Kick Starting Science
By Don McKenney, FOSS Professional Developer

Since retiring, I have been working part-time for the FOSS Project at the Lawrence Hall of Science in Berkeley, California. The part of systemic science education reform that has most fascinated me is implementing FOSS in the classroom. What are the most effective approaches to shifting teachers at a school from using textbooks to teach science to using hands-on science with FOSS? And I mean the full McGilla: students learning science by doing science; students using notebooks to make meaning from the science activities; reading in their FOSS Science Resources books; using the FOSS embedded assessments to help think about how they are learning the content; and finally, writing in their own words to build science content understanding.

Recently I’ve been working on a project to kick start science at a school from scratch. St. Jerome is a K–8 diocese school in my neighborhood. Walking my dog by the school almost daily for years, I’ve often wondered what they were doing there to teach science. Well, I got a chance to find out when we had a block party a few months ago and I set up a “science table” for the neighborhood kids to sample some FOSS activities. One of my neighbors turned out to be a parent with a child at the school and a member of the St. Jerome school board. She told me St. Jerome had a new principal and they were focusing on improving academics, particularly science, and asked if I would meet with the principal.

That was an interesting meeting. The principal had just inherited about a dozen old FOSS modules, including some of the original green boxes, from another diocese school. Indeed, the new principal had once been a teacher at that school and become an experienced FOSS practitioner. Now she wanted to “turn science on its head” at St. Jerome and fully implement FOSS so all the students at her school would be learning science by doing science, and only then, opening their science textbook to review, reinforce, or expand on a concept.

The first challenge was to inventory the old FOSS modules they had recently come into. That took a couple of days and as expected, they were in pretty poor shape. Unfortunately, they had but a small budget that could be used to refurbish the kits. Serendipitously, back at the Hall, FOSS was in the process of cleaning out and giving away tons of parts from the

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Kick Starting Science continued

older modules to make way for the new FOSS Third Edition modules. St. Jerome School became the beneficiary of enough materials to fully refurbish almost all their old FOSS modules. The materials still needed for a couple of the modules were within their available budget to purchase.

From there, I began working with two teachers two afternoons a week to start with a FOSS module appropriate to their grade levels. Science notebooks were introduced as an integral part of doing the investigations and processing meaning. Based on the feedback I am getting from the four teachers I have worked with so far, the transition to an inquiry-based approach to teaching and learning science is going well. My approach to coaching science has been to plan lessons with a teacher and then demonstrate several lessons real time in her classroom. We focus on providing students with plenty of opportunities to figure out the meaning for themselves as they do activities and work in their notebooks. We try to have fun, present a good lesson, and learn something too with each session. When the time seems right, I “pass the torch” to the teacher and let her take the lead in presenting the lesson. I provide a lot of support planning lessons with a teacher, help her prepare the materials, spend time with her groups of students during the lesson, and help clean up afterwards so the teacher has time to interact with students and reflect a little during the lesson-closing and the transition to the next thing on her schedule.

We have also been very lucky in having the opportunity to send four of the St. Jerome teachers to all-day grade level FOSS trainings at the Lawrence Hall of Science. This exposure to high-quality professional development has resulted in a lot of excitement among teachers toward implementing hands-on science with their students.

I have only been working at St. Jerome School for a handful of months, but the anecdotal evidence is a testament to the efficacy of FOSS. One first year fifth-grade teacher was initially very reluctant to distribute “a bunch of stuff” and let her students “mess around” with it to learn science. To her credit, she was also excited to give it a try with me there to get things started. Now she is teaching FOSS twice a week on her own with me checking in to help her plan lessons. She has told me that she loves the way her students work in their notebooks and wants to use what she is learning about notebooks throughout her teaching.

After some hesitation, the second-grade teacher I am working with agreed to take the lead in doing her first FOSS lesson. At first she wanted me to continue teaching lessons because she “only wanted the best for her students.” Very flattering, but of course, I was there to help her learn as well. When the time was right, we carefully planned the lesson together and discussed issues right up to the last moment. She then delivered an excellent lesson. She was very excited and happy about the results of our efforts and the learning she could see from her students. This teacher has told me several times that she has never before seen her students so excited and engaged in learning as they have been with FOSS and science. She pointed out that this is the first time she has seen all her students fully engaged in a lesson and the first time every student in her class has participated in discussions. She also told me that she has been surprised that her weakest student is for the first time excited and fully engaged in a lesson. She followed up by giving students a question to answer in their notebooks and found that this same student had performed to a very high academic level.

It’s rewarding to see the kind of “aha” learning moment in a teacher that we often see in students when they discover a key content connection for themselves. For me, these are the moments that truly warm the cockles of my heart! I feel we are truly well on the way to kick starting science at St. Jerome School.
Have you checked out FOSSweb.com recently? You may have noticed some big changes on the website!

FOSSweb 2.0 was softly launched in August 2011. This school year (2013–14), we hope that all FOSSweb users will transition to using the new FOSSweb. If you haven’t visited the new FOSSweb yet, you’ll find that the site has been re-designed to improve teaching efficiency and updated with fresh new resources for teachers and students.

The new FOSSweb.com is now the default version of the website when you visit FOSSweb.com. Users can temporarily use the original version of FOSSweb, which is now accessed at http://archive.FOSSweb.com. Because the archive site will only be up for a short period, we highly recommend that you create an account on the new FOSSweb and begin using the new site. However, if you still need to keep your old FOSSweb links for now, you will be able to access bookmarked content on archive. FOSSweb.com for the immediate future; a redirect page will provide you a link to the page you’re trying to access.

If you’ve already been using the new FOSSweb, you’ll notice some changes as well! Responding to user feedback, the teacher homepage has a new design to make it even easier for you to manage your classes and modules. New badges and buttons have been added to make it easy to distinguish between different editions of FOSS.

Getting started with the new FOSSweb is easy! All you have to do is head over to FOSSweb.com and RAP (see the table below).

Once you finish your registration and add access codes to your account you are ready to dive in and explore all the new resources on FOSSweb!

For further questions on FOSSweb, please don’t hesitate to contact our technical support team.

**Account Questions/Help Logging In:**
School Specialty Online Support loginhelp@schoolspecialty.com
Phone: 800.513.2465, 7:30 am–5:00 pm CT

**General FOSSweb Technical Questions:**
FOSSweb Tech Support support@fossweb.com
Phone: 510.643.6997, 9 am–6 pm PT

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### Access Codes:

**Elementary, Second Edition:** AME2EL7862
**CA Edition:** AME1CA6195
**NYC Teachers:** NYCBE19833
**Middle School, First Edition:** AMEIMS1214

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<td>A: Access code</td>
<td>Once you have your account set up, you will need to log in to FOSSweb and enter module access codes to activate access to your modules. An access code will provide you with access to protected content on FOSSweb. To activate the code, log in to FOSSweb. On your teacher page, select the “Add New Modules” button near the top of the page. You can enter in your access code in this screen. <strong>Third Edition Elementary and Second Edition Middle School Teachers:</strong> You will find your access code on the inside cover of your Investigations Guide. <strong>Second Edition and California Edition Elementary</strong> and <strong>First Edition Middle School Teachers:</strong> Sign up for your access code online, or use one of the codes above. You’ll receive an email with your access code after signing up. <a href="http://archive.FOSSweb.com/news/fossweb_signup.html">http://archive.FOSSweb.com/news/fossweb_signup.html</a></td>
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Focus Questions: A Key Feature of FOSS Third Edition
By Erica Beck Spencer, the New England Representative for FOSS Third Edition Implementation and Curriculum Support and Diana Velez, FOSS Professional and Leadership Developer, The Lawrence Hall of Science

So, what exactly are focus questions and why are they an integral part of the FOSS Third Edition program? A focus question is an overarching question that focuses the investigation and indicates the question to be answered, the challenge to be met, the mystery to be solved, or the principle to be uncovered. Each part of each investigation in FOSS Third Edition is driven by a focus question that communicates a concise expression of the objective of the activity that students will achieve by the end of the lesson. This helps teachers know what the big idea of the lesson is and sparks students’ curiosity about what they are about to learn.

In each FOSS Third Edition Investigations Guide, focus questions are first listed in red in the At a Glance chart, found on the second page of each investigation. Two pages later, the Background for the Teacher section is revisited by students during the Wrap-up/Warm-up (an additional new feature of FOSS Third Edition) for that part, during which students discuss their thinking with a partner.

Focus questions differ in complexity through the grade levels and to some extent, throughout a module. They also vary in how they call upon different science and engineering practices. For example, a focus question might ask students to describe or think critically about procedures, generate statements of cause and effect, evaluate or develop methodologies, create solutions to a problem, produce explanatory models of something too big or too small to see, to describe relationships, or to present data as evidence.

Incorporating Focus Questions into Your Practice
It’s a good idea to have kindergarteners and first and second graders glue printed copies of focus questions into their notebooks to save time. Teachers may download and print a sheet of the questions from FOSSweb, in the Digital-Only Resources section for each module. Use a paper cutter to speed up the process and then place the questions in labeled envelopes until you’re ready to distribute them. Or print out sets on mailing labels, which students can easily stick into their notebooks. Younger students might be given a sentence starter to help them answer the question. Sentence starters can be written into the class notebook and displayed, recorded, or projected on the white/smart board, or even typed up, copied, and glued into the notebooks. As with any scaffold, sentence frames should be used strategically with the goal that students will write the answer to the focus question as independently as possible in their own words.

In grades 3–6, students write focus questions in their notebooks and label them “FQ.” Teachers can modify or adapt this for students as needed, but students often better understand a question if they physically record it. At the end of the active session, students can draw a line under their last notebook entries and write “FQA” (Focus Question Answer).

It might initially perplex students when you ask them to record a focus question and think about it but not answer it immediately. Students are conditioned to answer questions, and they often start trying to think of an answer when a question is posed; many will raise their hands ready to take a stab at answering a focus question. It is fine to listen to a few answers, but it is important to not respond
with, “That’s right!” or any other response that indicates a right or wrong answer. Instead of immediately answering a focus question, encourage students to think: “what do we need to do to find the best answer to this question?” Students will soon learn that the focus question is introduced, almost always, before the inquiry begins and is answered at the end. Depending on the question, sometimes the Investigations Guide calls for sharing of thoughts about the question, or sometimes a teacher may decide to have students make predictions orally as a way to activate prior knowledge. But it is also OK to simply allow students to sit with the question. Young scientists learn new routines quickly.

**Answering Focus Questions**

After students have made observations, clarified new terms and concepts, and discussed their thinking about the focus question with their peers, students are asked to answer the focus question in their notebooks.

In the Animals Two by Two Module, kindergarteners are asked to determine the difference between two types of worms—red worms and night crawlers. The focus question is: **How are red worms and nightcrawlers different? How are they the same?**

You can provide students with a frame to answer the question if you think they need it; however, students are identifying the differences and similarities themselves, based on their observations. This allows the teacher to determine students’ level of engagement with the content.

In the upper-elementary Energy and Electromagnetism Module, students are given a challenge: **Which design is better for designing long strings of lights—series or parallel?**

This type of focus question engages students in argumentation. The answer is not simply one circuit or another. Students’ answers should include a claim about which circuit is a better design, evidence to support the claim (drawn from their investigations), and reasons as to why that particular design is better.

The regular use of focus questions is just one of the new and improved features of the FOSS Third Edition—a feature driven to help teachers become more effective at increasing student long-term understanding of science and engineering disciplinary core ideas. No matter what edition of the program you are using, incorporating the regular use of focus questions into your teaching and looking at student notebooks for student understanding are important aspects of the FOSS program.

**Using an earlier edition of FOSS?**

Check out the At a Glance chart on pages two and three of each investigation and use one or more of the Inquiry Questions as your focus question. In the California Edition, you can find the focus question(s) in the last step called, Make Content Entries, in the Wrapping-Up section of each part.

Students craft answers to focus questions using both words and illustrations.
Walk into any one of the 54 elementary schools in Oakland, California, and chances are you’ll see students engaged in science. They may be figuring out how to make electricity flow through a circuit, observing chemical reactions, or attempting to make the tallest towers out of cups, straws, and other solid materials. Or students may be comparing the structures and functions of isopods, worms, or snails, observing how organisms change over time, or going outdoors to learn about the plants and animals that live in their school yards. All of these are typical activities in classrooms using the FOSS curriculum. What’s different is that not long ago only a small percentage of Oakland students were receiving this type of comprehensive science instruction on a regular basis. Now, hands-on science is happening in every classroom. And a growing number of teachers are using science as the context for reading, writing, and academic discussions in ways that support student understanding of science content and develop literacy skills and promote language acquisition.

Building the Foundation for Classroom Science

How did this happen? What made Oakland Unified School District (OUSD), an urban program improvement district, change its course to make science a focus and a priority for all students? Caleb Cheung is the science manager for OUSD. He uses the analogy of building a house to explain the process of bringing science instruction to the forefront of elementary education. According to Caleb, the foundation was there when he took over the science department in 2006. In the 1990s, one teacher from every elementary school in OUSD participated in the Leadership Institute for Teaching Elementary Science (LITES), an NSF funded project lead by Mills College that provided professional development in inquiry-based science instruction. Despite the pressures brought on by No Child Left Behind in the early 2000s to focus exclusively on reading and math, this core group of LITES teachers continued to teach and advocate for robust science teaching in their classrooms, at their sites, and at the district level. Many continued to participate in other science professional development workshops, institutes, and
projects. A few of those teachers became principals. One of those principals was Caroline Yee, an educator with vision as a teacher and administrator, and a FOSS pioneer in OUSD. (See the article “In Remembrance of Caroline Yee, 1944–2013, FOSS Pioneer in Oakland, California” on page 15.)

Having a core of dedicated teachers and administrators provided a foundation for the other components necessary to build the house for science. Caleb credits supportive and visionary leadership from the OUSD board and top administrators, teacher leadership, and a systems-based approach to infrastructure as key features of a successful blueprint for building the district’s capacity for high-quality science instruction.

In 2007, the district adopted the FOSS California Edition wholeheartedly and instituted a system for rotating the kits from school to school. Providing every teacher access to all three fully stocked modules (including live organisms) at each grade level in a timely manner is no small feat. Caleb soon realized that the existing barcode system based on paper was not an efficient way to track the FOSS kits in their journey from school to school and back to the warehouse. He devised a mobile computerized system using laptops, wireless scanners, a cordless printer, and speakers, which cuts the processing time and decreases the number of errors significantly. Currently, 54 schools (about 1,000 classrooms) receive a FOSS kit three times a year. Behind the scenes is another extensive operation. Over three thousand boxes of materials need to be accounted for and refurbished every year. Again, Caleb led a rethink of ways to make the system more efficient and sustainable. He and his team devised a new layout for the warehouse, a new labeling system for the materials, and a process for hiring high-school interns in the summer to refurbish the kits.

However, getting FOSS kits to the school sites wasn’t enough to ensure that every child received high-quality science instruction. Regrettably, there were schools where the FOSS boxes were delivered but never distributed to classrooms, or where boxes sat unopened in classrooms. There was also poor attendance at the kit trainings that were offered for teachers throughout the school year. Caleb realized that something had to change and that it had to come from the top. He focused on the minutes for instruction that were mandated in the school day. OUSD, like most program improvement districts, required that the majority of the instructional day be devoted to reading and math, with little time for science, social studies, and the arts. In May 2010, in a historic move, the Oakland School Board unanimously passed an Elementary Science Policy requiring weekly science instruction—a minimum of 60 minutes for grades K–2 and 90 minutes for grades 3–5.

**Getting Serious about Science**

Mandating instructional minutes was a good start, but still not enough. Now it was time for the real work to begin. Over 60 corporate foundations, public agencies, and community organizations were brought together to forge a network of informal partnerships with each other and the district to provide resources and support for science instruction. As a result, in 2011, Caleb was able to expand the elementary science team, hiring a full-time coordinator, Claudio Vargas (formerly a director of the Bay Area Science Project), and four specialists to provide professional development and support for the growing infrastructure necessary to sustain a high-quality science instructional program. The team implemented a new approach to professional development. The unit of change shifted from the individual teacher to the whole school staff. FOSS trainings are now conducted at school sites and it is a requirement that the whole staff including the principal attend. Caleb credits these 90-minute site-based trainings for providing the enthusiasm and the confidence teachers needed to hop on the science bandwagon. In addition, teachers throughout the district began participating in major projects funded by state and national agencies, and directed by the Lawrence Hall of Science to improve science instruction and develop teacher leadership. These included: ACES (Advancing Collaboration for Equity in Science) and CAL: BLAST (A Collaborative Approach to Learning Brining Language and Science Teaching), and more recently, PRACTISE (Practicum Academy to Improve Science Education) and BaySci: A Partnership for Bay Area Science Education (privately funded). Each project has a slightly different focus or approach, but all have the common goal of supporting teachers in the development of science content and pedagogical content knowledge and the leadership skills necessary to lead a school reform effort.

*Continued on page 8*
Bringing principals up to speed was another critical component. Putting the spotlight on science meant providing principals with the knowledge, tools, and structures they would need to support comprehensive science instruction at their sites. For the past two years, all elementary principals were required to attend 30 hours of science professional development, to help strengthen their roles as instructional leaders—another first in OUSD history. This last school year, the science department began using the Instructional Rounds approach. A group of principals meet at a school site and visit classrooms together to observe science instruction. Using a tool dubbed the “5x8 card,” principals look for evidence of specific science learning principles and student actions based on the Next Generation Science Standards (NGSS).

With principals and students grappling with as they make their way through the process of deeper understanding. In addition to the instructional rounds, extensive video recordings of classroom instruction in science are used to help principals and teachers examine their practice more closely through the lens of the 5x8 card.

Science-Centered Schools
Capitalizing on the momentum, a “Focus School” model was adopted where certain schools opted to make science the center of their instruction. Teachers at these schools receive classroom coaching, two days of training during the school year, and are invited to the district’s two-week science summer academies. Currently 13 of the 54 schools are part of what is now called the Science and Literacy Cohort. These schools are committed to improving the quantity and quality of science instruction in all classrooms, increasing science teacher leadership capacity, and developing science resources and models for effective practices for the district. They are focused on science and literacy integration and issues of equity. The science department, together with principals to plan and implement professional development at their sites. This is a significant change. Claudio, the elementary science coordinator, explains, OUSD has begun a shift that goes beyond the convergence of goals and expectations espoused in CCSS and NGSS. It is a shift in leadership at the schools, a shift that gives teachers a voice and a role in the transformation of their schools. For the first time, teacher leaders from every elementary school, one each from math, ELA, and science, worked together during a three-day institute this summer to understand the common shifts in instruction across subject areas proposed by CCSS and NGSS, with a focus on academic discussions, and made instructional as well as leadership decisions for their schools. At the end of the three days, teachers met with their principals to discuss implementation plans. This level of distributed leadership, collaboratively led by the science, math, and ELA departments, has never been practiced before, and gives the shifts in teaching and learning a much greater chance for success.

Science and the Common Core
Leading the convergence of ELA and science (as well as math and other subjects) is Maria Santos, OUSD’s Deputy Superintendent. Maria also serves as the co-chair for Understanding Language, a national initiative at Stanford University that is developing knowledge and resources to help teachers meet their students’ linguistic needs as they address the Common Core State Standards (CCSS) and the Next Generation Science Standards (NGSS). Under Maria’s leadership, the English Language Arts (ELA) and science departments have been exploring new territory by combining subject area expertise with literacy and language development. For example, last year, the two departments worked closely together to develop and roll out an assessment called, the Science Writing Task (SWT) for all third through fifth grade students. The SWT consists of five one-hour lessons that prepare students to write an opinion/reason-

### K-12 Science Learning Principles and Actions

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<thead>
<tr>
<th>Principles (Practices)</th>
<th>Vital Student Actions</th>
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<tbody>
<tr>
<td>1. Questions guide inquiry (1, 4, 6)</td>
<td>Students ask meaningful questions relevant to the science topic or lesson.</td>
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<tr>
<td>2. Learning occurs through investigations (1, 2, 3, 4, 6)</td>
<td>Students use materials, tools, and tests to explore, gather data, and answer questions.</td>
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<tr>
<td>3. Explanations are evidence-based (2, 4, 6, 7, 8)</td>
<td>Students use evidence to interpret observations, support ideas, and construct explanations.</td>
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<tr>
<td>4. Science is a community endeavor that evolves with new evidence (4, 5, 6, 7, 8)</td>
<td>Students collaborate to build understanding and revise their thinking when presented with new evidence.</td>
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<tr>
<td>5. Application is essential for building understanding (1, 2, 3, 4)</td>
<td>Students apply science knowledge and practices to respond to open-ended and novel problems.</td>
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<tr>
<td>6. Academic success depends on academic language</td>
<td>Students use discipline-specific academic language, models, and mathematics to communicate understanding orally and in writing.</td>
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<tr>
<td>7. ELs develop language through content</td>
<td>English learners produce language that communicates ideas and reasoning, even when that language is imperfect.</td>
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<tr>
<td>8. Equitable participation</td>
<td>All students are engaged in learning and choose appropriate scaffolds for learning.</td>
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The “5x8 Card” is a classroom observation tool that establishes a common language for how students engage in opportunities to learn science. Oakland USD, 2012

Next, the principals engage in a facilitated discussion focusing on what they observed and identifying patterns that evolve. The host principal describes a “problem of practice” on which he/she asks the group of visiting principals to focus and then provide feedback. Principals find that this process helps them to see the level of student involvement in academic conversations, which is a district-wide priority across all subject areas. Listening in as students share their science investigation results and try to make meaning of their experiences gives principals a chance to see the value and the challenges
Every spring, students and teachers can look forward to bubbling potions, robots, and forensic mysteries, all while enjoying a formal dinner at the Oakland Zoo. Since 2009, Oakland Unified has been hosting Dinner with a Scientist to bring together local scientists, teachers, and students to celebrate science. At the end of each school year, four semi-formal events take place—three for elementary and one for secondary, serving a total of 700 people. Over the course of the evening, teachers and students meet researchers, university professors, engineers, doctors, veterinarians, and even forensic scientists. Each scientist talks about her or his work, leads an activity, and answers questions, switching tables every 30 minutes. A fourth-grade teacher attending the event for the first time last year said, “I took a student that had been quiet and shy in the classroom all year and was amazed when she started firing off questions to the scientist at our table. She was so interested in the science experiment. It was like she was a different person.” OUSD is able to offer these events free to invited participants thanks to donations and local funders.

A Vision for the Future

Oakland’s vision for elementary science is blazing the trail for other districts. Recently the administration endorsed a vision statement that makes it clear that all students will receive daily science instruction and that there shall be a widespread convergence of science instruction with ELA and English language development.

According to Caleb, the present challenge is to plan for the implementation of NGSS. He and his team are exploring how to give teachers and students the opportunity to succeed with the new standards by creating a road map to guide the way. Caleb says, “Elementary instruction will look at things differently—holistically. Science is going to flow into ELA time and CCSS literacy strategies will help students to learn science.” Erin Cogan, OUSD’s Elementary Literacy Coordinator agrees. She believes implementing the CCSS for ELA is a huge paradigm shift.

If we know that literacy in the content areas is one of the biggest shifts, then we need to open up our world to not limiting instruction to separate blocks for literacy and for science. We need to give permission to our teachers to plan and try out integrated learning experiences that connect reading, writing, speaking and listening to the FOSS investigations.

The OUSD leadership sees their work as an issue of equity. Across the state of California, urban schools lost emphasis on science and that put students at a huge disadvantage, in terms of pursuing STEM-related careers. Oakland wants all students to experience the fascination with the natural world, to be curious about the mysteries of how things work. They believe science is intrinsically interesting to students, and more importantly, that the understanding of science is fundamental to participating in an informed and scientifically aware community. OUSD is doing its part to make sure its children are a part of that community.
Observations . . . by Larry 
NGSS: Ready or Not

By Larry Malone, FOSS Co-director

There’s a new day dawning in science education. The blinding glare of the Next Generation Science Standards is rising above the horizon. The NGSS, intended to illuminate the science education universe, have dazzled and stunned many of us. Is this fast changing environment all flash and sparkle, or is there prospect for a clear vision guiding us in a meaningful direction?

The NGSS are a derivative effort that has grown out of the National Resource Council’s (NRC) A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012). The purest light shining across the science education landscape emanates from the Framework. The energy of NGSS has evolved into a kind of radiant fog that ironically clouds vision and makes it more difficult to see the path forward. How should we look at these NGSS? Is it safe to look directly at them, or do we need to cast our vision to one side so as not to be blinded by the glare?

NGSS come to us as “standards.” Traditionally we have recognized standards as comprehensive compilations of specific bits of knowledge we are expected to communicate to students. Standards historically provided specific guidance for instruction, thus, a nominal outline for curriculum. NGSS break out of that tradition. NGSS do not describe what to teach; they describe performance criteria: descriptions of what students should know and be able to do to demonstrate proficiency in science and engineering. NGSS are probably more fruitfully considered as an assessment blueprint or framework. NGSS describe what we want our students be able to do. Is this a good thing or another barrier to effective science instruction? It has the potential to operate for good or bad, depending on how educators relate to NGSS.

At this time, it is unclear what kinds of accountability assessments will be implemented. Assessments of the kind suggested by NGSS have not yet been designed. Producing assessment of science proficiency in K–12 is challenging assessment designers to conceive of ways to efficiently and accurately examine students’ abilities to perform in alignment with NGSS. A high-powered committee convened by the National Research Council’s Board on Assessment and Testing is ruminating on this issue and recently announced that “the committee will review recent and current, ongoing work in science assessment to determine which aspects of the necessary assessment system for the Framework’s vision can be assessed with available techniques and what additional research and development is required to create an overall assessment system for science education in K–12.” By the time you are reading this article, a report outlining a conceptual framework for the task and proposed steps to accomplish the goal will have been released by the NRC committee.

In the meantime, during this transition to NGSS, what should we do? We will need to embrace the fact that we are confronted with a significant conceptual shift in our relationship with school science. In an Education Week webinar (Preparing for the New Science Standards, June 2013), seven elements of this shift were identified.

1. K–12 science should reflect the interconnected nature of science as it is practiced and experienced in the real world.
2. The NGSS are student performance expectations—NOT curriculum.
4. The NGSS focus on deeper understanding of content as well as application of content.
5. Science and engineering are integrated in the NGSS, K–12.
6. NGSS content is focused on preparing students for the next generation workforce.
7. NGSS and Common Core State Standards (ELA and math) are aligned.

It would seem prudent to acknowledge the advice of the designers of the NGSS (specifically Stephen Pruitt): take your time, don’t rush to acquire new instructional materials, continue to teach what you are currently teaching, but endeavor to modify how you teach it—align instruction with the guidance provided in the Framework regarding implementation of the scientific and engineering practices. And Peter
McLaren (Science and Technology Specialist at the Rhode Island Department of Education), who has made a thoughtful and thorough analysis of the NGSS terrain, says, “The Framework is a key document and absolutely necessary to understand NGSS implementation; design professional development around the Framework.” And he advises, “Go slow, build awareness and understanding; open communication and share successes; be patient.”

When you have taken time to wade into the NGSS, you will discover that they are deep, implying a need for purposeful cognitive engagement with significant and provocative content. Hard stuff. So the big question is, what kind of instructional materials will be needed to guide students to a place where they will perform well on the yet unknown assessments? The answer is simple: FOSS. Why FOSS? FOSS provides a comprehensive science experience. The FOSS program is designed carefully to move students along a developmental path from kindergarten through middle school. Along that path, students are exposed to all of the key disciplinary core ideas (content) as well as the complete array of scientific and engineering practices.

Some will protest that the FOSS program is not perfectly aligned with NGSS grade by grade. There are a few places, particularly in grades K–3, where FOSS research on learning progressions leads to a slightly greater array of experiences for young students than would be suggested by NGSS. Grade-level alignment is unimportant when compared to the benefits of curriculum coherence. The Framework promotes the importance of providing science learning as a coherent progression. A progression places value on teaching concepts in a thorough, sequential manner, carefully teaching prerequisite concepts before advancing to progressively more complex related concepts.

As an example, let’s consider an individual fifth-grade NGSS performance expectation. 5–ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. Whoa! This is a load for students to learn in fifth grade and for teachers to teach in fifth grade. It would necessitate guiding student to understand the materials and functions of the geologic subsystem of Earth (the rocks and minerals); the distribution and activities of the water on Earth; the materials and activities of the envelope of gases surrounding Earth; and the properties and distribution of the diverse, squirming layer of living organisms that lives in the tenuous biosphere between Earth’s hard solid mineral crust and the middle reaches of the atmosphere. The primary Earth subsystems are complex and it takes a concentrated coordinated effort to systematically teach how each of these major subsystems acts. This suggests that students should come to know these subsystems in a carefully conceived learning progression that unfolds over a period of many years, starting in kindergarten, so that by the time students advance to fifth grade they have acquired a fundamental knowledge of Earth systems. Then in fifth grade, teachers can concentrate on helping students grapple with concepts of how the subsystems interact to produce the mega-effects of subsystem interactions (weather, climate, ecosystem, energy transfer, etc.).

Although the Framework communicates this learning-progression philosophy clearly, NGSS are lax in honoring learning progressions. The learning-progression failures are particularly obvious in the primary grades. Because it is unlikely that students will be assessed each year throughout their K–8 careers, it is more important that students be thoughtfully introduced to the ideas communicated in NGSS before their science knowledge is examined, rather than being exposed to those ideas on the arbitrary schedule promoted by the grade-level NGSS.

The challenge facing educators will be to muster the courage to teach science in a manner that honors a commitment to provide students with a meaningful, stimulating science learning experience. This will necessitate a commitment to professional development to ensure that teachers understand that achieving the vision of the Framework is much more than ticking off standards from an NGSS checklist. And educators will need to be aggressively vigilant when confronted by instructional materials that display comprehensive checklists that identify the page on which a given standard is taught. Because of the nature of the NGSS performance expectations, it is virtually impossible to “teach the standard” in a succinct single lesson exposure. Trust FOSS to deliver a meaningful science experience for your students; it’s not a quick fix solution to NGSS, it is a commitment to good science instruction that unfolds throughout students’ entire academic careers.

Note: As the NGSS saga plays out, the FOSS staff will continue to reshape the FOSS program to ensure that students have access to the learning experiences they need in order to respond effectively to the NGSS. Check FOSSweb for the release of documents showing FOSS Connections to NGSS. We will continue to develop activities to establish an ever stronger grade-level connection between FOSS and the entire NGSS spectrum. ☀️
Earthshaking News from the FOSS Middle School Project

By Jessica Penchos, FOSS Middle School Coordinator, The Lawrence Hall of Science

The FOSS Middle School Project released the FOSS Planetary Science Course, Second Edition last year and is ready to release the FOSS Earth History Course, Second Edition in early 2014. For existing Earth History Course users, it will be a smooth conversion to update your program. And for those looking for a new resource to connect with the National Research Council’s A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) and the Next Generation Science Standards (NGSS) performance expectations, this is a dynamic and down to Earth course that will meet your needs.

Here’s a sneak preview of what is coming in the Earth History Course, Second Edition.

The course consists of nine investigations that engage students in reading evidence from rocks, landforms, and fossils to tell the geological story of locations on Earth—the investigations have been updated to include the latest models of the forces in Earth that cause land masses to move and change over time.

The course begins with an interactive multimedia look at geology around Earth using Google Earth™, then zooms in to Grand Canyon to begin in depth geological exploration.

In Investigations 1–4, students look at weathering and erosional processes, sedimentary rock formation, and think about geologic time.

In Investigation 5, students “fly” out of Grand Canyon and land in the Pacific Northwest, where they encounter some new rock samples that lead to investigations of igneous rock formation and the structure of Earth’s interior.

For Investigation 6, students map earthquakes and volcanoes on Earth, leading them to discoveries of plate boundaries; then they explore the Earth processes that cause the plates to move.

In Investigation 7, students look at evidence that plate interactions can cause rocks to change (metamorphism). They encounter metamorphic rocks by visiting the Appalachian Mountains, giving students the opportunity to develop an understanding of the rock cycle.

Investigation 8 asks students to apply what they’ve learned in case studies called “Geoscenarios,” in which they explore issues associated with extraction of natural resources.

In Investigation 9, students return to Grand Canyon for one final synthesis activity exploring some mysterious non-sedimentary rocks in the canyon and finally telling the complete “story of this place.”

Some of the revised pedagogical features in the Earth History Course include:

- Notebooking embedded in the revised course, including focus questions and sensemaking practices.
- Assessment aligned with the FOSS K–6 Program based on findings from the NSF funded ASK Project research.
- FOSSmap, providing online assessment and diagnostic reports.
- FOSS Science Resources literacy improvements that reflect Common Core State Standards in English Language Arts.
- New and improved multimedia features embedded in each investigation.
- Homework suggestions for each part.
- Teaching strategies that support content and practices as described in the Next Generation Science Standards.

Transforming FOSS Middle School Courses

Our course preparation process requires at least three years: one year for curriculum development, including work with local trials teachers in their classroom; one year for national trials and processing voluminous feedback from students and teachers; and one year for editing and production, along with a critical content review by scientists. This might seem like a long time when you’re waiting for new classroom materials to reach publication, but it’s essential that we take the time to make sure we uphold the FOSS commitment to thorough classroom testing, rigorous conceptual content, and a high-quality product that will best support teachers’ instruction and student learning.

What Is Next for FOSS Middle School?

With educators scrambling to align with NGSS, we are aware that people are hoping to purchase curriculum materials (new courses or conversion kits) in the near future. We are making every effort to provide FOSS resources that will meet and exceed the expectations of our users.

With FOSS Middle School Second Edition courses, FOSS now has grade-level recommendations. Some FOSS courses serve as the foundation for later courses. For example, in the Life Science Strand, the Diversity of Life Course helps students explore the characteristics of life and basic classification of living things, which lays the groundwork for content engaged in the seventh- and eighth-grade Life Science courses. Similarly, in the Physical Science Strand, the Motion and Forces Course is closely aligned with the skills in the Common Core State Standards for math at sixth grade.

FOSS Middle School
Second Edition Courses

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<tr>
<th></th>
<th>Life Science</th>
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<tr>
<td>8th</td>
<td>Systems, Heredity, and Evolution</td>
<td>Forces and Energy Transfer</td>
<td>Planetary Science</td>
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<td>(available early 2017)</td>
<td>(available early 2017)</td>
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<tr>
<td>7th</td>
<td>Populations and Ecosystems</td>
<td>Chemical Interactions</td>
<td>Earth History</td>
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<td>(available late 2016)</td>
<td>(available late 2015)</td>
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<tr>
<td>6th</td>
<td>Diversity of Life</td>
<td>Motion and Forces</td>
<td>Weather and Water</td>
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<td>(available early 2015)</td>
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FOSS Planetary Science Course, Second Edition
Investigation 4: Moon Study
Part 2 How Big/How Far?
In this FOSS investigation part, students explore the Earth/Moon relationship by creating a scaled model of the system. Using a small globe as a starting point, they calculate the diameter of a ball to represent the companion Moon, and then position it at the right distance to represent the Moon’s orbital distance.

• Scale is the size relationship between a representation of an object and the object.
• Scale can be expressed as a ratio when an object and its representation are measured in related unit.

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<td>MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.</td>
<td>ESS1.A Patterns of the apparent motion of the Sun, the Moon, and stars in the sky can be observed, described, predicted, and explained with models. ESS1.B The solar system consists of the Sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the Sun by its gravitational pull on them.</td>
<td>Scale, Proportion, and Quantity Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. Systems and System Models Models can be used to represent systems and their interactions.</td>
<td>Asking questions (SP)/Defining problems (EP) Developing and using models (SP) Planning and carrying out investigations (EP) Using mathematics and computer thinking (EP) Obtaining, evaluating, and communicating information (SP/EP)</td>
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grade, and develops content that students will expand on in the seventh- and eighth-grade courses. Districts could also choose to teach Life Science in year one, Earth Science in year two, and Physical Science in the last middle school year.

What happened to the Human Brain and Senses and Electronics Courses? Parts of Human Brain and Senses will appear in the revised life science courses, Diversity of Life and Systems, Heredity, and Evolution. The Electronics Course does not have a place in this revised content sequence, but it will be reworked in the future as a STEM course focusing on electrical engineering, suitable for engineering classes, science electives, and electronics/robotics clubs.

Not all of the revised courses will be available immediately. From a school/district adoption standpoint, this can be seen a good thing. It’s not necessarily advantageous to change all your curriculum materials at the same time, which could overwhelm teachers. FOSS recommends introducing one to two courses per grade level per year, using the materials that are available at the time. This will also give teachers time to study and analyze the NGSS as they proceed and understand how the new FOSS curriculum supports their science-learning goals (see the sample NGSS Connections graphic on this page). The Delta FOSS Regional Sales Managers work very closely with FOSS Middle School Program development team at the Lawrence Hall of Science to design a rollout plan that works for your district and school.

FOSS Connections to NGSS Teaching the nine new FOSS middle school courses will address the learning expectations for the disciplinary core ideas, crosscutting concepts, and scientific and engineering practices described in NRC’s Framework and NGSS. For each revised course, we are developing a connections document that will be posted on FOSSweb (www.FOSSweb.com). The Planetary Science Course, Second Edition document is available now. These documents will help you understand which aspects of the Framework and NGSS are addressed in each part of each investigation. The graphic on this page shows one example from the Planetary Science Course, Second Edition. The text at the top of the graphic describes one investigation part (Investigation 4, Part 2) and its content. The graphic also shows the connections of this part to NGSS.

FOSS at NSTA Conferences The two new FOSS middle school courses, Planetary Science and Earth History, will be featured in workshops at the NSTA fall conferences and the national conference in Boston next spring (see the calendar at the end of this newsletter). Look for other announcements about professional development opportunities on the FOSSweb PD calendar.

Science Course, Second Edition
A Middle School Teacher’s Experience with FOSS
By Sarah Lee, Teacher, Learwood Middle School, Avon Lake, Ohio

If you’re anything like me, you are thrilled when your students have settled into your classroom routine and show confidence in their learning. I look forward to the end of the first month of the school year for this very reason; it seems easier to manage a classroom once effective routines are in place. Teaching seventh-grade science in middle school has been an exciting change from my many years in high school instruction. My transition has been made easier with the adoption of three FOSS courses, which are the backbone on which we hang our curriculum. It has been a pleasure using the Weather and Water and Populations and Ecosystems Courses for the past six years. Recently, we adopted the Chemical Interactions Course to fill a big gap in the middle school curriculum. I hope my comments will encourage your continued use of the inquiry method used in the FOSS courses, as well as extend particular areas for additional emphasis on teaching with inquiry.

Order of Units
Our school year starts out with the FOSS Weather and Water Course. The timing of this course corresponds well with tracking hurricanes and is of very high interest for students. The fundamental concepts of the gas laws are well established, as well as the transfer of energy, density, and convection, phase changes of water, and the water cycle. A short unit on measurement follows the Weather and Water Course. This skill-based unit helps break up the regular routine and establishes a useful familiarity and understanding of the instruments used in science and the physical properties of matter that can be easily measured. Students are assessed with a measurement practicum, which includes mass, weight, temperature, air pressure, and humidity (which were introduced in the FOSS Weather and Water Course) as well as volume and length.

The FOSS Chemical Interactions Course follows. This course builds nicely on the students’ understanding of matter from the Weather and Water Course and continues the development of the particle model of matter, which was introduced in Weather and Water. Starting off with identifying the mystery mixture, students are guided by the particle model to understand physical and chemical changes happening when a substance’s particles rearrange, becoming a new substance. We end the school year with the FOSS Populations and Ecosystems Course, which works well with the coming of spring in Ohio.

The Science Notebook
Over the last four years, students have organized their science work for each unit in a science notebook. The students start with a table of contents that includes three columns; the date, the title, and page number. All pages are numbered sequentially. This notebook includes all notes, labs, worksheets, and quizzes. So when I want to refer back to work we have completed, I ask the students to turn to a page, and they do! It’s as simple as that. Keeping a notebook proves to the student that the work they have completed is valuable, that keeping a record of their learning is valuable, and that just because they completed a paper doesn’t mean that it is not useful to them anymore. I have found that notebook quizzes are also helpful and prove to them that keeping an organized notebook will pay big dividends for them during an open-notebook assessment.

I stress the importance of the science notebook to students. I have them review the pertinent pages in their notebooks to prepare for quizzes and tests. Students do not lose/misplace papers as they have in the past. At the end of each unit, the students make personalized covers and their notebooks are theirs to keep. Throughout each unit, I keep a notebook as well, which I use to help students who were absent and to keep track of suggested changes for the next school year. I have seen such remarkable benefits for middle school students, I would never again teach a class without notebooks!

The Use of Models and Questioning Strategies
If you are sold on the inquiry method of instruction, you probably already have elements of modeling in your instruction, as it is an important component of the instruction in the FOSS courses. Developing and using models, one of the scientific practices described in the National Research Council’s A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012), links the microscopic, the macroscopic, and the symbolic levels of understanding together. Take, for instance, the concept of a chemical reaction from the FOSS Chemical Interactions Course. Students see the chemical reaction between citric acid and sodium bicarbonate (the macroscopic), represent this reaction with chemical symbols (symbolic), and, using colored dots, show how the chemicals rearranged to become a new substance (the microscopic).

Understanding is deepest and long lasting when all three levels of understanding are thought through and linked together. It’s amazing how our minds work, isn’t it? The modeling community of educators is growing by leaps and bounds every year. (I’ve been involved in summer workshops on the topic here in Ohio). My middle school students have responded positively to the use of models, and I’m sure, with some training in teaching using this approach, your students will benefit greatly also. The FOSS Weather and Water and Chemical Interactions Courses include many particle models that fit perfectly with this teaching approach.

Embedded Assessment and Next-Step Strategies with the FOSS Curriculum
When I identified that students needed additional support understanding phases of matter, a very fun addition was a big hit with the students. Using a large parachute and ping-pong balls as particles, the ping-pong balls “pooled” in the center of the parachute. The students pulled on the parachute to see them moving around on the parachute, rolling over each other, but keeping mostly together,
In Remembrance of Caroline Yee, 1944–2013, FOSS Pioneer in Oakland, California

Caroline Yee was a FOSS pioneer in Oakland Unified School District. We first met Caroline when she joined the NSF Teacher Enhancement Project with FOSS, Science Update, at the Lawrence Hall of Science in 1990. The first national trials edition of FOSS was just released, and this project was the companion professional development effort. Caroline wasn’t sure that science was for her, but at the urging of her husband, Gary Yee, she and a colleague, Evelyn Gertler, formed a Science Update team at Sequoia Elementary School. During the workshops, both teachers sat up at the front table, engaging in hands-on activities, asking intriguing questions, and making discoveries while having fun with their experiences. Caroline became eager to use this approach in her classroom; it was clear that science education was in Caroline’s future. She obtained a $100,000 grant to extend Science Update to her entire school. The Live Wires Project (aptly named for its creator), brought the FOSS directors to Caroline’s second-grade classroom to work with the staff, and we always arrived before the end of the school day so we could visit with her young students and hear about their joyful adventures in science with Caroline. She organized the first Sequoia School Family Science Night, which featured the students proudly sharing their FOSS science experiences with parents and others, including members of the school board.

Becoming a science teacher leader in the district, Caroline joined the LITES program at Mills College to hone her skills so she could help make high-quality science experiences available to all students in the district. She performed as the “talent” on the FOSS Variables Module teacher preparation video to help other teachers get started with this module. (Her 2000 performance is available on FOSSweb.) Later, Caroline became a principal at Hillcrest K–8 school, and invited our FOSS middle school development team to work in classrooms there. As we walked into the school each day with our boxes of science materials, we could feel Caroline’s impact on the learning community—teachers and students working together in a supportive environment, embracing challenges, celebrating progress, and enjoying the journey. Her smile and enthusiasm was infectious. And when Caroline became the principal of her own alma mater, Lincoln Elementary School, she established a science discovery room for all students (featured in the FOSS Newsletter, Spring 2010). It was with Caroline’s staff at Lincoln that we conducted the first FOSS CA Edition pilot in 2006.

As a teacher and principal, through classroom experiences, science camps, science fairs, and science nights, Caroline shared her love of learning with her students and their parents, with teachers and district administrators, and with the Oakland community. Caroline is remembered as a creative and inspirational educator who left her mark on Oakland USD and on projects at the Lawrence Hall of Science. She is greatly missed.

mimicking the flow of liquid. Students added energy to the “particles” by pulling on the parachute, and the ping-pong balls started to bounce on the parachute, spreading apart, mimicking boiling, a phase change. As more energy was added, the ping-pong balls moved wildly around the parachute, bounding off each other, the ceiling, and the parachute. This phase is the gaseous phase. When students do a really good job, the ping-pong balls bounce all over the room! This model allows them to visualize what happens to particles in solids, liquids, and gases as energy transfers to and from a material. A trip back to a preschool parachute experience provided a great model for phase change!

Earlier in this article, I mentioned that the FOSS curriculum is used as the backbone for our middle school science curriculum. The student’s excitement and engagement in the many hands-on activities are hard to beat. Meeting standards and learning outcomes can be challenging using a rigid curriculum, yet the FOSS curriculum allows for easy adjustments and additions to meet student needs based on the results of embedded assessment. The Science Notebooks in Middle School chapter provides “next-step strategies” that help support student understanding.

The addition of specific questioning strategies has proven vital for me to know what my students know or understand at a particular moment in time. It is amazing to see students who are asked to explain/defend their thinking and in the middle of a sentence correct themselves! Self-correction seems to happen most often during the whiteboard questioning sessions. Outcomes from these questioning sessions give me insights into how to handle the next lesson or which topics I may need to review. Modeling assists in flushing out these often hidden student misconceptions. As science teachers, we dread the thought of creating or reinforcing a misconception. Giving students the opportunity to reflect and respond creates the environment for open thinking and discussion of solid scientific concepts that can and should be understood and applied by every student.

Editor’s Note: Learn more about embedded assessment by referring to the Assessment chapter in any FOSS Teacher Toolkit, and learn more about using whiteboards and next-step strategies by reading Science Notebooks in Middle School, a FOSS Teacher Resource PDF, which you can download for free on FOSSweb.
Chew On This: Everything You Don’t Want to Know About Fast Food

I was tipped off to this book while on a site visit to a sixth-grade science classroom in Olympia, Washington. One of the students was about halfway through the book and had just learned about some tiny insects that are crushed up to make red food coloring that ends up in our food. With a crowd of students gathered around his desk after class, he had the book open, showing them drawings of the bugs and explaining the process. The student was also explaining that he would never eat fast food or candy again. I heard a student respond, “I have GOT to read that book now!” After teaching eighth grade and working in middle school classrooms for over a decade, I know any book that generates that level of interest in middle school students is a rare find that should be taken advantage of!

This book, co-written by the author of Fast Food Nation, elaborates on much of the food culture in America. How did fast food come into existence? What sort of science is required to create food that lasts longer, tastes better (well, that might be a matter of opinion), and can be quickly opened or served? Going beyond just fast food restaurants, Chew On This looks into the entire food production industry of the United States, from the farms where cattle are raised, to the labs where new flavors are developed, to the doctors meeting younger and younger patients with diet-related health conditions. These issues are important for adults to consider but perhaps even more so for the youth growing up in this era of cheap, abundant processed foods.

Here are a few highlights:
- In the span of a year, the average American child watches more than 40,000 television commercials, about half of which are for junk food (defined as soda, candy, breakfast cereals, and fast food).
- Lamb Weston, the world’s largest French fry producer, stores mounds of potatoes spanning a length of nearly 14 football fields, which it then runs down an entirely automated fry-making-machine via conveyor belt in a scene which sounds like a Rube Goldberg contraption, complete with airblasting guns to eliminate faulty potatoes.
- Kellogg’s school educational program about the benefits of breakfast explained to third and fourth graders that cereals are low in fat (but didn’t mention the quantity of sugar), with the message “go ahead and enjoy them!”
- Industry regulations impose stricter regulations and recalls on children’s toys than the meat children eat.

The book is riveting, and it encourages the reader to think about what might be everyday habits, to question the motivation of all parties involved in the food industry, and to learn more about potential health consequences of food choices. It provides examples of positive work, reform, and education being done to promote more healthy ways of eating. The author acknowledges the fact that sometimes junk food is the fastest, easiest, and least expensive option, even providing information about which companies might be better choices for those times when you choose fast food. Ultimately, the book leaves the reader with a sense of empowerment, which might be one of the best things you can give to a middle school student, along with a sense of curiosity about how they spend their money and the food they eat.
Welcome to the FOSS Assessment Corner. Here we’ll provide FOSS users with a more detailed look at some of the subtler aspects of the FOSS Assessment System. The Investigations Guide for each FOSS Third Edition module gives you step-by-step directions about exactly when to use assessments in each part of each investigation; the purpose of the Corner is to better explain the reasoning behind doing these things. In addition, the Corner will help FOSS Second Edition users acquire and use the new assessment methods and materials that were developed and tested in our NSF research project called ASK (Assessing Science Knowledge, 2003–2009), which lead to the assessment system now part of FOSS Third Edition.

In this installment, we’ll start with some basics. The FOSS Assessment System consists of two types of assessment: embedded and benchmark.

Embedded assessments occur in each part of each investigation. This means taking a piece of student work that students have completed as part of the lesson and using it to determine how concepts or practices are developing. Using the Reflective Assessment technique, teachers spend 10 minutes looking at written student work (usually these are notebook entries, such as student-crafted answers to focus questions or writing prompted by a more rigorously designed response sheet). At the end of the 10 minutes, teachers reflect on the trends and patterns of understanding they’ve observed from student work or from a sampling of students in multiple classes. Teachers use this information to plan next instructional steps.

Benchmark assessments include surveys (given before instruction begins), I-Checks (given after each investigation is completed), and posttests (after all instruction for a module is completed). Grades 1–2 use I-Checks only; grades 3–6 use all of the assessments. The survey provides teachers with information about the nature and extent of students’ prior knowledge. Teachers can use this information to make decisions about how much time and effort they spend on various parts of the investigations. An I-Check is given at the end of each investigation. I-Check is short for “I check my own understanding," Students take the test; teachers look at students’ answers and record progress, but they put no marks on students’ papers. The unmarked papers are returned to students for peer- and self-assessment activities (next-step strategies), that guide and stimulate students’ reflections, intended to lead students to revise their thinking as needed. The posttest is given at the end of instruction to enable students to observe and appreciate their improvement. The items on the survey and posttest are the same so that students can observe their own progress. The posttest provides summative data to confirm learning and provide formative information to teachers about what they might want to stress or focus on differently when they teach the module the following year.

FOSS also has a new computer program online called FOSSmap. You can access FOSSmap and online assessment via a computer or using iPads or other tablets. FOSSmap was developed to facilitate the use of the assessment system. You must be registered with FOSSweb. com in order to use the system (the good news is that both systems use the same login and password for teachers).

Continued on page 18
Once you are registered, you can go to FOSSmap directly, without having to go through the FOSSweb site.

You’ve probably noticed the similar names: FOSSweb vs. FOSSmap. Just to clarify, FOSSweb.com is the general FOSS website where you go to access all the resources, multimedia, notebook and assessment masters, streaming video, and so forth. FOSSmap is an exclusive assessment site that allows you to keep track of assessment data, open online assessments for students, and run reports about class and student progress. FOSSweb and FOSSmap are two separate entities.

After you are registered, you set up your class in FOSSmap by clicking the link on FOSSweb or by going directly to FOSSmap.com. (Note: this is a separate task from setting up a class page for communicating with students at home on FOSSweb). In FOSSmap you will need to set up a class roster with student first names and ID codes (these can be any codes you want to use, including district codes). Once you have set up a class, you are ready to: record embedded assessment data, open online assessments for students, and run reports about class and student progress. FOSSweb and FOSSmap are two separate entities.

Reference

The AEP Awards honor excellence and innovation in the educational resource community and spotlight the best resources for teachers, parents, and students. Each submission undergoes a rigorous three-round review by a panel consisting of educators and education professionals. Only products with high scores and comments from each round of judging are recognized as finalists and winners, with just 25 percent of overall entrants advancing to the finals. The largest of the AEP Awards, the Distinguished Achievement Awards honor the widest range of educational content available for use in educating learners of all ages.
**FOSS Institutes**

Delta Education will host two one-day FOSS Institutes before the National NSTA Conference in Boston, Massachusetts (April 2, 2014). These Institutes, one for K–6 and one for middle school, will be for educators from districts that have implemented FOSS or are planning to implement FOSS. The Institutes will focus on K–6 FOSS Third Edition and the revision of selected FOSS Middle School Courses. These Institutes are designed for experienced FOSS educators—lead teachers, administrators, curriculum coordinators, professional developers, and university methods instructors.

These Institutes are free, but you must register in advance to attend.

To secure your spot at an Institute, please write, fax, or e-mail:

Pam Frisoni  
Delta Education  
80 Northwest Boulevard  
Nashua, NH 03063  
pam.frisoni@schoolspecialty.com  
Fax: 920.882.4598

**NSTA 2013 FALL AREA CONFERENCES**

**K–8 Commercial Workshop Schedule**

- **Portland, OR**  
  October 24–26, 2013
- **Charlotte, NC**  
  November 7–9, 2013
- **Denver, CO**  
  December 12–14, 2013

**Thursday (10/24, 11/7, 12/12)**

- 8:00–9:15  FOSStering the Common Core: Science-Centered Language Development
- 10:00–11:15 Scientific Practices: What Does Argumentation Look Like in an Elementary Classroom?
- 12:30–1:45 FOSS Assessment Online!
- 2:15–3:30 Asteroid! Will Earth Be Hit Again? Planetary Science for Middle School
- 4:00–5:15 Evidence for Plate Movement with FOSS Earth History, Second Edition for Middle School

**CAST 2013: FOSS TEXAS EDITION WORKSHOPS**

- **Houston, TX**  
  November 7–9, 2013

**Thursday (11/7)**

- 8:30–9:30 Many Forms of Energy in Your Classroom
- 12:30–1:30 Get Your Students Into the Swing of Science
- 1:00–4:00 Science-Centered Language Development Using FOSS (Short Course)
- 2:00–3:00 Solutions for Your Elementary Science Classroom
- 3:30–4:30 Magnetic Activities that Really Stick with Your Students

**Friday (11/8)**

- 8:30–9:30 Take the Plunge Into Density
- 10:00–11:00 Around the World in 60 Minutes: The Water Cycle
- 11:30–12:30 FOSStering a Charged Classroom with Energy and Electromagnetism
- 1:30–2:30 My Sediments Exactly
- 3:00–4:00 EnLIGHTening Investigations!
- 4:30–5:30 Teaching Between a Rock and a Hard Place

**Saturday (11/9)**

- 8:30–9:30 No LEP Child Left Behind
- 10:00–11:00 Teaching Work Without Any Heavy Lifting
- 11:30–12:30 Many Forms of Energy for Your Classroom
- 1:00–2:00 Get Your Students Into the Swing of Science
- 2:30–3:30 FOSStering a Charged Classroom with Energy and Electromagnetism

For more information about the workshops on this page and other professional development opportunities, visit the FOSS Professional Development calendar:

You’re already running with FOSS. Now, with FOSS Third Edition, you can fly.

Sprout wings with these features in FOSS Third Edition:

- Embedded and benchmark assessments provide ways to continually monitor learning.
- Enhanced technology engages students and provides management tools for teachers.
- Embedded science notebook strategies solidify students’ understanding.
- Content area readings provide students with regular encounters with informational text.

Contact us to discuss conversion kits and other transition pathways to help you move to FOSS Third Edition.