This Workshop Will Blow You Away!
FOSS Weather and Water in Norman, Oklahoma
Summer 2005

“The weather—everyone talks about it, but…”
You know the rest. Well it’s time to do something about it!
From June 26 to July 2, 2005, the FOSS staff from the Lawrence Hall of Science, in cooperation with the University of Oklahoma, the National Weather Service (NWS), and the National Severe Storms Lab (NSSL), will present a Weather and Water Course workshop in Norman, Oklahoma.

Who should apply?
❖ Science leadership educators from universities 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 more meteorologists than any other city in the country.

Continued on page 12
As a part of the **FOSS Human Body Module**, fourth-grade students at South Mountain Elementary School in Dillsburg, Pennsylvania, recently dissected owl pellets. Students learned that owls cannot digest the fur and bones of the rodents they eat. Instead, they cough up a pellet that contains indigestible rodent parts. With the help of many parent volunteers, students removed all the bones, identified them, and compared them to human bones. They used the **FOSS Rodent Bone Identification** sheet to reconstruct the rodent skeletons. Students were amazed at their findings. This proved to be a rewarding lesson for both students and parents.

The following paragraphs were written by some of the Dillsburg fourth graders.

**By: Matt**

**Owl Pellets**
By Suzanne Funk, Fourth-Grade Teacher, South Mountain Elementary, Dillsburg, Pennsylvania

Fourth graders at South Mountain Elementary School in Dillsburg, Pennsylvania, are learning a lot in science. We just recently dissected owl pellets, which we got from the FOSS kits. The owl pellets were full of tiny rodent bones. Owl pellets are really only animals that the owl has eaten. It is just the animal’s fur and bones. We are studying the owl pellet because we’re learning about the Human Body. I’m glad we are studying all about our bodies.

**BY: Annie**

All of the fourth graders at South Mountain Elementary School in Dillsburg, Pennsylvania, loved working with the owl pellets. We found bones and fur of the animals the owl ate. We tried to figure out what the owl ate but it was hard. We got to identify bones and many of them were the same as human bones. We had a lot of fun and I really want to do it again.

**BY: Jason**

At South Mountain Elementary School in Dillsburg, Pennsylvania, the fourth grade got the **Human Body** kit from the FOSS company. In the **Human Body** kit we worked with owl pellets. Owl pellets are from when an owl ate a mouse and coughed it up. They’re like hairballs with bones inside. We enjoyed dissecting the owl pellets and examining the bones. Thank you to FOSS for making such a fun kit for us to use.

**BY: Matt**

Students work with a parent to dissect owl pellets.

This student begins to organize the contents of an owl pellet.
These students collect a soil sample to begin their study of soil in the FOSS Pebbles, Sand, and Silt Module.

These students show off the results of putting their soil sample through different-sized screens.

**Pebbles, Sand and Silt Report from Dillsburg, Pennsylvania**

Tonya Meyers and Jennifer Gruber, First-Grade Teachers, Dillsburg Elementary, Dillsburg, Pennsylvania

Mrs. Gruber’s and Mrs. Meyers’ first-grade classes at Dillsburg Elementary have been getting “down and dirty” collecting soil samples for their **FOSS Pebbles, Sand, and Silt Module** investigations. They have made explorations into dirt like never before. Who would have thought a metal spoon would be so handy when excavating a small area for a soil sample? The children found it amazing that so many different materials go into making up soil. Most of the students assumed it was all made of the same stuff—dirt. Students have been actively participating in identifying the parts of soil. Venturing outside to imitate the everyday practices of a “real life” scientist has given students a whole new perspective on the earth material they walk on everyday.

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**Trouble with Brine Shrimp**

On November 11, 2004, I received this letter from Mrs. Mary Martin’s fifth-grade class in Spokane, Washington, regarding Investigation 5, *Hatching Brine Shrimp*, in the **Environments Module**. The letter came right to the point—the brine shrimp eggs didn’t hatch, and she and her students wanted to know why.

Right away I suspected that the cause of the problem was not the environmental conditions provided by the students, but the viability of the brine shrimp eggs. I dropped the students a

Continued on page 4
note, suggesting that the information they
found on the Web probably applied to
culturing brine shrimp and raising them to
maturity.

The inquiry from Adams Elementary
was perfectly timed. We had recently found
out that the suggested saltwater recipe
for hatching the brine shrimp eggs was
not producing acceptable results with the
eggs currently being supplied in the
Environments Module. It appeared to
be too concentrated. I needed data. It
looked like an opportunity for Mrs.
Martin’s concerned students to help out.

I suggested to the class that the two
most critical variables in a hatching
investigation were salt concentration and
live eggs. I sent a sample of eggs that
I was sure were viable and proposed that
the class test these eggs and their eggs
in a series of salt concentrations. I also
let them know that I was anxious to see
their lab report.

On December 15, I got the report. The students had designed
and conducted a nice experiment. They set up two identical sets
of cups with 100 ml of water and from 0–7 ml of kosher salt. In
one set they put a tiny spoonful of the questionable eggs from
their kit, and in the other set they put a tiny spoonful of the eggs
I provided. Here is their data table.

<table>
<thead>
<tr>
<th>Amount of salt (ml)</th>
<th>Old eggs hatching</th>
<th>New eggs hatching</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Sure enough, they determined that the original eggs in the
kit were no longer viable. And, after two days, the new eggs
had hatched in all of the salt concentrations they had tested,
except for 0 ml of salt. Included with their report was a sample
of the eggs they had determined to be dead. In the spirit of
good science, I replicated their experiment, following their
procedure precisely. After three days I was able to confirm their
results and conclusions.

The students at Adams Elementary experienced some difficulty
determining which salt concentrations provided the optimum
environment for hatching. My results suggested that the lowest
salt concentrations provided the greatest hatching and that
hatching actually declined in the more concentrated salt
solutions. This will require a revision of the student sheet in the
Environments Module.

Thanks go out to Mrs. Martin and her class of excellent
scientists. Their pursuit of answers to questions about the natural
world represents science at its highest level. As a result of their
good work, we have two important bits of information to share
with teachers around the country using the Environments
Module.

1. Test those brine shrimp eggs a week or so before you plan to teach
   Investigation 5. Dissolve a 5-ml spoon of kosher salt in 150 ml of
   water. Add one minispoon of your brine shrimp eggs. In two days you
   should have a little swarm of pinpoint-sized hatchlings moving around in
   the cup.

2. Modify the brine shrimp hatching experiment procedure and student
   sheet no. 17, Hatching Brine Shrimp, by reducing the amount of salt in
   half. You should still use the 5-ml spoon and 150 ml of water, but use
   only half as many spoons of salt. The cups will then be labeled 0
   spoons, 1 spoon, 2 spoons, and 3 spoons. Student sheet no. 17 should
   be modified in a similar fashion. A pdf version of the revised sheet can
   be downloaded from FOSSweb at this url:
   http://lhsfoss.org/fossweb/worksheets/unprotected/
   Environments17_BrineShrimp.pdf.
I have been a middle-school science teacher for the past 12 years, teaching seventh- and eighth-grade students. Typically, I teach biology to the seventh graders and earth science to my eighth graders. Jane Cancellieri, who also happens to be my cousin, also teaches the eighth-grade science classes across the hall from me. Both Jane and I were trained in our undergraduate programs in education with some biology. Neither of us really had an interest in earth science. We would assign chapters to read and fumble through explanations of the rock cycle, the formation of the Earth, weather, and so on. It was a tedious task to say the least. We would commiserate about how bored the kids were and how tough it was to teach earth science to eighth graders.

In 2001 the state of Massachusetts implemented the new science education frameworks. Our district was able to connect with another district beginning in 2002 for teacher training through an NSF-funded initiative called Critical MASS. The goal of Critical MASS was to provide in-depth training in science and math content areas. Jane and I were comfortable with the biology concepts, but when it came to earth science, we were in trouble. That is when we met Sue Jagoda, one of the FOSS developers from Lawrence Hall of Science. Sue was able to make the earth science training interesting and relevant. She sparked an interest in both of us to understand earth science. We were beginning to realize that our own lack of content understanding of earth science was a big reason teaching it was tedious and difficult.

After the Critical MASS workshops, Jane and I would have impromptu conversations in the hallway between classes about earth science and how it should be taught in our classes. We had taught portions of the FOSS Earth History Course, but we weren’t feeling confident and connected to the content. Our enthusiasm for the kit was about as heated as that of lukewarm tea.

In one of the Critical MASS trainings, Sue told us about the Earth History workshop being offered right at Grand Canyon. Grand Canyon is far away, and neither one of us had ever been there. Jane and I agreed that we had to attend this course one way or another. We even thought about paying for it ourselves. Luckily, our district had some money set aside for this type of professional development. We filled out the application and made our plans to head out West!

Jane arrived a week early and had a nice, relaxing time with her husband. She had rented a convertible for the trip to the Grand Canyon. We made a quick stop at the Hoover Dam and then continued to Grand Canyon. The landscape flew by on the way there. I fell asleep on the way, a victim of changing time zones. Jane woke me up when we entered Grand Canyon National Park. I was thinking, “Oh, this is nothing, just some pine trees and it doesn’t seem to be that big of a deal. It reminds me of the White Mountains.” Then, we got to the first open area and my mouth dropped open. We parked and I had my first look into Grand Canyon. I had never seen such an incredible sight. No words can describe the feeling I had. All I knew was I had to get down into the Canyon and explore what was there. Jane laughed at me as she had already experienced her first sight of Grand Canyon the prior week. Having had her
first experience, she was thrilled to see my face when I saw it for the first time. It was getting dark and we had to find where we were staying and check in with Sue. I felt like a little kid on Christmas Eve. I couldn’t wait until

morning to really see Grand Canyon during daylight hours. Something was starting to change for us, “the biologists,” and we were on the path to become “rock heads” and didn’t even know it. During the weeklong training, we were able to get in-depth explanations about the different layers of Grand Canyon and what was going on geologically. Being there and getting my hands on the materials helped me understand how the magnificent Grand Canyon is and what amazing things have gone on in geologic history. The concepts we were beginning to grasp were amazing.

First, being on the Colorado Plateau took some getting used to. Physically, we had to drink gallons of water. The idea that we were sitting on the top of so much geologic history was mind-boggling. Understanding that each layer had a story to tell was fascinating. The day that we went to the site where we could investigate the actual fossils in the limestone was a highlight for me. I looked at the Canyon in a whole new light. I tried to imagine what the area would have looked like submerged under a great ocean with these critters residing on the bottom. I tried to visualize what the landmass looked like surrounded by ocean and what creatures were emerging from the water onto that landmass. Simultaneously, my teacher mind was thinking of ways to bring back the wonder I was feeling to my classroom. All sorts of cool lesson plans were forming in my mind that day. The idea that limestone could tell such an interesting story blew me away. Jane and I shared many ideas about how to bring this enthusiasm back with us to school.

The workshop inspired both Jane and me to actively pursue more information about geology. We have, since the Grand Canyon visit, signed up for more courses in geology at our local college. We felt the need to have more understanding of geology to teach the Earth History Course well. We now teach the Earth History Course with much more enthusiasm then ever before. Even the students have remarked to Jane that she is almost over-the-top with her passion about rocks! I think that comment made Jane realize how much the experience at Grand Canyon influenced her teaching

of what was before a rather tough and tedious curriculum. For myself, I have found that understanding more about Grand Canyon and its history has made me more excited and confident to teach the Earth History Course.

With this newfound confidence with geology, I have tweaked my earth history lessons to reflect the geology surrounding my school. Not only are the students learning about the geology of Grand Canyon, they are able to use their new skills to help them identify the rocks and minerals of Massachusetts and begin interpreting the geologic history of the area.

The Grand Canyon workshop transformed two stubborn biologists into budding geologists—an amazing feat! The work we did during the workshop sparked something in both of us to find out more about rocks and bring our newfound enthusiasm for earth science back to our students. 

JENN FISCHER TAKES A BREAK FROM STUDYING FOSSILS IN THE KAIBAB FORMATION ALONG THE HERMIT TRAIL.

JENN AND JANE POSE AMONG PETRIFIED LOGS IN ARIZONA’S PAINTED DESERT.

JENN AND JANE POSE AMONG PETRIFIED LOGS IN ARIZONA’S PAINTED DESERT.
Earth History Field Experiences
By Ashley Griffith, Bellingham School District, Washington

Field-based experiences are a meaningful part of any science curriculum. The FOSS Earth History Course lends itself toward local investigations. During the second investigation, Grand Canyon Rocks, students learn and practice how geologists make sketches of rock outcrops, record their observations and collect rock samples. As a follow-up to the investigation, I arranged for my sixth-grade students to visit a local rock outcrop to gather information about the geology of our local area and to apply the skills they had learned in class.

Students sketched the outcrop and recorded observations of the different types of rocks, just like they did from the photos and samples in Investigation 2. Students observed and recorded the colors, textures, and other features of the rocks and tested them with hydrochloric acid. Based on their observations, students tried to identify the rocks as sandstone, shale, or limestone. This field-based experience gave students the opportunity to observe and learn about local rock formations following their classroom experiences. The students felt like professional geologists! Following the field trip, students compared their local rock samples with the Grand Canyon rock samples in the Earth History Course.

To support students, each adult chaperone had a folder with field trip tips for adults, equipment safety sheet for the hydrochloric acid, a list of adjectives helpful for describing rocks, and a list of characteristics helpful for identifying the rock type. In addition, each adult was responsible for carrying a set of acid bottles, safety goggles, and magnifying lenses to the site and checking them out to students. Each student had a clipboard with two sheets—one for doing their sketch and the other for recording their observations. These sheets were later inserted into their composition books in the classroom.

See the Web version of this article at http://lhsfos.org/newsletters/index.html for more information about the materials and supporting documents described in this article.

Ashley Griffith
Bellingham School District
agriffit@bham.wednet.edu
It took Clancey 10 minutes to ride his skateboard 2 kilometers down the hill to Richie’s house. They played Claw on the computer for 20 minutes. It took Clancey 20 minutes to walk back home up the hill. Make a data table and two graphs to show Clancey’s movement.

This is a typical problem tackled by students in Investigation 4 of the newest course in the FOSS middle school program, Force and Motion. How do we prepare students to think through this problem effectively?

The course starts with the basic concept on which the whole vast and colorful family of interactions we recognize as motion depends: the concept of position. At any given moment in time, every object must be someplace. That someplace is the object’s position.

Change of position defines distance and displacement. Speed and velocity are functions of distance and displacement per unit time. Change of velocity per unit time is acceleration.

These are simple concepts in colloquial conversation. The multiple meanings and loose definitions are perfectly fine for casual use. These same concepts are difficult when considered within the rigorous constraints of physics. Precise definitions and complete, accurate, conventional, and intellectual constructs associated with these concepts are the lingua franca (or common language) of Newtonian physics.

When students have built a solid knowledge base around motion, the curriculum turns to the agent responsible for change of motion, force. Force is abstract and illusive, but its effects can be readily observed. The course concludes with a brief excursion into momentum and impulse.
Back to Clancey… in the Clancey problem, students need to understand and apply several concepts.

- Clancey’s adventure involves three separate motion/time events. These are identified as legs.
- Clancey has an initial position \( x_i \) and a final position \( x_f \) for each leg.
- Change of position yields two pieces of information: Total distance traveled (like on an odometer) and displacement from a starting position. Clancey traveled a specific distance \( d \) during each leg, which can be calculated using the equation \( d = x_f - x_i \). Distance is the magnitude of the change of position, so it is always positive. Displacement \( \Delta x \) is calculated using the equation \( \Delta x = x_f - x_i \), but the change of position can be positive or negative, depending on direction.
- Distance per unit time is speed. Speed \( v \) is calculated using the equation \( v = \frac{d}{\Delta t} \).
- A two-coordinate graph can be an effective way of representing a relationship between two variables, such as time and position or time and distance.

These concepts are developed carefully and thoroughly in Investigations 1–3. Clancey appears in Investigation 4. Students first organize the data given in the problem in a table. The given data look like this.

<table>
<thead>
<tr>
<th>Leg</th>
<th>( t ) (min)</th>
<th>( x ) (km)</th>
<th>( \Delta t ) (min)</th>
<th>( \Delta x ) (km)</th>
<th>( d ) (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
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<td>2</td>
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</tr>
<tr>
<td>3</td>
<td>50</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Next, students fill in the rest of the table with derived (calculated) data, which look like this.

<table>
<thead>
<tr>
<th>Leg</th>
<th>( t ) (min)</th>
<th>( x ) (km)</th>
<th>( \Delta t ) (min)</th>
<th>( \Delta x ) (km)</th>
<th>( d ) (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
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</tr>
<tr>
<td>2</td>
<td>30</td>
<td>2</td>
<td>20</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>0</td>
<td>20</td>
<td>-2</td>
<td>4</td>
</tr>
</tbody>
</table>

This table exposes some important fundamental concepts. Leg 1 is straightforward. In 10 minutes Clancey moved from a position at 0 km to a position at 2 km in the positive direction. The change of time from initial time \( t_i \) to the final time \( t_f \) was 10 minutes, the change of position \( \Delta x \) was 2 km, and so was the distance.

Leg 2 is a little more interesting. Here, Clancey played Claw on the computer for 20 minutes. Time marched on, so at the end of the Claw session, 30 minutes had passed. His position, however, did not change; it was still 2 km. By extension, the change of time for Leg 2 was 20 minutes, the change of position was 0 km, and the distance was still 2 km.

Leg 3, the motion home, ended when 50 minutes had passed, and Clancey was back home at 0 km. Again, by extension, the change of time from the start of Leg 3 to its end was 20 minutes, the change of position was 2 km in the negative direction, and the total distance traveled at the end of Leg 3 was 4 km.

Continued on page 10
Grant Gardner to develop a simple breakthrough in the acquisition of these data, the FOSS electronic Dotcar™.

The FOSS electronic Dotcar is a free-rolling car fitted with a phototransistor that monitors changes in reflective quality of a black-and-white-striped drum attached to the car’s axle. After making an untethered run, data stored in the microprocessor on the car are downloaded to a classroom computer for display. Position data in tenths of a centimeter are displayed every tenth of a second throughout the run. These data can then be transformed into average velocity, instantaneous velocity, acceleration, and a host of other useful results.

A Resource for Physics

The Force and Motion Course was developed for sixth and seventh graders, but it will find a home in many eighth- and ninth-grade classes as well. The math in the course will be challenging for sixth graders from acceleration onward. Science teachers might want to team with the math teacher when possible. But the course can be equally challenging for ninth graders if every opportunity for inquiry into basic physics is pursued.

Force and Motion Components

The Force and Motion Course includes the five familiar FOSS components, each carefully designed and tested to make the teaching and learning of the Force and Motion Course as effective and efficient as possible for both students and teachers.

❖ Teacher Guide

This complete resource for teachers includes everything needed to teach introductory physics to middle school students. Planning guides, content information, preparation discussions, lesson plans, assessments, and much more are included.

❖ Student Laboratory Equipment

Students learn physics in large part by doing physics. Three drawers of materials, from scales and meter tapes to electronic time-and-distance recording cars, permit Force and Motion Course users to explore concepts and acquire just the right data to make learning logical and enjoyable. Materials are supplied for up to five back-to-back classes of as many as 32 students each.

❖ Force and Motion Lab Notebook

This collection of science-notebook sheets helps students conduct inquiries and organize data effectively for later processing. These can be purchased for distribution to all students, or photocopied for use as needed during the course. One copy of the Lab Notebook is provided in the kit.

❖ Force and Motion Resources Book

Readings to support the active investigations are found in the Resources Book. The readings include expository articles, biographical and historical stories, and technical readings. Thirty-two copies of this full-color, hardcover book are included in the kit.

❖ Multimedia Program

An interactive multimedia program is provided on the Web and on CD-ROM.
Instructional Strategies

Students engage in a variety of different encounters with the concepts introduced in this course. Students are physically active, experiencing change of position by moving from one place to another. They calculate their own speed over a measured distance with stopwatches. They run two separate tracks, hitting numbered marks on consecutive seconds—one representing a constant velocity of 0.5 meters per second, and the other representing a constant acceleration of 0.5 meters per second per second. And they push and pull on all sorts of things to develop a sense of force/mass interactions. Students have extensive direct, firsthand kinesthetic experience with fundamental concepts in Newtonian physics.

Students conduct experiments with mechanical and electronic Dotcars to gather immediate and accurate time and distance data for analysis. They fly planes, time rolling cars, compare acceleration of cars of different masses, and lift loads under different friction conditions to advance their understanding of fundamental Newtonian concepts.

Students work with several interactive multimedia programs to exercise and extend the basic concepts. The Photo Finish simulation, involving calculating head starts for racers that run at different speeds, is of high interest to students. The Force Bench is a simulated laboratory environment where students can manipulate variables to investigate fundamental principles that underlie all force and motion interactions. The bench can be operated in a frictionless environment, bringing clarity to the $F = ma$ equation.

And finally, there are lots of opportunities for problem solving, like the Clancy outing, using concepts and understandings introduced in the activities. These often have a significant mathematical component, either in the areas of calculation, proportionality, graphing, or simple algebra.

Delta began shipping the Force and Motion Course in January. Contact your regional FOSS representative to test drive a Dotcar and give your students a chance to experience force and motion the FOSS way.
Meteorologists are employed by organizations, such as the NWS and NSSL and businesses that interpret and market weather information for various audiences. 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 content by meteorology researchers from the NWS, the NSSL, and the University of Oklahoma.
- Field trips to meteorological research and weather data-gathering facilities, as well as to some of the businesses that use the research and weather data to create products for the marketplace.
- The opportunity to learn how to locate and use local weather information using Web resources that may be unique to your geographical area.
- Networking with other teachers and science education leaders from across the country.
- A weather balloon launch.
- An introduction to weather visualization software that you can take back to your classroom to enhance the FOSS materials.
- Some time to use your imagination to identify creatures and objects in the cumulonimbus clouds, see some fabulous Oklahoma sunsets, and personally 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.

**Reinvent Your Science Classroom!**
Spark student interest with materials for scientific discovery!

Delta Education wants to give YOU the ultimate science classroom!

Four lucky winners from around the country will each receive a science classroom makeover valued at $4,000 using Delta Education material, including FOSS modules. Our expert science consultants will work with the winners to customize their prizes to best meet their state standards and science needs.

Receive a $10 Delta gift certificate just for entering!

Please visit www.deltaeducation.com/contest to enter. Just tell us (in 200 words or less) why you deserve a new science classroom and how you will put it to use. Contest limited to teachers of K–5 science. All entries must be received by May 20, 2005. Winners will be notified in June 2005. No purchase necessary, void where prohibited.
The FOSS Force and Module Course for middle school is now available. This Wordsmiths column includes a selection of books and other resources that supplement the investigations students conduct in the Force and Motion Course. These resources may also be a great addition to the Levers and Pulleys Module.

You can find more FOSS reading resources, as well as software and video resources, at http://lhsfoss.org/fossweb/teachers/resources/index.html.

If you would like to recommend books or other resources to our FOSS users, send your title and other information to the FOSS staff at foss@berkeley.edu.

NONFICTION

Galileo Galilei: Inventor, Astronomer, and Rebel
Covers the life and accomplishments of Galileo. The book captures the conflict between the scientists of the time and the Catholic Church. It includes background details of his early life and the society he lived in, as well the story of his education and the development of his scientific career. Also included are illustrations of Galileo’s inventions and descriptions of his most famous experiments. Part of the Giants of Science Series.

Isaac Newton and Gravity
This biography of Newton describes his scientific achievements and spells out his foibles in interesting vignettes. Students will read about Newton’s life, including his career later in life as “Master of the Mint,” during which he caught and sent many counterfeiters to their deaths. Includes full-color photographs and illustrations.

Isaac Newton: Discovering Laws That Govern the Universe
Clearly written and engaging description of the life and accomplishments of this English mathematician. At the age of 26, he became the youngest mathematics professor to teach at Cambridge. This position and his discoveries made his

Continued on page 14
colleagues jealous, leading to charges of lying and fraud. Nevertheless, he was the first scientist ever to be knighted. Includes a timeline of the important events in the lives of the scientists.

In Investigation 3, Comparing Speeds, students are presented with a fairly complex scenario from which they are asked to solve two problems. The scenario is the famous Iditarod Sled Dog Race. Here are some books students can read on the history of the race.

**Storm Run: The Story of the First Woman to Win the Iditarod Sled Dog Race**

In 1985, Libby Riddles made history by becoming the first woman to win the difficult 1,100-mile Iditarod Sled Dog Race. Riddles’ timeless adventure story is complete with updated narrative details, sidebars on all aspects of the race, photographs, and all-new illustrations. An inspiration to children and adults everywhere, this is a compelling first-hand account of the Arctic storms, freezing temperatures, loyal sled dogs, and utter determination that defined Riddles’ Iditarod victory.

**Race Across Alaska**

Unabridged version of Libby Riddles’ adventure, the story of a courageous woman and her heroic dogs.

**VIDEO**

**Galileo: On the Shoulders of Giants**

This video, winner of two Daytime Emmys, uses actors to capture an episode in the life of Galileo. Galileo becomes the tutor for Prince Cosimo, the young son of the powerful Medici family in Florence. Galileo teaches the prince the importance of experimentation, observation, and logical thinking to understand the physical world. There is one short clip of Galileo using a ramp and ball to demonstrate the force of gravity on falling objects. This video is included in the Force and Motion kit. 58 minutes. Phone: 877-339-4633. http://www.devine-ent.com/shows/inventors/galileo.shtml.

**Understanding Car Crashes: It’s Basic Physics**

“You can’t argue with the laws of physics,” says Griff Jones, award-winning high school physics teacher who is the facilitator in this video. He takes us behind the scenes at the Vehicle Research Center to explore the basic science behind car crashes. Concepts of inertia, momentum, and impulse are introduced. The IIHS-prepared lessons for this video can be downloaded at their website, http://www.hwysafety.org/default.htm. This video is included in the Force and Motion kit. 22 minutes. Phone: 1-703-247-1500. http://www.hwysafety.org/videos.htm.

**RESOURCES FOR TEACHERS**

**Touch This! Conceptual Physics for Everyone**

A highly recommended, readable paperback with terrific examples to strengthen your understanding of physics. Chapter titles include “Being in Equilibrium,” “Linear Motion,” “Newton’s Laws of Motion,” “Momentum,” “Energy,” “Rotational Motion,” “Gravity,” and “Projectile and Satellite Motion.” If you purchase one resource for this course, this should be it.
FOSS Institutes

Delta Education hosts one-day FOSS Institutes in conjunction with the Regional and National NSTA Conventions. There is a K–6 Informational Institute and a Middle School Informational Institute that takes place on the Wednesday before the convention. These Institutes are designed for all educators—lead teachers, administrators, curriculum coordinators, professional developers, and university methods instructors.

The K–6 Institute provides an introduction to the elementary school program by focusing on several modules from the different grade levels. FOSS developers are there to lead each workshop and provide program updates and introduce new components.

The Middle School Institute provides an introduction to the program by focusing on a few of the eight courses currently available. FOSS development staff and experienced teachers lead the Middle School Institutes.

Below is the calendar for 2005:

NSTA National Convention
Wednesday, March 30  Dallas, Texas
- FOSS® K–6 Informational Institute (SORRY, THIS IS FULL)
- FOSS® Middle School (grades 6–8) Informational Institute

NSTA Area Conventions
October 19, 2005  Hartford, Connecticut
November 9, 2005  Chicago, Illinois
November 30, 2005  Nashville, Tennessee

There is no charge, but participants must register in advance to attend. To register for any of these exciting FOSS Institutes, please call, write, fax or e-mail:

Pam Frisoni
Delta Education
80 Northwest Boulevard
Nashua, NH  03063
pfrisoni@delta-edu.com

Phone: 1-800-258-1302 ext. 503
Fax: 603-579-3504

For more calendar events, visit FOSSweb at

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

Tony Artuso
Delta Education
80 Northwest Boulevard
Nashua, NH  03063
tartuso@delta-edu.com
Phone: 800.338.5270

NSTA NATIONAL CONVENTION
Dallas, Texas  March 30–April 3, 2005

PDI-4: Professional Development Institute
Understanding Student Learning Through Assessment in Science
Offered by the Lawrence Hall of Science, University of California, Berkeley  http://www.lawrencehallofscience.org

Wednesday, March 30, 8:30 am–4:00 pm
Thursday, March 31, 8:00–10:00 am

Level: Grades 3–10
Limit: 60
Registration Fee: $225 (lunch included on Wednesday); by preregistration only

Thursday, March 31
Explore to Understand with FOSS Middle School Weather and Water Course
8:00–11:15, Room C154, Convention Center

Friday, April 1
Integrating Math and Science with the New Force and Motion Course for Middle School
8:00–11:15, Room C154, Convention Center

Formative Assessment in Science through Technology: The FAST Project
12:30–1:30, Room D223/224, Convention Center

Breeding Larkeys in the FOSS Middle School Populations and Ecosystems Course
1:00–4:15, Room C154, Convention Center

Saturday, April 2
Using Science Notebooks Featuring FOSS
8:00–11:15, Room C154, Convention Center

A New Accountability: Valuing Academic Progress
8:00–9:00, Room D223/224, Convention Center

Focused Classroom Assessment for Effective Teaching
9:30–10:30, Room D223/224, Convention Center

A Look at FOSS 2005 for Grades K–6
12:00–1:15, Room C154, Convention Center

FOSS Materials Management
2:00–3:15, Room C154, Convention Center

Summer 2005 Professional Development Opportunities

FOSS Weather and Water Workshop
June 26–July 2
Norman, OK (see page 1 of this newsletter)

FOSS Force and Motion Middle School Course Workshop
July 28–30
Lawrence Hall of Science, Berkeley, CA

Check your NSTA Convention program for any time or room changes.
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 World Wide Web with FOSS. Send your contributions to:

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

The deadline for submissions to the next issue is June 13, 2005. We’re waiting to hear from you.