The Fulcrum Flash

Calling on Fulcrum Teacher Leaders

What does a Fulcrum leader do? Answers can be as varied as the participants in the Fulcrum Institute, although there is a common core. For these educators, leadership is anchored in the classrooms of teachers who committed themselves to honing their science teaching skills and boosting their own science learning through rigorous study and course work. Classroom leaders actively, constantly seek to improve their own knowledge and skills. They lead by opening their classroom doors for collaboration with colleagues in their schools. From time to time, leadership opportunities outside the school arise. Fulcrum staff have called upon its teachers to be partners in the development of Fulcrum courses.

In 2007, a new Fulcrum course was developed, *Some of What Matters About Matter*. New video resources were needed and as a result, we reached out to several Fulcrum “grads” to work with us. José Rosa and Ilse O’Brien and some of their students volunteered to spend a Saturday morning investigating properties of liquids. We taped these investigations. Thanks to José and Ilse’s skillful facilitation, the course includes video case studies to illustrate the development of student ideas about liquids and teaching strategies that support student inquiry.

In addition to helping with Fulcrum curriculum development, former Fulcrum teachers participate in The Inquiry Project, another science curriculum initiative between Tufts University and TERC.

Something to Think About

The two questions below have the same answer. Can you figure out why?

The diameter of the dome on the Pantheon in Rome is 142 feet. Suppose you stretch a string all the way around the dome. How much string would you have to add to this string if you wanted it to be a circle with a diameter of 143 feet?

The diameter of a pizza is 2 feet. Suppose you stretch a string all the way around the pizza. How much string would you have to add to this string if you wanted it to be a circle with a diameter of 3 feet?

Ilse O’Brien, Fulcrum Cohort One, explores properties of liquids, with one of her students, to help develop the new Fulcrum Course: Some of What Matters About Matter.

The Pantheon Dome, Rome, Italy
Schools partnering with this Project are two Fulcrum Schools: Forestdale School in Malden and the Mason School in Roxbury. Fulcrum Cohort One teachers, Pam Zelaya and Aadina Balti, serve as Inquiry Project-school liaisons. They, as well as other Fulcrum teachers, Pam Skinner, and Robin Jorgensen, are part of a group of twelve teachers from the two schools who meet with us monthly. They are development partners for a third grade curriculum about the particulate nature of matter, which will be field tested in the two schools in January, 2008.

For Fulcrum participants, ambitious leadership and learning goals have been set which aim at providing stronger science education for students. As a result and without having to forgo classroom work, Fulcrum teacher leaders are making significant contributions to innovative courses for teachers and students. Lead on!

Sally Crisman,
TERC/Fulcrum Institute.

An Invitation to K-8 Principals to Participate in Fulcrum Course Three Launch!
Saturday, January 26, 2008

At this time last year, your Fulcrum teacher had just been accepted into the Fulcrum Institute at Tufts University. The Fulcrum Institute is part of the National Science Foundation’s Math-Science Partnership (MSP) Initiative. By participating in the Fulcrum Institute, Fulcrum teachers have become part of a national movement to develop leadership in science education among teachers in elementary, and middle school classrooms. They are developing their scientific knowledge and enhancing their classroom practice. We would like to invite you to join your teacher/s as he/she begins the final graduate-level course in this leadership development experience.

The third semester graduate level science education course, Global Climate: Earth Systems and Energy Balance, will begin on Saturday, January 26, 2008, with a day-long face-to-face launch at Tufts University. We are inviting you, and other appropriate administrators, such as the school or district science coordinators, to attend. It will be an opportunity for you to engage in a conversation with the teachers about science leadership from the perspective of the principals. The teachers will work in small groups to identify ways in which they have had success with their leadership goals, as well as challenges they have encountered in trying to “spread the word” of inquiry-based science in their schools. We’d like the principals to respond with ideas to help the teachers move forward.

One of the goals of the Fulcrum Institute is to support participating teachers to build a cadre of science leaders among their colleagues. Our hopes are that the teachers who complete our program will lead by example from the classroom and will be knowledgeable advocates for science in their school. Some Fulcrum teachers are already providing guidance and support to other teachers in their school, to strengthen science teaching and learning. Others have

MORE INFO: 617-627-3039  FULCRUM.TUFTS.EDU
become members of their district’s science committee. One teacher has successfully set up a science study group for the six fourth grade teachers at her school (who are teaching science). She has even received approval for this group to receive PDP’s for their participation!

January 26 will be a day to share the Fulcrum experience in which your teacher has participated for these past twelve months. We’re hoping you will make the effort to attend. You are welcome to attend for the full day, as the morning will provide an opportunity for teachers to share what they have been doing in their classrooms. We will also have a hands-on activity on spatial and temporal averages, as this will be a topic in Course Three. If your time is limited, please attend lunch and then the leadership activity:

Your participation will not only benefit your own Fulcrum teachers, but will support the science program in your school. You’ll have an opportunity to gain insights into the goals and practices of the Fulcrum program as well as meet the staff.

Please R.S.V.P. this invitation by January 14th by calling Roxane Johnson, Fulcrum Program Manager, at (617) 627-3037 or reply by email: fulcrum@tufts.edu, or roxane.johnson@tufts.edu

Educators came to “Meet the Scientists”

On Wednesday, November 14th, Tufts University and the Fulcrum Institute for Leadership in Science Education hosted “Meet the Scientists”- a presentation of the Northeast Science Center Collaborative (NESCC), a program of Clean Air-Cool Planet. The goal of NESCC is to bring the latest research on climate change science, impacts, and solutions to science centers and environmental educators for interpretation to the public. To learn more about NESCC visit: www.sciencecentercollaborative.org.

Since it is the International Polar Year, two Polar scientists from Woods Hole shared their research. Dr. Mary-Louise Timmerman, a Physical Oceanographer at Woods Hole Oceanographic Institution, began the morning with her presentation “Suspended in Ice: Profiling the Arctic Ocean with New Technology.” Timmerman talked about the difficulty of sustained observation of the deep Arctic ocean underneath the sea ice. She shared current findings and then explained the technology used to capture this data: Ice-tethered Profiling Instruments. These profilers (ITP) can extend 500-800 meters below the ice to collect daily high-vertical-resolution temperature and salinity (thermo-haline) measurements of the upper Arctic Ocean. Ms. Timmermans analyzes the data that these profilers collect. She is especially interested in the seasonal changes in the mixed layers, the spatial distribution of the Atlantic Layer, and she wonders how global warming will effect the thermohaline properties and currents of the worlds oceans. To learn more about ITPs check out this website: http://www.whoi.edu/itp/

Dr. R. Max Holmes is an Earth System Scientist at the Woods Hole Research Center and Project Director of the Student-Partners Project. Dr. Holmes presented his work with the Student-Partners Project, funded by the National Science Foundation. This project unites students, teach-
ers, and scientists to advance scientific understanding of the role of major Arctic rivers in the changing arctic and global systems. K-12 grade students and teachers living near the mouths of the largest arctic rivers in Russia, Canada, and Alaska, partner with researchers to collect frequent river water samples that are needed to understand seasonal dynamics and annual biogeochemical fluxes in the river systems.

Dr. Holmes believes that through actions of communities and education and awareness of our behaviors, the impacts due to global climate change can be mitigated. To learn more about the Student-Partners Project visit: http://www.studentpartnersproject.org/

After lunch, the talk continued with Mechanical Engineer, Sally Wright, from the Renewable Energy Laboratory at the University of Massachusetts. Sally shared data and information on why wind energy in New England is such an attractive source of energy: its renewable, and makes clean, emission-free power. She talked about wind turbine projects she’s been involved with from the city of Hull, Massachusetts to Vermont. Ms. Wright formed the Wind Working Group in Massachusetts to promote smart wind energy development and advance the public understanding of modern wind energy, its benefits and impacts. She’d like everyone to go see, and listen to a wind turbine and form their own opinion about how “ugly” or “loud” they are. You can find more about the Renewable Energy Research Lab here: http://www.ceere.org/rerl/index.html

Meet the Scientists took place in the new Sophia Gordon Hall at Tufts University, the first “green” dorm on campus. The beautiful new residential hall integrates passive solar heating, photovoltaics and solar hot water into its design. The building has been designed to meet a set of stringent sustainable goals and is Tufts’ first building to be built to Leadership in Energy and Environmental Design standards. Tufts University is committed to decreasing greenhouse gases from university activities. Learn more about the Tufts Climate Initiative here: http://www.tufts.edu/tie/tci/index.htm

2008 National Science Teachers Association Convention will be held here in Boston, March 27-30. The Conference registration and sessions will be at the Boston Convention and Exhibition Center, as will the exhibits and the NSTA Science Store. Additional sessions will be held at the Renaissance Boston Waterfront Hotel, the Seaport Hotel and Seaport World Trade Center, and the Westin Boston Waterfront. Short courses will also be held at the Westin.

This is a wonderful opportunity for K-16 teachers to attend science education workshops and information sessions, to meet other teachers, and to be infused with the excitement of science education. Register and learn more at http://www.nsta.org/conferences/2008bos/
Leading from the Classroom:

10 Leadership Steps Taken By Fulcrum Cohort Two Teachers

1. Three Fulcrum Teachers shared their classroom practices at educational conferences.
2. A Fulcrum Teacher successfully applied to have female students participate in the Women in Science Day at the New England Aquarium.
3. A Fulcrum Teacher accepted a position on his city’s elementary school science committee to develop a science plan for elementary schools. The plan has been published and positively received.
4. A Fulcrum Teacher shared her learning experiences as a participant of the Fulcrum Institute with her student teacher, her students, and their parents.
5. A Fulcrum Teacher organized a science study group for the six teachers in fourth grade at her school. She collaborated with the principal and central office so this group of teachers could receive PDP’s for their participation. As a result of the study group, the teachers are creating a binder of common lesson plans that align the frameworks, science atlases, and the school’s report card.
6. To aid in strengthening student understanding, a Fulcrum Teacher has taken steps to improve the communication between 6-8 grade science teachers.
7. Two Fulcrum Teachers from the same school met with the Superintendent and Assistant Superintendent of their district and shared their experiences with the Fulcrum Institute to encourage more focus on science education.
8. Several Fulcrum Teachers increased the use of the Inquiry Model when planning science lessons for the classroom: They asked probing questions, used formative assessments, and had students reflect on their learning to guide future planning.
9. A Fulcrum Teacher met semi-monthly with grade-level teachers to discuss science curriculum and how to bring science awareness into the classroom and the school.
10. A Fulcrum Teacher attended the American Association for the Advancement of Science Workshop in Washington D.C. She learned how to use the Atlas for Science Literacy to guide curriculum planning. She will plan a workshop for her school district and other Fulcrum teachers.

Solving a Cucumber Mystery

Did you make an attempt to think about the “Something to Think About” from the last Fulcrum Flash?

Here’s the explanation to the answer:

If 300 lbs. of cucumbers are 99% water, then there are 297 lbs of water (99% of 300 lbs.) in the cucumbers and 3 lbs. (1% of 300 lbs.) of cucumber meat.

If we assume that a week later all that happens is that some of the water evaporates but the amount of cucumber meat remains the same then we still have 3 lbs. of cucumber meat but it is now 2% of the total weight.

How much does something have to weigh if 2% of its weight is 3 lbs? Answer: 150 lbs.
Heat Transfer in My Life
A Fulcrum teacher responds to Course Two, Conceptual Distinctions: The Case of Heat and Temperature

“My awareness of heat and heat transfer has been raised so much in this course, that I find myself thinking about it all the time, especially as the temperatures outside have turned cooler.

“I think about my glass sun-room off the back of the house (which is not insulated or heated) and ask, ‘Is that making my house warmer than it used to be before we added it on? How warm is the air in between outside and inside in that room on a warm day?’

“When I walked this morning (31 degrees outside) I was sure that I dressed in black and stayed in the sun to get as warm as fast as I could. As I put my mini blinds up and down on the south side of my house, I wonder if they are able to help keep the heat in at night.

“As my classroom was 85 degrees today, I thought about the role of heat transfer and hot air molecules rising.

“These are just a few examples. I love that the course has raised my consciousness. I also feel a bit like I've got a ‘Heat Curse’ similar to Jon Scieszka's *Math Curse* book, where everywhere he turns he sees a math problem. I'm feeling like everywhere I turn I'm facing heat transfer.”

-Laura Spangenberg

If you know of any teacher or school principal who you think might be interested in the Fulcrum Institute, please have them go to our website at http://fulcrum.tufts.edu/ and click on Application. We will be recruiting Cohort Three starting in the Spring of 2008. Cohort Three will begin Course 1 in the Spring of 2009.