS in their region. With a robust videoconferencing system already in place across the state of Washington, Hale looked for support from ESD 112 in Vancouver, Washington, who were already working with videoconferencing. Hale contacted Anne Kennedy, the director of ESD 112’s Science and Math Education Resource Center (SMERC). Anne Kennedy has been instrumental in establishing training and support in ESD 112, as well as the establishment of a FOSS teacher leadership institute program. Anne was supportive of the ESD 113 proposal, helping to nurture the fledgling project by providing space and materials for trainings at SMERC.

Videoconference trainings have been offered nearly once a month for several grade levels and FOSS kits over the past two school years. Emily Hopple, an experienced FOSS consultant, conducts the sessions. These trainings have provided quality FOSS after-school staff development for districts that are well over 200 miles away. Teachers who might otherwise have to get
in a car and drive several hours to a training session were now able to stay in their district for the workshops. Making enough training sessions available for the different grade levels and modules remains a challenge. However, it is a welcome challenge.

This was Emily’s first experience with videoconference training. Videoconferencing coordinators at both ESDs, Carrie Sherman, ESD 113, and Laura Anderson, ESD 112, were helpful and patient as Emily learned to utilize the document camera while conducting her regular FOSS training. Emily quickly learned to make smooth transitions. Deborah Hale steps in during the sessions to facilitate the question-and-answer portions and round-robin discussions.

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Rock Around the World: Scientists Need Your Help!

Mars scientists are asking students from around the world to help them understand the red planet. You can send in a rock collected by you (or your classroom) from your region of the world. Then scientists will use a special tool like the one on the Mars rover to tell you what it’s made of. A picture of your rock and information about what kind of rock it is will be posted on the Web. Then everyone can compare their rocks to the ones found on Mars. Your rock will be kept in a special collection where scientists from around the world can come to study them.

For more information about the Rock Around the World project, check out this website, http://marsprogram.jpl.nasa.gov/rockworld/.
“My students can’t read. Tell me how I can justify teaching science.”

This challenge was voiced by a teacher attending a science conference in California as schools and districts prepare to adopt new science curriculum materials. Such statements are disappointingly frequent, and they break my heart. I have seen understanding of science education and its importance in the education of our young people erode to an alarmingly low level. Still, I refuse to give up the crusade for good science education for our citizens. To do so would be to give up on the future of our great country and our extraordinary planet. So I respond to the teacher by saying...

First of all, your students can read, but often not at grade level. Students’ functional reading should be exercised in authentic environments, like science. This is where information in text format is of greatest value to all of your students, accomplished readers and emerging readers alike. So, whatever reading ability your students have, give it wings so they can use it to enhance and color their science inquiries.

Second, because your students are delayed readers, it is doubly important that they are presented with stimulating intellectual learning experiences that are not text dependent. Active-learning science experiences are appropriate for every student, providing a consistent, accessible opportunity to learn for all. Equity issues imposed by text-dependent activities must be considered. Text-intensive activities discriminate against students who are delayed readers. Active-learning science experiences provide opportunities for success for all students.

Plus, there is solid research evidence now showing that hands-on, active-learning experience stimulates the development of reading skills. Students who think critically about science phenomena—recording data, drawing conclusions, and explaining phenomena—advance faster with their reading skills than their peers who do not benefit from active-science instruction.

The current preoccupation with reading instruction can be counterproductive for many students. So-called nonreaders are labeled as such because, obviously, they are poor readers. It is fair to say they are experiencing failure by the judgment of the schooling standards. Our contemporary response to below-grade-level reading performance is to hammer the child with more reading instruction—three or four hours a day. That is three or four hours of failure a day for students struggling with reading. It is counterproductive to focus only on the one thing a student cannot do.

The logical alternative for our nonreaders is to provide them with a wide variety of alternative learning opportunities, especially in active science, where they will have success and maintain enthusiasm for learning. Our education system is currently misguided, denying millions of students the opportunity to engage in science and learn about the natural world.

Teaching science is justified in many ways. First, it is required by the State of California and most other states as well. States have standards, and every child is expected to meet them. They can master the standards only if coherent, consistent instruction is provided. Thus, there is no justification for NOT teaching science.

Second, science is the largest body of human knowledge, the most influential in the affairs of humanity, and the cornerstone to western civilization. Knowledge of scientific principles and the ability to think scientifically and engage in scientific discourse are required for citizenship in the 21st century. Science has content (reading and arithmetic have little as they are usually taught as skill), which means there are valuable things to know in the area of science—things that have impact on our lives, the health of the planet, production of food, water quality, diversity of life, the operation of ecosystems, and a million other important and fascinating things.

Finally, science is fun and exciting. Science is about the natural world, so it is filled with the beautiful, the amazing, the unexpected, the dangerous, the mysterious, and the unknown. There is always a surprise to be pondered and figured out in the natural world. And figuring it out is stimulating. Science is the playground of the mind—the place where students discover things about their environment, their companions, and themselves. And, when students have the opportunity to take part in the science adventure, the character of the class transforms. Visit a classroom where FOSS is being used by a skilled teacher and watch students deeply engrossed in their investigations. The joy of learning is palpable. You can see it in their eyes and hear it whispered around the room. The wonderful message is, “we’re doing science now!”

The young fellow in this picture was a delayed reader. He didn’t decode until third grade and didn’t read with fluency until he was in sixth grade. But he is OK. He grew up in an earlier era when teachers didn’t panic if a student was below grade level in reading. He was included in a full, rich curriculum—social studies, science, math, music, fine arts, physical education, dramatics, domestic arts. He grew up well educated and remains an enthusiastic learner to this day. And yes, he is a fine reader and makes his living as a writer. I shudder to think what might happen to that same young man entering school today.
In 2003, Lake Washington School District reorganized to better serve the professional development needs of its teachers. This decentralized system resulted in a more responsive professional development structure that could efficiently deliver information and resources to teachers in the district. The new organization has been critically important to the successful implementation of FOSS in the district over the past three years.

The district, which covers 75 square miles on the east side of the Seattle metropolitan area and serves approximately 24,000 students and their families, has divided its schools into four learning communities. Each community is headed by a Director of School Support, and each of the 41 elementary and junior high schools has a leadership team including four teacher leaders, one each in the areas of literacy, science, math, and technology. (High schools, also a part of the learning communities, are organized somewhat differently.) The Directors of School Support work to support the schools within their learning communities, including providing support for principals. The teacher leaders serve as advocates, mentor/coaches, model teachers, resource coordinators, and professional development facilitators.

Before moving to the learning communities model, the district administration, along with the professional development team and principals, planned many of the professional development activities based on data from testing and district goals.
The district professional development specialists then offered workshops and classes for teachers throughout the district.

Now, individual schools determine the professional development that teachers feel they need to help students learn. Professional development planning starts with conversations around student work; the school leadership teams examine student work to see what students know and can do. Based on the learning data, teams then create goals for each grade. The professional development plan is also informed by what teachers feel they need to help students meet specific school goals. Often the professional development is designed and led by the site teacher leaders, or even grade-level teachers. As a result, one school may provide different professional development opportunities than another school in the same learning community.

Of course time is always an issue, and in order for learning communities to be effective, teachers need time to work together around their school’s student learning goals. In order to improve effective communication in the learning communities, the school schedule was modified to allow time for teacher collaboration. The district now supports five full-day training days (three of which are release days) throughout the year and a two-hour early release each Wednesday. The Wednesday release time can be focused on school, grade level, or individual goals. This schedule not only allows the whole staff to work together during a release, but also allows for important conversations at the team or individual level. Teacher leaders are also provided release time to attend meetings, paid a stipend, and have paid time for evening and weekend meetings.

At a recent Wednesday meeting, an elementary science teacher leader, Jennifer Cruze, facilitated a two-hour FOSS formative assessment training for the staff at her school. This training covered the distinctions between formative and summative assessment, the types of formative assessments used in the FOSS program, and how to use the formative assessment strategies with actual student work. Later, teachers had the opportunity to look at their own students’ work using the formative assessments in their specific FOSS modules. Many teachers use this time to collaboratively look at student work to determine specific skills or concepts.

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Learning Communities continued

needs work and then planning instruction to address specific student needs.

Teacher leaders also communicate with other schools in their learning communities. The leadership teams from each school in the learning community meet once a month for a two to three hour meeting. This meeting allows for communication on any pertinent topics and for planning meetings for all the teachers within a community. On the five full-day professional development days each year, teachers generally meet with their entire learning community. For example, the initial FOSS grade-level training was a learning community day. The rest of the science work—related to topics such as inquiry and assessment—was done at the schools by teacher leaders. In addition, teacher leaders meet together to share their schools' work, determine common goals, increase their own expertise, and plan together. These meetings facilitate the dissemination of information within each learning community and throughout the district.

Now in its third year, the program has successfully moved from a more centrally directed professional development model to a locally distributed model where the professional development is embedded in the daily work of teachers at the school level. The establishment of science teacher leaders with a depth of knowledge in both content and inquiry has allowed the district to further support teachers in the implementation of the FOSS curriculum. Now teachers just need to jog down the hall to get questions answered by a teacher leader. Teachers appreciate the opportunity to collaborate and influence their own professional development based on their schools' needs. Teachers are more involved in their own professional development and receive training better matched to their specific needs.

Providing time for teachers to work together is clearly impacting student learning. Working collaboratively has allowed teachers to look at data from a variety of assessments and to plan effective lessons to help all students learn. Last year the junior high science teachers focused their work on aligning and clarifying standards and teaching inquiry. Students benefited from the extra efforts teachers made to look at their practice. The district's junior high science scores improved by 13 points in one year, with positive gains in elementary school WASL (Washington Assessment of Student Learning) scores as well.

The Lake Washington restructuring process involved several profound changes in District operation. First was the reorganization of a fairly large, centralized district into four more responsive learning communities of about 10 schools and 6,000 students each. The leaner units meant more manageable numbers at planning meetings and more efficient communication among teachers throughout the communities.

Second, Lake Washington made substantial investments in the professional development of its
teachers. Time is precious in education, and the district wisely committed a substantial amount of it for teachers to participate in professional development activities. In the case of science, every teacher received initial training on how to use the FOSS modules effectively and subsequently participated in professional development activities to refine and focus their science teaching practice. To ensure the professional development experiences were maximally effective, time was also provided for the leadership team at each school to do extensive planning. Having time to plan, collaborate, and reflect ensures that there is a shared sense of direction and purpose in the district.

Third, the district invested in people. The district has three science specialists in the professional development office who stay connected with science education issues and policies and convey important information and services to the schools. At the site level, each school has a teacher leader in science. The extra services provided to the staff at the school are supported by stipends from the district. This supported time guarantees that there is a person thinking about and promoting science issues at the school at all times.

Finally, Lake Washington has not lost sight of the reason for engaging in this demanding restructuring process: better learning opportunities for students. The site-based professional development activities during the third year of the process concentrated on student work. Teachers learned to trust the evidence presented by students themselves as the best indicators of the effectiveness of the teaching/learning process. This data-based approach to understanding student performance guided the focus of professional development activities at the schools. As a result, teachers are better attuned to the needs of their students, they are better able to make informed judgments about modifying their practice, and the students learn better and perform at a higher level.
The universe is what it is, not what we want it to be, and science must always be open to correcting its mistakes.

(From NASA—Pluto, Classification and Exploration)

A few weeks ago the topic of Pluto came up for discussion at our dinner table. My 14-year-old daughter mentioned that they had been talking about Pluto during band rehearsal. She related that one young man had considered that, “...When I’m older and have children, I’ll be able to tell them I knew when there used to be nine planets in the Solar System.”

So, what happened to Pluto? Why was it “demoted” from being a full-fledged planet to the category of dwarf planet? Why do we now name only eight planets in the Solar System? And, why does it matter?

Several astronomers had predicted the existence of Pluto after observing irregularities in the orbits of Uranus and Neptune. They suggested that a more distant, unseen planet was affecting their orbits. One of the astronomers was Percival Lowell, who is credited with the successful prediction of the planet’s orbit. He started the search for the planet, which was ultimately discovered by Clyde Tombaugh at the Lowell Observatory in Flagstaff, Arizona. The discovery happened on January 23, 1930, when Tombaugh compared the photographic plate he took through the observatory’s 13-inch telescope that evening with two other plates taken earlier in January. Pluto showed up as only a point of light moving extremely slowly against the background stars. Even now, with the Hubble Telescope, astronomers have been able to capture only blurry images of Pluto and its satellite Charon (discovered in 1978).

In 1930 there was no way to determine the mass of Pluto, so without this information it was not recognized as a new class of object. For many years, the size, mass, and density of Pluto were thought to be similar to those of Mars. Then in 1978, James W. Christy discovered Pluto’s satellite, Charon, using the 61-inch astrometric reflector of the U.S. Naval Observatory in Flagstaff. Pluto’s mass could now be calculated using Kepler’s laws of motion. Its mass was calculated as 1/400 of Earth’s mass with a diameter of less than 2414 km—it was smaller than the Moon! The seeds of the debate about Pluto’s planetary status were sown.

Until August 2006, there was no scientific definition for the word “planet.” The word planet originally came from the Greek and meant “wanderer.” Planets were objects that appeared to move across the background of fixed stars. The historical use of the word identified nine planets in the Solar System: Mercury (My), Venus (Very), Earth (Educated), Mars (Mother), Jupiter (Just), Saturn (Sent), Uranus (Us), Neptune (Nine), Pluto (Pizzas). (Substitute whatever mnemonic you used to remember the order of the planets.) The historical definition went something like this: Any of the nine large celestial bodies in the Solar System that revolve around the sun and shine by reflected light (from wordnet.princeton.edu/perl/webwn).

The historical definition for planet worked just fine for many years. Pluto fit the definition, but with the dawn of the space age and the development of new telescopes like the Hubble, other planet-like bodies were discovered orbiting the Sun, including Xena, Eris, and members of the Kuiper Belt, revolving around the Sun at a distance of 4.5 to 7.5 billion km (2.8 billion to 4.6 billion miles). The discussion about which objects should be called planets came to the forefront at the International Astronomical Union (IAU) in Prague on August 24, 2006. At this meeting, the first-ever scientific definition came to a vote. The new definition changed Pluto from planet status to that of a dwarf planet.

New Definitions

In all scientific endeavors, when new evidence is produced, definitions and theories may have to be modified or created. This is what happened with the latest discoveries in the Solar System. Not only was the term “planet” provided with a scientific definition, new terms had to be selected and defined to help categorize other objects.

So, what is the new scientific definition of a planet? A planet in our Solar System is

- A celestial body that orbits the Sun.
- Has sufficient mass to become round.
- Has cleared the neighborhood around its orbit.

Under this definition Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune all qualify as planets. Neptune affects Pluto’s orbit, so Pluto hasn’t “cleared the neighborhood around its orbit.” Pluto is now designated a “dwarf planet”—a descriptive term still under discussion. A dwarf planet is like a planet, except it does not clear the neighborhood around its orbit. Other dwarf planets include Ceres, the largest asteroid found in the Asteroid Belt, Pluto’s satellite Charon, Xena, and Eris. At this time the IAU is evaluating other objects in the Solar System, particularly those in the Kuiper Belt, to determine whether there are other dwarf planets.

With more observations of the eight planets, further categories have been established. Mercury, Venus, Earth, and Mars are the terrestrial planets—made mostly of rock. Jupiter, Saturn, Uranus, and Neptune are the gas giants—large planets composed mostly of hydrogen and helium and probably having a rocky or metallic core. These categories are again descriptive and are not officially defined by the IAU yet. A new category, pluto, is being reviewed and defined by the IAU. Plutons have enough mass to be round, but are distinguished from planets by their orbits. Their orbits around the Sun take longer than 200 years to complete (i.e., they orbit beyond Neptune), are highly tilted with respect to the classical planets, and are far from being perfectly circular. Pluto, Charon, Eris, and Xena would all fall into this category.
Why Does It Matter?

The announcement that Pluto was being demoted to dwarf planet status caused a furor in some circles. Some members of the general public reacted strongly to the change in Pluto’s status. The reaction is described in the web article, NASA: Pluto, Classification and Exploration.

Who would have thought so many people cared about Pluto? Some seem to be worried that their world view will now have to be changed from the one they acquired based on their textbooks. But surely the definition of textbooks...is that they change with new knowledge.

Even astronomers are not all in agreement over the new definition of planet. Over 300 scientists have signed a petition against the IAU resolution. Pluto’s destiny may yet be undecided. The petition states:

We, as planetary scientists and astronomers, do not agree with the IAU’s definition of a planet, nor will we use it. A better definition is needed.

Such is the nature of science—new knowledge stimulates new ideas and possibly new classifications. Debate continues, and agreement may or may not happen. As exploration goes on and knowledge accumulates, old ideas may evolve or be scuttled. New questions will be asked, and answers will be proposed. That’s how science is supposed to work.

Your students may think dropping Pluto from the classical planetary line-up is a good thing—one less planet to memorize. What a great opportunity to discuss the scientific process with your students! You might consider setting up a debate between groups of students concerning the new definitions, having them gather evidence to support their cases for accepting the new definition or retaining the old. Encourage them to study Pluto’s place in astronomical history and keep track of the debate happening today. Then, when they mention to their children that they remember when there were nine planets in the Solar System, they’ll have more to talk about than how an old memory device had to be changed.

Resources


Pluto (NASA Solar System Website), http://solarsystem.nasa.gov/planets/profile.cfm?Object=Pluto
New from the Wordsmiths

This issue’s Wordsmiths features teacher resources, many focusing on the earth sciences and the natural world. Some books include works of fiction, poetry, and nonfiction by well-known writers, such as Mark Twain, Stephen Jay Gould, John McPhee, and Ursula K. Le Guin. Others are good resources to help you explore your local geological environment. All should pique your interest in exploring the natural world and help bring that enthusiasm into your classroom.

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

America’s National Parks: The Spectacular Forces That Shaped Our Treasured Lands

Fifty-six of America’s national parks are captured in the photo-filled book. It includes interesting, easy-to-understand background on the geological and ecological forces that continue to make each national park worthy of protection. As one reviewer suggests, “… America’s National Parks is a must-have for anyone who relishes America’s natural wonders and wants to learn more about the powerful forces that created them.”
rocks includes remarkable chapters, with evidence for earthquakes, floods, asteroid impacts, and stark climate changes.

Bedrock: Writers on the Wonders of Geology

Novelists, poets, artists, anthropologists, naturalists, traditional elders, and philosophers create Earth’s geological portrait through their writings included in this book. Topics travel from the violence of earthquakes and volcanic eruptions to patterns in rocks and ever-flowing streams. Many cultures and historic times influence this book that focuses on planet Earth.

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.

Earth Time: Exploring the Deep Past from Victorian England to the Grand Canyon

Palmer examines the story of the quest to reveal Earth’s history and introduces the ensemble of eccentric characters that have lent their discoveries to the current understanding of the processes that have shaped the planet. The story unearthed in

Not just a reference book, but a book to read from cover to cover, Reading the Rocks is a stimulating volume focused on the topics of “pop-geology.” The author chronicles Earth’s history from the primordial supernova from which Earth had its origins to the human-made cataclysms of global warming and habitat destruction. Other topics include Moon’s birth, the “Snowball Earth” period when the oceans froze over, and the Permian extinction.
In the News: Mono Lake in Recovery
Adapted from the San Francisco Chronicle, July 29, 2006

In the FOSS Populations and Ecosystems Course for middle school, students use Mono Lake, an important alkaline lake, as a simple ecosystem case study. They study the functional roles of populations to construct a food web. Mono Lake was the focus of an ecological survey thirty years ago when a dozen students from Stanford University, UC Davis, and elsewhere camped at ancient Mono Lake for more than two months. They were studying the factors that were contributing to the death of Mono Lake as a result of massive water diversions to Los Angeles.

In July 2006, the same group returned to Mono Lake for a reunion. The former students were now college professors, government scientists, an inventor, a physician, and high school teachers. Their historic efforts in 1976 once inspired the “Save Mono Lake” bumper stickers that were attached to their vans.

The exciting news they were there to celebrate was that Mono Lake had recovered. Its level continues to rise, and the ecosystem is thriving!

The group studied the birds, insects, phytoplankton, salinity, and hydrology in 1976. Their work supported the 1983 ruling of the California Supreme Court’s that the state must protect natural resources such as Mono Lake under the state Constitution’s public trust doctrine. It was this ruling that sent Mono Lake on the road to recovery, saving it from the fate that turned Southern California’s Owens Lake into a 110-square-mile salt flat in the 1920s.

The students work in 1976 was just the beginning. Some of the initial studies involved collecting algae samples while teetering in a small boat rocking on the waves of Mono Lake. Other research involved the water chemistry of the lake and the tufa towers. Other students counted birds and observed other organisms. Some measured ground water levels, evaporation, and river flow. Once the students published their findings, further research by other scientists was conducted. It was shown that Mono Lake’s ecosystem was on the verge of collapse.

When the group returned to celebrate Mono Lake’s amazing recovery, they found a thriving lake freshened by a record amount of winter and spring runoff from the tributary creeks. The lake was teeming with brine shrimp and alkali flies that feed the birds. Bright green native grasses had grown large enough to cover the once-exposed lake bottom.

The old land bridges that had allowed coyotes to eat gull eggs and baby birds were once again inundated. A new crop of tufa crystals were created from freshwater springs that bubble up from the lake’s bottom. Their continued growth will eventually form new tufa towers. Jeffrey pines, buffalo berry bushes, and Woods’ roses are flourishing. The willow flycatcher, absent from Mono Lake for years, has returned. Known as the “ivory-billed woodpecker of Mono Lake,” the flycatcher is thriving with the resurgence of the native buffalo berries and Woods’ roses.

Encourage your students to do some online research to find out more about Mono Lake’s recovery. Some topics they might explore are:

- The organisms they studied in FOSS Populations and Ecosystems and their status in the recovery. Which have recovered and which have not?
- The Los Angeles Department of Water and Power’s role in the collapse and later recovery of Mono Lake.
- The Mono Basin Research Group’s efforts in Mono Lake’s recovery.
- The efforts of the Mono Lake Committee.
- Recent research done by PRBO Conservation Science (formerly known as the Point Reyes Bird Observatory).
- The California Water Resources Control Board decision regarding Los Angeles’s water rights.

You can read the San Francisco Chronicle article online at: http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/07/29/MNGDSK7VS81.DTL
Frequently Asked Questions for FOSSweb

As technology evolves, so must FOSSweb. We’ve included some of the FAQs concerning browsers and plug-ins. For more FAQs and future updates regarding technology, please check the FAQs at http://lhsfoss.org/fossweb/faq.html.

To use FOSSweb, your computer must have a compatible browser and recent versions of several plug-ins. Your computer may already have these plug-ins installed. You can check your browser at the FAQ website listed above. The requirements vary for the FOSS K–2 modules and the FOSS 3–6 modules. Depending on how many of the plug-ins you are missing, you may need to spend 10 to 20 minutes downloading and installing software before you begin. Once you have installed the software, you will not have to do this again (until the next update happens).

Current Support Topics as of November 22, 2006

Q: When I click on an activity, Firefox opens a window asking me to install additional plug-ins, even though I have the most recent version of Shockwave. Using Safari results in a blank window.
A: Users with Intel-based Macs may experience problems opening activities that use Shockwave on FOSSweb or on the CDs. In order to run Shockwave files, you will need to change your browser mode to run in a Rosetta Emulation mode.

Follow these steps to run Rosetta Mode:
1. Quit the browser.
2. Go to your Applications folder and control-click on the Firefox or Safari icon.
3. In the Preview menu that appears, select “Get Info.”
4. Under the General heading, check “Open using Rosetta.”
5. Close the Info dialog box.

If you are unsure whether your Macintosh is Intel-based or PowerPC-based, click on the Apple menu and select “About this Mac.” The processor field will indicate Intel or PowerPC.

Q: Why can’t I view FOSSweb activities after installing Windows XP Service Pack 2?
A: Windows XP Service Pack 2 contains pop-up prevention that may block many of the FOSSweb activities and other content. An Information Bar between the navigation bar and the browser window indicates the blocked pop-ups. You can allow pop-ups from the FOSSweb site by clicking the Information Bar when it notifies you that a pop-up has been blocked. Then click “Temporarily Allow Pop-ups.”

Q: Which browsers are compatible with FOSSweb?
A: FOSSweb is viewable on the Macintosh with Internet Explorer 5.1–5.2, Safari 1.0 or later, or Firefox 1.0 or later. It is viewable on the PC with IE 5.0 or later or Firefox 1.0 or later. FOSSweb was optimized for IE and is therefore best viewed using this browser. Earlier versions of IE and Netscape cannot handle certain Flash and JavaScript elements on FOSSweb and do not support the site’s printing functions.

Go to the Compatible Browsers page in the “Test Your Browser” (http://www.fossweb.com/detector/intro.html) section of FOSSweb for information on downloading and installing a compatible browser.

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Questions continued

Q What are the plug-in requirements for FOSSweb?
A The plug-in requirements are different for the K–2 modules and the 3–6 modules. To view the K–2 modules, your browser must have recent versions of Flash and QuickTime. To view the 3–6 modules, in addition to Flash and QuickTime, your browser must also have a recent version of Shockwave.

Go to the “Test Your Browser” section of FOSSweb to determine if you have all required plug-ins and for information on downloading and installing the software.

Q Nothing happens when I click the links in the site's navigation. What's wrong?
A First check to make sure you have a compatible browser and all required plug-ins to view FOSSweb. Then go to your browser’s “Preferences” menu and make sure JavaScript is enabled. If you have the correct software and JavaScript is enabled in your browser, and you still can’t view the site, please contact FOSS using the Technical Questions Form (http://www.lhsfoss.org/fossweb/email/techQuestions.php).

Q I can’t access the activities in the modules. What should I do?
A If you are having trouble accessing the activities, first go to the “Test Your Browser” section of FOSSweb to determine if you have all required plug-ins. If you have all plug-ins but are still unable to view the activities, the problem may be pop-up blocking software.

The FOSS activities open up in pop-up windows. If this type of software is installed on your computer, it will prevent the activity windows from appearing. Check to see if your computer has pop-up blocking software installed. If so, remove it to view the FOSS activities. If you are using a school computer and do not have Administrator privileges, you may not be able to remove this software. Consult your local tech support person for help.

Q When I try going to the K–2 or 3–6 module menu pages, the pages don't load correctly. Everything flashes. Help!
A If the content on the module menu pages (or any other module page) flashes continually, you have an outdated version of the Flash plug-in. Go to the Flash plug-in page of FOSSweb to download and install a more recent version.

Q My browser is sluggish and crashes regularly when I view FOSSweb. Is there anything I do to fix this?
A If you are viewing FOSSweb on a Macintosh with OS 8.6–9.x and are experiencing frequent crashes, increase the memory allocation to your browser.

To change your memory allocation, refer to the steps outlined on the Compatible Browsers page in the “Test Your Browser” section of FOSSweb. You can also consult your Macintosh Users Manual.

Memory is allocated automatically in OS X and in all PC operating systems. If your browser is sluggish, or crashes regularly and you are using one of these platforms, try restarting the browser and/or the computer. If problems persist, consult your local tech support people for help.

Q I get an error message that says my browser is out of memory when displaying the activities in the 3–6 modules. What should I do?
A If you are using a Macintosh with OS 8.6–9.x, try increasing your browser’s memory allocation, as outlined in the previous question. Because the grade 3–6 module activities are memory intensive, you may need to periodically restart your browser and/or computer while viewing the site.

Q I got a message saying to upgrade to the latest version of Shockwave. However, my browser's current version meets FOSSweb’s minimum requirement. Do I have to upgrade?
A It is not required that you upgrade to the latest version of Shockwave, but it is advisable. Although the new version requires more memory, it will make Shockwave animations run smoother and faster on your computer.

Q Do you have any tips for viewing FOSSweb with a slow Internet connection?
A Go to your browser’s “Preferences” menu and increase the cache. Your browser stores previously downloaded pages in the cache. Increasing the cache size in your browser will allow you to store more pages and thus speed up FOSSweb.

Bear in mind that if a page has been updated, or the page has downloaded incorrectly, you won’t see the new or correct version until the page has been refreshed or the cached version has been deleted.

Click “Refresh” in the browser toolbar to download a new version of the page. You may need to hold down the Shift key while clicking “Refresh” for the new version to download.

To change your cache size or empty your cache, look under the browser’s “Preferences” menu (Internet Options for Internet Explorer on a PC and FILE: PREFERENCES on a Mac). The cache is listed under the Advanced settings for all but IE on the PC. For IE on the PC, the cache, or Temporary Internet files, is under “General” in the “Options” menu. Use the settings to change the cache size and to delete cached pages.

Q How can I contact FOSS?
A If you are having technical problems with the website, please contact FOSS using the Technical Questions Form (http://www.lhsfoss.org/fossweb/email/techQuestions.php).
This workshop will blow you away!

The weather—everybody talks about it, but nobody ever does anything about it. Well it’s time to do something about it! The Full Option Science System (FOSS) staff from the Lawrence Hall of Science, in cooperation with the University of Oklahoma and the National Weather Service and with sponsorship from Delta Education, are presenting a FOSS Weather and Water Course workshop in Norman, Oklahoma.

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.

Why Norman, Oklahoma?
Norman has become the “epicenter for meteorology” with the newly opened National Weather Center and more meteorologists than any other city in the world. Meteorologists are employed by the National Weather Service office, the National Severe Storms Lab (NSSL), the National Storm Prediction Center, the NWS Forecast Office, the University of Oklahoma Department of Meteorology, and businesses that interpret and market weather information for various clients. The NSSL has been made famous by the NOVA programs featuring their storm chasers.

What will happen at the workshop?
- Hands-on training in the FOSS Weather and Water Course.
- Presentations on weather-related research and content by meteorologists from the National Storm Prediction Center, the NSSL, and the University of Oklahoma.
- Field trips to meteorology research and weather-data-gathering facilities and businesses that use the research and weather data as their product to market.
- 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 take back to your classroom/district to enhance the FOSS materials.
- Networking with other teachers and science education leaders from across the country.
- A weather balloon launch.
- Experience cutting edge technology that is used to forecast and track weather, see some fabulous Oklahoma sunsets, and hopefully experience a wide variety of weather that can be typical of June in Oklahoma! All this will be capped off by a Friday night BBQ.

The registration fee will be approximately $225. Participants are responsible for their own travel to Norman and for room and board costs. Special rates are available at the Residence Inn by Marriott.

Group size is limited to 30 participants. For more information and registration materials, contact foss@berkeley.edu, check the FOSS Professional Development Calendar at http://www.fossweb.com/calendar.php, or contact Terry Shaw at terryshaw@aol.com.

The registration deadline is May 4, 2007.
Who should apply?

- Science education leaders from universities or districts responsible for training teachers or helping them implement the FOSS Populations and Ecosystems Course.
- Teachers using or planning to use the Populations and Ecosystems Course in their classrooms.

What will happen at the workshop?

- Hands-on training in the FOSS Populations and Ecosystems Course.
- Presentations and discussions by research scientists on population genetics, human and naturally induced stress on ecosystems, and the ecology and natural history of the coral reef, rain forest, and surrounding area.
- A hiking field trip in the rain forest of El Yunque led by a local naturalist and the Caribbean National Forest staff.
- A field trip to a saline lake led by a professor from the Marine Sciences department at UPRM.
- A snorkeling field trip to the coral reefs lead by a professor and graduate students from the Marine Sciences department at UPRM.
- A nighttime swim/field trip in Bahía Fosforescente (Phosphorescent Bay).
- A farewell Puerto Rican fiesta on Saturday night.

COST: The registration fee for the workshop is $450 per person. Participants are responsible for their own travel to Puerto Rico and for room and board costs.


For more information and registration materials, contact foss@berkeley.edu or Teri Dannenberg at teridann@berkeley.edu or check the FOSS Professional Development Calendar at http://www.fossweb.com/calendar.php.
Delta Education will host one-day FOSS Institutes in conjunction with the 2007 NSTA National Conference on Wednesday, March 28, in St. Louis. The K–6 informational institute and the middle school institute are designed for all educators—lead teachers, administrators, curriculum coordinators, professional developers, and university methods instructors.

The K–6 Institute will provide an introduction to the elementary school program by focusing on several modules from the different grade levels and will include some information about using notebooks with FOSS.

The Middle School Institute will provide an introduction to the program by focusing on the Force and Motion Course. FOSS development staff and experienced teachers will lead the Institute.

Delta will offer an advanced-level two-day FOSS Institute prior to the National NSTA Conference. The Research Into Practice Institute is presented by Dr. Lawrence Lowery and is reserved for individuals who have at least three years experience teaching or using FOSS. This institute involves advanced study and application of research findings. Attendance is limited. The advanced-level institute will take place on Tuesday and Wednesday, March 27 and 28.

There is no charge for the Institutes, but they are by invitation only. Times and locations are listed in the calendar. To request an invitation and secure your spot at the Institute of your choice, please call, write, fax or e-mail:

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Nashua, NH 03063
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Phone: 1.800.258.1302 ext. 503
Fax: 603.579.3514

Check the FOSSweb.com Calendar for FOSS Institutes at the Fall 2007 NSTA area conferences.

If you would like to be added to the mailing list to receive this newsletter, send your name and address to:

Delta Education
80 Northwest Boulevard
Nashua, NH 03063
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NSTA NATIONAL CONFERENCE
March 29–April 1, 2007 St. Louis, MO

PRE-CONFERENCE INSTITUTES
Tuesday–Wednesday
9:00–4:30 Research Into Practice for educators with advanced FOSS experience, Renaissance Grand Hotel, Room Majestic A

Wednesday
8:30–4:00 K–6 Institute, Renaissance Grand Hotel, Room Majestic B
8:30–4:00 Middle School Institute, Renaissance Grand Hotel, Room Majestic C

Wednesday
7:30–4:00 NSTA Professional Development Institute: Seeing More Through the Formative Assessment Lens (PDI-4) for grades 3–9 Fee for this NSTA event is $295.00 Offered by the Lawrence Hall of Science For more information, see page 14 for details or contact http://www.nsta.org/conferencesupport&record_id=168&Meeting_Code=2007STL

FOSS WORKSHOPS IN THE NSTA PROGRAM
Thursday
8:00–11:00 Chemical Interactions—The New FOSS Middle School Course
1:00–3:30 Using Science Notebooks Featuring FOSS Middle School

Friday
8:00–10:30 Explore Diversity of Life through the FOSS Middle School Course
11:30–1:00 FOSS Forum: Implementing the Full Option Science System K–6
2:00–4:30 Explore to Understand with FOSS Middle School Weather and Water Course

Saturday
8:00–11:00 Using Science Notebooks with FOSS Modules K–6
12:00–1:30 A New Accountability: Valuing Academic Progress in Grades 3–6

Other Professional Development Opportunities
June 24–29, 2007 FOSS Weather and Water Workshop in Norman, Oklahoma
July 9–14, 2007 FOSS Populations and Ecosystems Workshop in Puerto Rico

For more details about these workshops and other upcoming events, visit the online FOSS Professional Development Calendar at http://www.fossweb.com/news/calendar.php.
About This Newsletter . . .
The intent of the FOSS Newsletter is to help FOSS users develop a network of support across the country. Delta Education and LHS will work together to bring you news two times per year, including articles regarding the latest development of modules, tips about management from teachers and administrators, ways to make connections with other teachers and districts, extensions and reading materials to add to modules you are already using, and informative articles about good educational practices.

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

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The deadline for submissions to the next issue is June 15, 2007. We’re waiting to hear from you.

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See you at the NSTA National Conference in St. Louis!

New Chemical Interactions Middle School Course! To order call Delta Education at 800.258.1302