

2005

2005 Newsletter

Morton Sternheim

University of Massachusetts - Amherst, mmsternheim@gmail.com

Follow this and additional works at: https://scholarworks.umass.edu/stem_newsletters

Sternheim, Morton, "2005 Newsletter" (2005). *STEM Education Institute Newsletters*. 11.
Retrieved from https://scholarworks.umass.edu/stem_newsletters/11

This Article is brought to you for free and open access by the STEM Education Institute at ScholarWorks@UMass Amherst. It has been accepted for inclusion in STEM Education Institute Newsletters by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.



STEM Ed



2005 VOL 8 NO. 1

Published by the
STEM Education Institute
University of Massachusetts

225 Hasbrouck Laboratory
University of Massachusetts
Amherst, MA 01003
413-545-1908
FAX 413-545-3697
Email: st-hq@umassk12.net
Web: www.umassk12.net/stem

INSIDE THIS ISSUE

20th ANNIVERSARY

UMASSK12: 20 Years Connecting
Teachers to the World p. 1,2
Pioneer Valley PC Users
Group Grand Finale p. 14

CONFERENCE

Alternative Certification p. 6
for Science Teachers

INSTITUTES/COURSES

Imagery for Classroom p. 4
Learning
Nanotechnology p. 6
Earth Science p. 7
Food Safety Online p. 13

STUDENTS

Noyce Scholars Announced p. 4
Adventures for Scouts p. 5

GRANT REPORTS

Science and Engineering p. 8
Saturday Seminars
STEM Connections:
8th Graders Win Awards p. 3
Update and Final Year p. 9
Science Conference p. 10
Field Trips p. 10
PV-STEMNET Project-Year p. 12
STEMTEC:
Nears End p. 14
Evaluation p. 15

AND

Staff Update p. 9
Calendar back page



from **THE DIRECTOR** MORTON STERNHEIM

mort@umassk12.net

Twentieth Anniversary for the STEM Education Institute

The academic year 2005-2006 marks 20 years of existence for the STEM Education Institute programs, so this is a good time to review our past and to look at future directions. Several articles in this newsletter reflect on programs that are ending or ongoing, and others highlight three new activities: the NASA funded STEM Earth Central project, an NSF funded conference on Alternative Certification for Science Teachers, and a nanotechnology summer institute.

STEM Ed's origins trace back to a fall 1985 proposal to create an electronic bulletin board for physics teachers. As is explained below, the bulletin board evolved into our UMassk12 Internet service for teachers. This effort led to workshops for inservice teachers on educational technology, and starting in 1989, workshops on science funded by federal and state grants carried out in cooperation with the Five Colleges Public School Partnership.

The Institute was formally approved by UMass in 1996, following the establishment of a Science After School Task Force (SAS) to consider how we could arrange for area teachers to take science, technology, engineering, and mathematics (STEM) courses at the University. The task force included faculty and staff from UMass and from the schools. SAS soon discovered that there were related issues waiting to be addressed, including preservice teacher education. SAS also learned there were many members of the University community working in the area of K16 STEM education. These groups were spread across the campus in various departments and in many cases were not aware of other local programs related to their own interests.

The Institute was formed to bring these people together, facilitating joint efforts and avoiding unnecessary duplication. Above all, the Institute was formed to play a major role in meeting the University's goals in academic outreach, teaching and learning, research, diversity, and multiculturalism. Coordinating these efforts has increased the opportunities to obtain external grants and to allow the University to play a leadership role in the national and state efforts to reform and improve science, technology, engineering, and mathematics education. ■

UMASSK12:

20 YEARS OF CONNECTING TEACHERS TO THE WORLD

BY HELEN AND MORT STERNHEIM

Note: This is an updated version of an article written in 2000.

We began the UMassK12 project in May 1986 with a PC based electronic bulletin board system (BBS) called the Physics Forum. Now an Internet service for teachers, it is in its 20th year of continuous operation. UMassK12 is the oldest such service in Massachusetts, and one of the oldest in the nation.

continued on page 2

UMASSK12: 20 YEARS OF CONNECTING TEACHERS TO THE WORLD

THE STEM Ed MAILING LIST

Whether an email announcement is useful information or ugly spam depends, like beauty, on the mind of the beholder.

The STEM Education Institute maintains a list of over 1500 Massachusetts teacher email addresses. We use this list to announce educational events and opportunities offered by STEM Ed and by others. Many of the recipients send the announcements to other teachers or mailing lists, so they reach many more teachers in Massachusetts and elsewhere. (Our new NASA program announcement got responses from as far away as Texas.) Many people email us asking to be added to the list, and others ask to be taken off. On balance the list keeps growing. Often teachers and event organizers tell us how valuable the list is.

We like this method of announcing our programs for the same reason as others do. It is an essentially free way of reaching a large and potentially interested audience. It's wonderfully effective and the only form of publicity we use for most of our programs. We routinely assist other colleges and workshop providers in spreading the word, and they also report good results in recruiting the appropriate teachers.

Let us know if you would like to be added to the list, or if you have a program to publicize. ■

The original Physics Forum BBS was designed to meet the needs of physics teachers, who are often isolated. Typically there are only one or two physics teachers in a high school, and many have minimal formal training in physics. The idea was to link them to each other and to the resources of the University. With the help of a Telecommunications Demonstration Grant from the UMass President's Office, and using our experience in running bulletin boards for the Pioneer Valley PC Users Group (page 14), we set up a system that would allow users to share ideas and download teaching materials. Being a bit naïve, we were surprised when nobody showed any interest. We discovered that teachers didn't have modems or telephones in school, or computers. Furthermore, they didn't see why they would want to get online.

Helen became the Director of User Services, providing extensive hand-holding support. We did presentations at MassCUE and other meetings, offered training sessions, and wrote articles. At the urging of Mary Alice Wilson, the Five Colleges Public School Partnership Coordinator, we broadened our vision to include all teachers. Eventually the idea caught on and people began to use the service. Massachusetts Computer Using Educators (MassCUE) helped with a small grant, and a state agency funded 800 lines for two years.

The bulletin board workshops led to helping teachers improve their science teaching with a series of projects funded mainly by the National Science Foundation (NSF) and by the National Aeronautics and Space Administration (NASA), and ultimately to the creation of the STEM Education Institute. SpaceMet, begun in 1989, helped middle school teachers to make science more engaging using space science and exploration, and, of course, telecommunications. It also funded the expansion of the bulletin boards to the SpaceMet system, four computers providing local access in the Pioneer Valley. These computers all shared echomail, which is similar to Internet newsgroups, with each other and with a global network of 30,000 "FidoNet" bulletin boards via phone lines. The State College network also provided connections statewide.

Angus "Terry" Dun, then a computer technology teacher at Franklin County Tech, joined us as Technical Director. 5C5E followed in 1992, showing teachers how to do environmental research with their students. Planet Earth, 1998-2002, was based on online NASA resources, something that would have been hard to imagine in the early SpaceMet days.

By 1992 the Internet had reached the point where everyone knew about it and was clamoring to get online, but access was not available to most teachers or students. This was before the web, and a menu-based precursor called Gopher was fairly new. Text ruled; there were no graphics, and most teachers had access only to relatively old and limited PC's. A service called Cleveland FreeNet had developed an easy to use set of menus, and we decided to put a similar system online based on the FreePort software. The UMass Office of Information Technology donated a DEC workstation and hired programmer Matt Kimmel, who had served as a volunteer in the early bulletin board years while in his mid teens.

The soft-ware was not designed for the version of UNIX on our computer, but Matt eventually got it run to reliably. The original

Again we were a bit naïve, but we were surprised in a different way: we were inundated by a flood of eager users.

UMassK12 text based system went online in May 1993. We offered free Internet accounts to all Massachusetts teachers and their students.

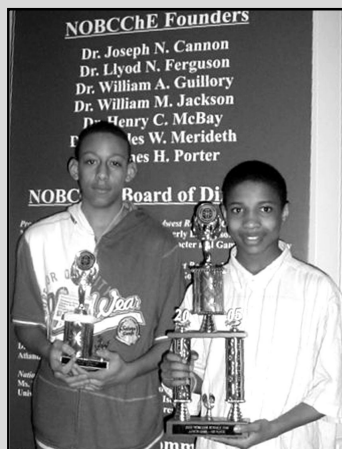
Again we were a bit naïve, but we were surprised in a different way: we were inundated by a flood of eager users. Before long we had three students employed setting up accounts. We held almost weekly training workshops on campus, and distributed countless users' manuals. Ultimately the system had as many as 100 simultaneous users, and response slowed to a crawl. We limited the number of new accounts per school in an attempt to slow the growth.

Another problem we had to face was funding. The NSF grants were ending, and UMassK12 was too much for volunteers to manage. Reluctantly, we began to charge

SPRINGFIELD 8TH GRADERS WIN AWARDS

BY BOBBIE COLEMAN, STEM Connections Fellow NASAmobile@aol.com

Four 8th grade students from Chestnut Middle School in Springfield traveled to Orlando, Florida in March of 2005 to participate in the junior division (7th-9th) of the NOBCChE (National Organization for the Professional Advancement of Black Chemists and Chemical Engineers) National Science fair.



Christopher Banks and Tariq Jiles

They were accompanied by their science teacher Uma Palreddy, STEM Connections Fellow and NOBCChE sponsor Bobbie Coleman, and Chemistry Graduate Student Richmond Ampiah-Bonney. Support came from STEM Connections (page 9) as well as other campus funds. Uma Palreddy was one of 13 teachers, at 11 Massachusetts middle schools, who took part in the 2004-2005 UMass STEM Connections program at UMass. About 110 students at Chestnut had been working since September 2004 on individual projects centered on identifying sources of arsenic contaminations in their home environments.

At the beginning of the school year, a team of graduate students from Professor Julian Tyson's chemistry lab traveled to Chestnut to supervise and train students in laboratory safety and the proper way to do arsenic testing.

The four students selected to attend the NOBCChE National Science Fair had original research topics that represented the best of the students at Chestnut, and were judged to be among the best at the NOBCChE science fair. Tariq Jiles won a first place trophy for his research project identifying common household items capable of removing arsenic from drinking water. Third place winner Christopher Banks' project involved investigating the rate at which arsenic travels in the soil from contaminated soil sources and from pressure treated wood (PTW) structures. The other students were Felicishia Holmes and Cecilia Morgan. Felicishia won third place in the Chestnut school science fair and qualified to attend a special exhibition of Springfield school winners. An article about her project appeared in a local Springfield Newspaper. ■

from page 2

UMASSK12: 20 YEARS OF CONNECTING TEACHERS TO THE WORLD

for accounts. This gave us the resources to maintain and expand our services to meet whatever the demand might be.

Soon after the text-based UMassK12 went online, the graphical World Wide Web made its appearance. Our users began to clamor for a system that would support web browsers as well as graphical mail and news clients. We couldn't provide the requisite PPP or Slip connections, but three Amherst Regional High School students (Chris Cardé, James Hines, and Joe Kislo) offered to set up a Linux based Pentium using a program called Slirp that accomplished the same purpose.

By late 1995 we could offer users a choice of the new graphical UMassK12S or the older system, which did not require up-to-date user hardware. Adam Kramer, then a home-schooled high school student in Greenfield, joined us as our Mac user support expert.

Gradually, as other commercial and education Internet options appeared, our user base diminished. However,

despite the free or almost free accounts now available to most public school teachers, we maintain a small but declining core of users who appreciate the kind of service we offer.

As Y2K approached, we learned that our DEC workstation's operating system and our FreePort software were both noncompliant. Once again we turned to talented high school programmers: Dan Gullage and Amos Weatherbee at Franklin County Tech. They reverse engineered the software, producing a similar looking menu based system with totally new innards. Late in 1999, users were transferred to the new system, and we waited with curiosity to learn what would happen to the old one at midnight on December 31. One more surprise: nothing happened. It was running just fine when we pulled the plug in March, 2000. The new system ran flawlessly until June of this year, when a power surge killed a hard drive. Only a handful of users were still using this text based system, and we arranged for them to use the same text-based

interface on our graphical server.

Currently our Internet server can be reached via modem pools in Amherst, Franklin County, and Holyoke, although the latter two will be shut down on January 31, 2006 due to low usage and aging equipment. We offer low cost accounts to anyone involved in K12 education. We operate a website - www.umassk12.net - with many pointers to educational resources. We also use our server to provide web sites for STEM Ed and other projects, and to distribute announcements of educational opportunities to our email list. Terry Dun continues as the Director of Technical Services and is also now the Technology Coordinator at Franklin County Tech. Mary Alice Wilson has retired and is focusing on grandchildren and bird watching.

All our bright young programmers are now in college or grad school studying computer science or are working as computer professionals. Dan Gullage is a member of the STEM Ed staff. ■

NOYCE SCHOLARS ANNOUNCED

Four UMass seniors are the first scholarship awardees in the NSF funded STEM Bridge for Noyce Scholars program. Joshua Cohen, Geoscience, is interested in many different aspects of science and looks forward to using colorful examples in teaching. Jennifer Dineen, Mathematics, was inspired by one of her high school math teachers who enabled all students to grasp concepts. Renee Mackay, Geoscience, looks forward to combining her love of the outdoors and her knowledge of earth science in the classroom. Eamon Weinheimer, Mathematics, looks forward to teaching after five years of experience as an Instructional Aid for middle school students with behavioral disorders and learning disabilities.

Altogether 52 scholarships ranging from \$7,500 to \$10,000 per year, depending on need, will be awarded to STEM juniors and seniors who are also enrolled in UMass teacher preparation programs. The program was subsequently expanded to include recent UMass graduates who need one more post-baccalaureate year to complete the licensure requirements. Part-time undergraduate students and community college and UMass University Without Walls (UWW) students are also encouraged to apply.

This program is a joint effort of the UMass School of Education and STEM Ed. The lead Principal Investigator is STEM Ed Associate Director Allan Feldman (Science Education); co-PI's are Mort Sternheim (STEM Ed), Farshid Hajir (Mathematics), and Portia Elliot (Math Education). An advisory committee with representatives from area community colleges and relevant UMass offices helped to set policies and plan the recruiting effort. This was spearheaded by project manager Irene Starr, and included visits to the community colleges, posters on bulletin boards and buses, emails to advisors and eligible students, tables at various events, and press releases.

ADVISORY COMMITTEE

Elizabeth Brinkerhoff, UMass
University Without Walls

Stephanie Chapko, UMass Admissions

Doris Clemmons, UMass Multicultural
Services

Bob Dickerman, Springfield Technical
Community College

Lindy Gougeon, Greenfield
Community College

Georgena Van Strat, Springfield
Technical Community College

Lisa Wyatt, Holyoke Community
College

The Robert Noyce scholarship program is named in honor of the co-founder of Intel. It seeks to encourage talented science, technology, engineering, and mathematics majors and professionals to become K-12 mathematics and science teachers. The program provides STEM Ed with \$500,000 over three years to support scholarships and programs for students who commit to teaching in high-need schools. Specifically, they must agree to teach two years in such a school for every year they receive funding. STEM Bridge scholars will be supported through an introductory course in math and science teaching, academic and social events, and mentors and advisors. Once they are teaching, support will include Science and Engineering Saturday Seminars, other STEM Ed seminars, and the opportunity to enroll in several innovative M.Ed. programs.

More information is available at www.umassk12.net/bridge. ■

IMAGERY FOR CLASSROOM LEARNING

BY TARIN WEISS, SCIENCE EDUCATION tweiss@umassk12.net

What do you get when you mix 10 teacher participants, 2 lead teachers, 1 lab assistant, 2 technology instructors, a project evaluator, and a principal investigator together with a bunch of digital cameras? An exciting display of digital imagery and pedagogical planning! The TIICL (Teachers Implementing Imagery and Imaging for Classroom Learning) project, part of PVSTEMNET, kicked off in June at the Elms College in Chicopee with an enthusiastic crew working together to learn about and create digital images aimed at enhancing classroom learning.

Funding for the project, from the MA Board of Higher Education, enabled each teacher participant to receive a digital camera, imaging software, and a stipend for attending the week's worth of technology instruction. Participants could also opt to register for 3 graduate credits from UMass at a reduced fee.

Principal investigator Allan Feldman (UMass) wrote the proposal for the grant and with program manager Kathy Baker organized the workshop. Instructors David "Goose" Gosselin (Elms College, UMass) and Doug

Wilkins (GCC, UMass) co-taught the workshop with the aim of getting teachers comfortable with using digital cameras and manipulating the images through Photoshop Elements. They provided teachers with lots of one-on-one practice time following each day's healthy mix of presentation and discussion.

Two lead teachers, Joy Ramnarine (Springfield kindergarten teacher) and Cindy Zielinski (Wilbraham Middle School) assisted with the instruction and showcased how they implement digital images and imaging in their

This fall we again will offer STEM Adventures, a three-hour Saturday hands-on programs for scout groups. Last year we had a total of six Saturday events: one for Cub Scouts, and five for Girl Scouts. Each Saturday morning or afternoon program includes two 75 minute sessions. Most of the presentations are made by undergraduate science majors, who serve as role models and make the science exciting. On various dates, the sessions last year included:

- Amazing Physics, physicist Heath Hatch and the Science Outreach Club
- Chemistry Fun, chemist Sharon Palmer and the Chemistry Club
- Shake N' Bake: Exploring Plate Tectonic, geoscientist Richard Yuretich and the Science Outreach Club
- Climate, Weather, and Atmospheric Measurement, atmospheric scientist Paul Voss and the Science Outreach Club



The responses to the program were very positive. Here are comments from the leaders:

Our troop had a great day. It was very informative. I was happy to see it was presented by the students of the college. We really had a fun time; everyone did such a wonderful job with their presentations and demonstrations. They worked very well with the girls! They show a lot of enthusiasm for science and the girls can feel that!

And some comments from the girl scouts:

I really, really like chemistry. The thing that I really like about chemistry is the ice cream. I suggest you don't do so much sticky stuff. I really liked the demonstrations for Amazing Physics. I also disliked the coldness (outside). I had a lot of fun! I loved the ice cream! My favorite part of Physics was when the guy had to push himself in the wagon.

THE FALL LINEUP INCLUDES:

Oct. 15, 1:45-5 pm.

- Amazing Physics: Experiments such as the famous "shoot the monkey" apparatus, dancing flames, break-glass with sound, suicide pendulum.
- Chemistry Fun: Explore invisible inks, investigate the colorful combinations that you didn't realize were lurking in your kitchen pantry - learn how to make some tasty crystals! Chemist Sharon Palmer and the Chemistry Club.

Nov. 19, 1:45-5 pm.

- Lunar Cycles: Explore the Moon's many changes during the month and year. Use hands-on activities to discover the connections between the Moon's phases and its place in the sky, learn how the height of the Moon and tides change throughout the year, and find how you can determine the height of the Moon's mountains. Astronomer Steve Schneider and the Science Outreach Club.
- River and Forest for All: We put our imaginations to good use, with activities that help us discover interconnections with the natural world and with each other. State Parks Educator Gini Traub.

Additional information is online at www.umassk12.net/adventures ■

continued from page 4

IMAGERY FOR CLASSROOM LEARNING

practice. Joy presented an example of "insect I spy" that she created from her own pictures of insects. Through Photoshop, she is able to lighten the insect's background as it appears to jump to the forefront. Cindy presented her efforts to focus students on flower morphology through highlighting, naming, and numbering the parts of the flowers.

Teacher participants came from urban, suburban, and rural districts. They too developed meaningful ways to use digital cameras and imaging in their classrooms. John Kudukey, a

physics teacher, plans to capture the lab activities involved in learning about Ohm's Law while Tamara Grogan, a French teacher, wants to enhance her students' Internet exchanges with a sister school in France. The teachers will implement their plans in the fall and conduct action research studies to assess their projects. Tarin Weiss (UMass) along with Allan Feldman, will support teachers' efforts to understand how their work as teachers is understood and changed as they conduct the action research.

The second week of the workshop

took place in August at Greenfield Community College with a new crop of teachers and lead teachers. Lead teachers Kathy Wilkins (Greenfield High School biology), and Donna Cycz (Greenfield 4th Grade) shared with participants the unique and exciting ways they use imaging and imagery with their students.

You can keep updated on the project by checking out its website at: www.umassk12.net/pvnet/imagery.htm

continued on page 11

ALTERNATIVE CERTIFICATION CONFERENCE

The STEM Education Institute and the School of Education at UMass will sponsor an NSF funded STEM-ACT conference on Alternative Certification (for science) Teachers. It will be held May 5-7, 2006 in Arlington, VA.

Alternative certification programs have grown rapidly in recent years as a way of coping with shortages of teachers in STEM and other subject areas. While they vary in their details, they generally seek to place teachers in classrooms more quickly than the conventional teacher education programs.

The conference's overall purpose is to identify these features and issues as a basis for developing a more systematic approach to the study of these efforts.

The conference will focus on alternative certification programs for the preparation of science teachers. Little research has been done in understanding the key features and issues relating to these programs. The conference's overall purpose is to identify these features and issues as a basis for developing a more systematic approach to the study of these efforts.

About 60 people will be invited to participate. All will be expected to play an active role, either as a speaker or as a responder to one or more papers. Participants will be from three groups: academic researchers, alternative certification providers, and policy-makers.

Funding for STEM ACT is from a \$200,000 NSF Teacher Professional Continuum program grant. Principal Investigators for this grant are Mort Sternheim (STEM Ed), Allan Feldman (Education) and Joe Berger (Education). Graduate students Yijie Zhao (Education) and Paula Valencik

(Geosciences) will also play major roles. Planning will be aided by an advisory board with distinguished representatives from the research, provider, and policy communities.

The output of the conference will include "white papers" addressed to these three groups which will summarize what is and what is not known about alternative certification for science teachers. The conference papers and responses will be collected and published electronically. Participants will also be invited to add papers to the proceedings after the conference. The PIs and the participants will present papers at professional and research conferences and will prepare papers for publication in the appropriate journals.

It is expected that each of the white papers will be used as a catalyst for additional activities, such as research proposals to NSF and other funding agencies; policy studies that seek answers to questions raised at the conference; and the development of methods, materials, and curricula to best prepare new science teachers in alternative settings.

Information:
www.umassk12.net/stemact. ■

ADVISORY BOARD MEMBERS

Fouad Abd-El-Khalick, Associate Professor of Education, University of Illinois Urbana
Sandra Abell, Professor of Science Education, University of Missouri
Dennis Bartels, President, TERC
Vicki Bernstein, Director of Alternative Certification, NYC Schools
Ted Britton, Associate Director, WestEd
Emily Feistritz, President, National Center for Alternative Certification (NCAC)
John Gantz, Chief, Troops to Teachers
Bruce Herber, Professor of Geophysics, Texas A&M
Michael Padilla, President, National Science Teachers Association (NSTA)
Antoinette Mitchell, National Council for Accreditation of Teacher Education (NCATE)
Carole Mitchener, Associate Professor of Education, University of Illinois Chicago
Michelle Rhee, CEO and President, New Teacher Project
Joy-Constance Stratton, Program Coordinator, First Class Alternative Certification, Chicago Public Schools

NANOTECHNOLOGY SUMMER INSTITUTE

UMass is a leader in nanotechnology, with many faculty and researchers involved. The STEM Education Institute will participate in nanotechnology education projects by organizing programs for teachers.

Tentative plans include a one week summer institute for science teachers July 17-21, 2006. Watch www.umassk12.net/nano for more information.

Nanotechnology deals with materials and devices created on the nanometer size scale. A nanometer is one millionth of a millimeter, or a few atomic diameters. Such materials can behave in very surprising and useful ways.

Applications of the rapidly growing nanotechnology field include regenerative medicine, fabrics and construction materials of unprecedented strength, ultra-high performance computers and data storage, more efficient solar photovoltaic cells, and much more. ■

STEM Earth Central is a new program sponsored by the STEM Ed Institute and the Department of Geosciences. It is supported by a \$659,000 NASA grant and by funds from the UMass Vice Provosts for Outreach and for Research. STEM Earth Central is designed to promote the teaching of concepts and processes articulated in the Earth and Space Science strand of the Massachusetts Science and Technology/Engineering Framework in the middle and high school.

The first group of 39 teachers attended an August 1-12 summer institute. Many teach earth and general science, with a few in math, biology, chemistry, physics and technology. Most were from Massachusetts, but 11 came from other states, including Vermont, New York, Pennsylvania, Virginia and Texas.

The institute blended earth science content with a variety of proven techniques for effective teaching, including inquiry-based teaching, cooperative learning, and methods for formative assessment of student learning. As with most STEM Ed Institute programs, the staff included a mix of UMass and K12 faculty.

The summer institute focused on the relationship between science and technology as teachers explored hydrology, geology, plate tectonics, and atmospheric science. A highlight of the Institute was a daylong workshop presented by Professor Barry Rock from the University of New Hampshire. He showed how to use the damage to white pine trees to measure ground level ozone levels over a period of time. A variety of computer workshops were offered: using PowerPoint to create web sites, an introduction to Geographic Information Systems (GIS), using Excel to analyze and graph data, and using Photoshop Elements to enhance digital images.

**More
information
including application
materials for
next year
is on
the website,
www.umassk12.net/earth**

The teachers also began to develop curriculum units using NASA materials and local measurements. These will be completed and implemented in the fall, using online discussion forums to facilitate collaborative efforts among participants and project faculty.

The program provided stipends, campus housing and meals as needed, some funds for materials needed for the curriculum units, and the opportunity to receive free Professional Development Points (PDP's) needed for recertification. There was also an option to receive three graduate credits at a reduced cost, and additional credits for completing a research program or conducting a dissemination activity – a paper in a journal, a district workshop, etc.

The response to STEM Earth Central was overwhelmingly positive, with many requests for a followup program.

The tentative date for the 2006 summer institute is July 31- August 11. See www.umassk12net/earth. ■

PARTICIPANTS

From Massachusetts unless indicated

Alexander Alvarez; Math; Chestnut MS; Springfield
Elizabeth Bach; Bio, Earth Sci; Smith MS; S.Hadley
Deborah Baldwin; Earth Sci; Nissitissit MS; Pepperell
Erica Browne; Gen Sci; Chestnut MS; Springfield
Janice Bryant; Gen Sci; Bartlett School; Lowell
Danny Buzzell; Gen Sci; Knox Trail Jr. HS; Spencer
Monique Cafarelli; Bio, Env Sci; Sutton HS; Sutton
Carolina Castro; Earth, Env, Eife; DeWitt Clinton HS; Bronx, NY
Nina Corley; All subjects; Satori School; Galveston, TX
Bobette Doerrie; Physics, Chem; Perryton HS; Perryton, TX
Kevin Drozdowski; Physics, Earth; Easthampton HS
Irka Elsevier; Bio, Earth Sci; Penn Yan Academy; Geneva, NY
Ronald Garney; Earth Sci; Amherst Reg. HS
Samantha Genier; Earth Sci; Day MS; Newtonville
Betty Gerossie; Earth Sci; Nissitissit MS; Pepperell
David Gorrill; Chem, Earth, Bio ; Barnstable HS; Hyannis
Theresa Green; Physics, Earth; Wellesley HS
Mark Greenman; Physics, Chem; Marblehead HS
Wesley Griffin; Earth, Life Sci; George Wythe HS; Richmond, VA
E.J. Hauck; Technology; Islip MS; Islip, NY
Brendan Hayes; Earth Sci; Bigelow MS; Newton
David Hruskoci; Physics, Earth; Shrewsbury HS
Susan Johnson; Gen Sci; Dudley MS
Tara Kisiel; Gen Sci; Hampshire Reg. HS; Westhampton
Juliet Lewis; Chemistry; Springfield Central HS
Michael McCormic; Earth Sci; Amherst Reg. HS
Michael Moakley; Gen Sci; St. Mary School; Shrewsbury
Karen O'Toole; Gen Sci; Overlook MS; Ashburnham
Marjorie Pine; Earth, Bio, Phys ; Marsh Grammar School; Methuen
Noelia Ramos; Gen Sci; Chestnut MS; Springfield
Kathy Renfrew; All subjects; Peacham ES; Peacham, VT
Susan Reyes; Earth, Life; Shutesbury
Alan Roditi; Env Sci; HS of Graphic Communication Arts; NYC, NY
Ramona Smith; Earth, Life sci; S. Hadley HS
Amy Sternheim; Amherst Reg. School
Henry Sudeman; Math; North Shore HS; Houston, TX
Craig Weart; Physics, Chem; Weslaco HS; Weslaco, TX
Wendi Wilson; Gen Sci; Tredyffrin/Easttown MS; Berwyn, PA
Janice Wing; Bio, Env Sci; Quaboag Reg. MS-HS; Warren

STAFF

Holly Hargraves, Hampshire Reg. HS, retired
Steve Schneider, Astronomy
Rob Snyder, Brookline High School, retired
Mort Sternheim, STEM Ed, Principal Investigator
Irene Starr, Project Manager
Tarin Weiss, School of Education
Paula Valencik, Geosciences, doctoral student
Richard Yuretich, Geosciences, Co-PI

SCIENCE AND ENGINEERING SATURDAY SEMINARS

The Science and Engineering Saturday Seminars, begun in 2001 with a Raytheon grant to the College of Engineering, continue to play a unique role in supporting area science teachers. Record numbers of teachers participated this past academic year, with as many as fifty teachers attending some sessions. A total of 45 teachers came to one or more workshops in the fall semester, and 59 in the spring.

Record numbers of teachers participated this past academic year, with as many as fifty teachers attending some sessions.

Most live in the local area, but some travel traveled two hours or more. Since teachers must give up their Saturday mornings to attend, it is clear they feel that they are getting something of value.

Funding in 2004-2005 came from the NSF STEMTEC grant and from the Commonwealth via the Pipeline Fund (see page 12). The program will continue this year using some of the remaining STEMTEC funds. Five seminars are offered each term on Saturdays from 8:30 to 1:00. Teachers who want to receive graduate credit pay a reduced tuition fee and also complete a lesson plan and book report. They also have the option of earning Professional Development Points (PDP's) at no cost.

Joe Berger, who along with Steve Sireci leads the STEMTEC evaluation team, has evaluated the seminars. He concluded:

It is clear from the results of the evaluations and the focus group that the Saturday Seminars provide a positive experience for the participants. In general, the results demonstrate the seminars are meeting the needs of participating science and math teachers. The focus group identified many of the challenges and

concerns facing science and math teachers. The respondents indicated that the Saturday Seminars provide some much needed relief from and support for attenuating those challenges. While the evaluations indicated that not all of the seminars are relevant to every teacher and that some teachers are less likely to actually incorporate the material into their own classrooms, the evaluations and focus group responses also reveal a high level of satisfaction with the structure and content of the Saturday Seminars.

Some focus group highlights are:

Members of the focus group feel as if they are sought out by others, in large part because of the activities they bring back from Saturday Seminars and other innovations they use in their attempts to be inquiry-based teachers. Many noted that other teachers in their schools have come to ask them about what they have learned in the seminars, especially regarding the hands-on concrete demonstrations.

The seminars also provide the "nuggets" to further develop projects. One teacher described how incorporating some math and science in addition to what was learned in the seminars expanded the projects. This person exclaimed that "The kids love it!"

Participating teachers also get ideas from the seminars that they never thought about before in other workshops and seminars. The seminars also take the teachers out of their normal teaching style and give them new ideas in terms of how to deliver the material. Another advantage is that they are affordable in comparison to many other professional development programs in the area, state and nation.

Participants noted many advantages associated with the Saturday Seminars. That they are held on Saturdays away from school-time is a big benefit. The content was also viewed favorably and the seminars are a great time to relax and be more reflective about teaching.

Participating teachers appreciated opportunities to share projects with small groups. The interaction with other teachers is particularly valuable, especially for those who teach in isolation in their schools.

All agreed that the Saturday Seminars provided better professional development than anything currently being offered in their districts. Participants greatly appreciated the interaction with and support of graduate students and faculty from UMass. The interaction with UMass faculty members and students in their classes, in addition to the seminars, enables their students to see a broader view of what they are studying and realize that there is still new research going on in those areas. Increased interaction with science and scientists at UMass is a very compelling experience for elementary and secondary school students.

All agreed ... the Saturday Seminars provided better professional development than anything currently offered in their districts.

Focus group members also like the flexibility of the graduate credit option in which they can earn academic credit through engaged activity rather than through learning the material strictly from textbooks. This approach is in contrast to many of their previous experiences in university science and math courses.

The individuality that is built into the seminar structure is also viewed very positively. The participants feel that they have the opportunity to "get to those things that really matter" for them and this is very rewarding. Moreover, the seminars provide a forum to develop and focus on ideas and approaches that really are of interest to the participants. ■

This past year was the third and last for the STEM Connections program. It was funded by a \$1,500,000 grant from the NSF GK12 program which provides fellowships that allow graduate students in science, math, and engineering to work with K12 teachers and students.

Principal investigators were Julian Tyson (Chemistry), Kathleen Davis (Education), and Morton Sternheim (STEM Ed Institute). The Fellows, who are future researchers and academics, gain an understanding of the needs of the schools. The participating Teacher Scholars have an opportunity to improve their knowledge of science and science teaching, and their students gain an increased understanding of science and the experience of working with role models.

Each year the UMass program included 10 GK12 Fellows and approximately 15 Teacher Scholars from Springfield and nearby communities. In June, the new fellows were introduced to the program with school visits and a science teaching methods course. A two-week summer institute in July brought the fellows, teachers, and UMass faculty mentors together to explore several research areas. This past year these areas included the Arsenic Project, Global Warming, Birds, Growth and Development, and Watershed (See sidebar).

During the academic year, the teachers attended a course on inquiry-based teaching taught in Springfield by Kathy Davis. The fellows spent 10 hours a week in classrooms, helping the teachers to guide students in carrying on group and individual projects in one of the research areas. Some of the fellows also arranged campus visits for their classes. Over 1000 students were directly involved in the program each year.

Many of the teachers held fairs at their schools showcasing the student projects, and most of them brought students to a STEM Connections Conference held at UMass on June 1-2. A total of 800 students attended this event over the two days. They shared their research projects and attended physics and chemistry demonstrations. For many the highlight of the day was lunch in the Franklin Dining Commons, which offered a hearty and kid-friendly menu. As in past years, the conference and campus visit were a very popular and exciting experience for the students and their teachers (see page 10).

Although STEM Connections is no longer funded by NSF, it does offer a good model for encouraging children to study math and science and to think about STEM careers. We are exploring possible sources of funds to continue the program in some form. ■

2004-2005

ARSENIC

Faculty: Julian Tyson, Chemistry
Fellows: Bobbie Coleman, Maura Mahar
Teachers: Debbie Danoff-Hoppe (Forest Park MS, Springfield); Uma Palreddy (Chestnut MS, Springfield)

BIRDS

Faculty: Bruce Byers, Biology
Fellows: James Kearns, Kathryn Lord
Teachers: David Hale (S. Deerfield ES); Kevin Gunnison (Fairview MS, Chicopee); Kate Parrott (JFK MS, Northampton); David Powell (Kennedy MS, Springfield)

WATERSHED

Faculty: Richard Yuretich, Geoscience
Fellows: Bree Carlson Laurin Stever
Teachers: Ron Burney (Donahue ES, Holyoke); Steve Mangine (Chestnut MS, Springfield); Jacob Wheeler (Mahar Regional, Orange)

GLOBAL WARMING

Faculty: Stephen Schneider, Astronomy
Fellows: Edgardo Ortiz, Lisa Provencher
Teachers: Tara Kisiel (Hampshire Regional HS, Westhampton); Mary Seccareccia (Fairview MS, Chicopee)

GROWTH/DEVELOPMENT

Faculty: Joe Kunkel, Biology
Fellows: Versa Clark, Nancy Croteau
Teachers: Stan Coly (Hughes Academy, Springfield); Maureen Keating-Lessard (Wilbraham MS)

STAFF UPDATE

Moving On

Andy Rice will teach high school math in Framingham, MA. He has an engineering degree from Cornell and a new M.Ed. in math education. He managed the STEM Adventures program. **Irene Starr** is returning to technology consulting and teaching. She was the Project Manager for STEM Ed programs during the 2004-05 year. **Sandra Turcios-Payne** is living in Cambridge and will be a biology researcher. She recently completed her M.Ed. She was in charge of the Science and Engineering Saturday Seminars.

Moving In

New Project Manager **Amy Zuckerman**, is an award-winning author with expertise in strategic marketing for technology and the global economy. She operates A - Z International Assoc. in Amherst and is founder/co-chair of Hidden-Tech, a business networking organization for virtual company owners. **Yijie Zhao** is a doctoral student in education doing research on alternative certification in the sciences. She will oversee parts of the Alternate Certification Conference that STEM Ed is planning for May 5-7, 2006, in the Washington DC area.

Continuing

Terry Dun is Director of Technical Services for UMassK12 and technology coordinator at Franklin County Technical School. **Allan Feldman** is STEM Ed Associate Director and Professor of Science Education. **Dan Gullage** is now full time at STEM Ed, offering computer and general support for the STEM staff. He recently married and graduated from Greenfield Community College. **Eugenie Harvey's** main responsibilities are paying people and invoices - complex undertakings at STEM Ed and UMass. **Helen Sternheim** is Director of User Services for UMassK12, our pioneering Internet service for K12 teachers. **Mort Sternheim** is STEM Ed Director. He "retired" from the UMass Physics Department in 1997. He spends much of his time writing proposals for new STEM Ed programs and planning their development once funding is received. **Paula Valencik** is a doctoral student in geology. She coordinates the Tuesday afternoon STEMtalk seminars and maintains STEM's display boards. She played a key role in past conferences and will help with the Alternate Certification Conference, spring 2006. ■

SCIENCE CONFERENCE

Eight hundred eager middle school students and teachers gathered for the third annual STEM Connections Science Conference at the UMass Campus Center – half on June 1 and the other half on June 2. The focus each day was to duplicate the experience of a professional scientific conference, thus giving students an opportunity to show their research and share their results. Many of the people who helped with the field trips (see “Field Trips” below) also helped with this event.

Students took turns exhibiting their research results and exploring the work of others. The program also included chemistry and physics demonstrations by UMass Amherst faculty and students plus an opening welcome and a closing lunch in the much appreciated Franklin Dining Commons.

Students who completed worksheets about exhibits (for teacher feedback) were eligible for the lunch-time raffle of many items donated by local stores as well as by national vendors of scientific equipment.

Sharon Fross, Vice Provost for Outreach, and Mike Gargano, Vice Chancellor for Student Affairs and Campus Life, welcomed the participants who were from Springfield, Chicopee, Holyoke, Northampton, Westhampton, S. Deerfield, and Orange. Those who correctly answered questions based on Gargano’s brief comments won UMass t-shirts and other prizes. In addition, Vice Chancellor Gargano offered the students a waiver of their application fee when

they apply to UMass.

The program’s graduate student fellows helped middle schoolers design and carry out their own research experiments during the school year.

Some of the questions students researched were: Is rainfall in Springfield acid rain? Is the quality of tap water the same throughout Springfield? Is the level of chloride in Springfield water dangerous? Others tested the level of chloride in the Connecticut River to find out if it was harmful to fish. They hypothesized the chloride level would be harmful, but found it wasn’t when it came to the American eel. One team was surprised to find that that the chloride didn’t harm their

fish because the Connecticut River is “really, really dirty.” Another learned that you have to be prepared to have your hypothesis proven wrong: “You have to expect anything to happen when you do a project.”

Stan G. Coly, an eighth-grade science and math teacher at R.M. Hughes Charter School in Springfield, said the program is working. “We’re trying to stimulate the interest in science,” Coly said. “It’s like bringing the university to the classroom.”

Morton M. Sternheim, director of the STEM Education Institute, said. “They’re asking their own questions and doing their own experiments.”

FIELD TRIPS

The enthusiasm of middle schoolers filled the science end of campus on six occasions during the spring 2005 semester when NSF/GK12 STEM Connections teachers and fellows brought their students on field trips – as many as 125 at a time.

Most trips featured four sessions plus lunch; these varied depending on the day but included research lab tours (geosciences, physics, nanotechnology, chemistry, driving simulator), physics demos, liquid nitrogen demos, a rock lab, water analysis, entomology, ornithology, a greenhouse tour, and a campus tour. Besides showing that science is interesting and fun, presenters also briefly described their own studies and career paths as a way to motivate the students to consider science careers.

The cooperation of many faculty, staff, graduate students, and undergraduates, as well as people from UMass Transit, Scheduling, Admissions, Dining Services, and Conference Services, was essential and greatly appreciated – especially since teachers, fellows, and STEM staff had to work around the University’s scheduled courses to arrange each trip.

Professor Bruce Byers used his collection of stuffed birds to engage students in a discussion of their behavior. Researcher Paul Voss showed the low-cost platforms he



designs and builds to explore the atmosphere and spoke about his research on critical questions related to the Earth’s chemistry and climate. Princess Hernandez and her chemistry graduate student colleagues, who work in such fields as environmental applications of atomic spectroscopy, demonstrated liquid nitrogen’s ability to quickly freeze foods and plants such as bananas, flowers, milk, and cream. With just a few minutes of stirring, the last two became ice cream which was then dished out for everyone to taste – making this especially memorable.

continued on page 11

STEM CONNECTIONS FIELD TRIPS

During planning, one teacher suggested *eating real college food on campus at a dining hall, as it would mean a lot to my students*. Roberta Potter, Manager of Franklin Dining Commons, which features a wide choice of healthy, ethnic, and fast foods, made this wish come true for all the field trips. Perhaps food is a way to the student brain, as one student was overheard telling another that *college students eat good; I'm going to study hard so I can go to college*. Other teacher and student feedback included: *The field trip was wonderful!!!!!! ...the kids are still talking about it. The teachers on my team raved about it. ...what a pleasure it was. We all appreciate it and we want you all to know how fun and exciting it was for all of us. I can't thank you enough for the awesome job ... Everything was great. Can't wait til next year to go to UMass again. The students had a blast.*

Additional faculty, staff, and graduate student presenters were Jessica Bloom (Geosciences), Bree Carlson (Environmental Engineering), Professor Stan Hertzbach (Physics), Maura Mahar (Chemistry), Hans Mentzen (Chemistry), Armand Prevost (Director, Durfee Conservatory), Laurin Sievert (Geosciences), Professor John Stoffolano (Entomology), Professor Julian Tyson (Chemistry), Professor Dhandapani Venkataraman (Chemistry), Dr. Tate Wilson (Physics), Ozgur Yavuzcetin (Nanotechnology), and Professor Richard Yuretich (Geosciences).

The Science Outreach Club's Amazing Physics presentation included dancing flames, breaking glass with sound, the suicide pendulum, the bed of nails, and more! The undergraduate members, led by Lecturer Heath Hatch, were Dave Bearse, Matt Gratale, Christine Harrington, Jen Hertzberg, Megan Juskiewicz, Coleman Krawczyk, Matt Libby, John McColgan, and Elizabeth Samson. (Note that the club will visit nearby schools.)

Others who helped included Versa Clark (physics), Dianna McMenamin (Geosciences), Katie Niman (Geosciences), Paula Valencik (Geosciences and STEM Ed), Tarin Weiss (Education), Hongqin Zhang (Education), and STEM Ed staffers Dan Gullage and Eugenie Harvey.

The teachers, schools, and fellows were: Mr. Mangine, Chestnut MS - Springfield, Laurin Sievert (Geoscience); Ms. Hoppe, Forest Park MS - Springfield, Maura Mahar (Chemistry); Ms. Parrott, JFK MS - Northampton, Kathryn Lord (Biology); Mr. Coly, R. M. Hughes Charter - Springfield, Versa Clark (Physics); Ms. Keating-Lessard, Wilbraham MS, Nancy Croteau (Microbiology); and Sue Regensburger, North MS - Westfield, (2002-2003 participant). ■

IMAGERY FOR CLASSROOM LEARNING

ELMS COLLEGE

PARTICIPANTS

Alexandra Clines, Hampden-Wilbraham Regional, 2-6, science & technology
Tracy Hyde, Westfield, 6, science
Tamara Grogan, Greenfield, 9-12, French & Women Studies
Ellen Kennedy, Northampton, 8, Science
Donna Klaiber, Turners Falls, 5-6, Regular class & inclusion
James Klaiber, Franklin County Tech, 9-12, Science Principles & Environmental Science
John Kudukey, Greenfield, 11-12, Physics
Pamela Pearson, Hampden-Wilbraham Regional, 1, Science, Health, PE
Joy Ramnarine, Springfield, K
Michael Stewart, Gateway Regional, 5, all
Kara Toole, Greenfield, K12, SPED, all
Cindy Zielinski, Wilbraham MS

STAFF

Andrew Connolly, Elms College
Allan Feldman, UMass
Goose Gosselin, Elms College, UMass
Tarin Weiss, UMass
Doug Wilkins, Greenfield CC, UMass

GREENFIELD COMMUNITY COLLEGE

PARTICIPANTS

Thomas Aiken, Northampton, 7, Science
Alexander Alvarez, Springfield, 8, Math
Ceil Antes, Sunderland ES, PreK
Ronald Burney, Holyoke, 5-7, Special Ed
Genie Casie, Leverett ES, 5
Donna Cycz, Green River School, 4
Helen Kittredge, Sunderland ES, 5
Michael Lipinski, Erving, K-6, Math/Computer
Philip Lussier, Mohawk Trail Regional, 9-12, Science
Susan Powers, Springfield, K
Lisette Samolot-Martinez, Milton Bradley Elementary K, ELL
Patricia Tierney, Rowe ES, K-2
Ellen Von Flatern, Sunderland ES, 5
Johanna Weinstein, Rowe ES, 5-6, Language Arts & Social Studies
Cathy Wilkins, Greenfield HS, Biology
Janice Wing, Quaboag Regional MS & HS, 10-12, Life & Environmental Science

STAFF

Allan Feldman, UMass
Goose Gosselin, Elms College, UMass
Denise Soto, Elms College
Tarin Weiss, UMass
Doug Wilkins, Greenfield CC, UMass

PV-STEMNET “PIPELINE” PROJECTS – YEAR 1

BY KATHY BAKER, PROJECT MANAGER PV STEMNET kbaker918@aol.com

The Pioneer Valley Pre K12 Science, Technology, Engineering and Mathematics Network (PV STEMNET) has completed its first year, under the guidance of Dr. Allan Feldman, Professor of Education at UMass Amherst. Funding came from the Massachusetts Board of Higher Education.

This network of schools, institutions of higher education, other formal and informal educational organizations, and regional industry was established in the summer of 2004 "to increase the number of Massachusetts students who participate in programs that support careers in fields related to STEM...to increase the number of qualified STEM teachers in the Commonwealth and to improve the STEM educational offerings available in public and private schools."

The Engineering pathways mapping project was the primary project for this year. Overseen by Kathleen Baker, the mapping project organized available career and educational options into a set of coherent engineering/technician pathways.

Holyoke Community College and Springfield Technical Community College received funds from the Network to catalog existing programs and to resolve transfer issues between high school, community college, and four-year college institutions. Two guides were designed: one for students and parents, and the other for high school guidance counselors and college admissions personnel. They are being distributed this Fall - especially to those under-represented in STEM careers to help them to make better and informed choices about available opportunities in STEM fields.

Three engineering/technology career fairs were held by the Tri-County Tech Prep Consortium (Holyoke Community College and Greenfield Community

College); the Tech Prep 21 Consortium (Springfield Technical Community College); and the UMass Amherst College of Engineering. The Tech Prep fairs targeted 1200 high school and middle school students from the area. The UMass fair focused on recruitment of minority students into engineering.

This network...was established "to increase the number of Massachusetts students who participate in programs that support careers in fields related to STEM... to increase the number of qualified STEM teachers in the Commonwealth... to improve the STEM educational offerings available in public and private schools."

New summer camps were created at Springfield College and Greenfield Community College. For a week STEM professors led middle school students in a series of STEM-related activities designed to increase the students' awareness of STEM careers in the hope that they will choose challenging science and math-oriented courses in high school.

Saturday Explorations in Science and Engineering was a winter program at Western New England College for middle and high school students in Springfield. The six sessions mixed presentation, hands-on activities, lab work and visits to labs and facilities. Each day was devoted to one of the following fields (and their interrelations): math, physics, chemistry, biology, mechanical and electrical engineering, and bioengineering.

Three summer content and pedagogy institutes were implemented for K12 teachers (one for grades 4-8; two for high school). They drew upon existing curriculum materials for teaching engineering at those levels, such as the Teach Engineering project, funded by the NSF. The institute for grades 4-8 was coordinated by the Westfield State College Center for Teacher Education and Research and the Hampshire Educational Collaborative.

It included:

- a) learning major math concepts through engineering applications;
- b) learning activities that link math to STEM careers;
- c) integration of educational technology into the curriculum; and
- d) implementation of practices that will raise student MCAS scores in math.

The Smith College institute for high school teachers focused on engineering across the curriculum. The UMass Amherst program incorporated engineering curriculum materials into traditional high school mathematics and science courses. Followup sessions will be held during the 2005-06 academic year.

Two sets of academic-year seminars for teachers included STEM Ed's Science and Engineering Saturday Seminars for K12 teachers and bimonthly seminars for K12 teachers and higher education faculty. Although these seminars focused primarily on content, curriculum, and pedagogy, they were designed to increase awareness of STEM careers.

We are extremely pleased by the success of the above projects and the commitment by members of the business community, the area school districts and colleges, and the community. The Network is looking forward to continuing its work. ■

FOOD SAFETY FIRST ONLINE EDUCATION

BY RITA BRENNAN OLSON, UMASS EXTENSION ritabo@nutrition.umass.edu

This fall, Food Safety FIRST (<http://www.foodsafetyfirst.org>) begins its second year helping science teachers implement active food safety education lessons in their classrooms. This joint project was developed by the University of Massachusetts Amherst Extension Nutrition Education Program, Departments of Nutrition and Food Science, STEM Education



Institute, and the Department of Computer Science in partnership with National Science Teachers Association (NSTA) as the result of a three-year U.S. Department of Agriculture \$530,608 grant to promote and enhance food safety education for teachers and youth through an online program.

The UMass Amherst team, led by Nutrition Department Head Dr. Nancy Cohen and Extension Food Safety Education Project Manager Rita Brennan Olson, assessed teacher interests and needs and then develop learning activities to encourage inquiry, experimentation, and theory.

A set of three modules includes Bacteria Are Everywhere, Food Handling Is a Risky Business, and Current Controversies in Food Science.

Each module has been designed to take about 15 hours and will provide documentation for professional development, 1.5 continuing education units (CEUs), and the potential for graduate credits.

Over 70 teachers, potentially reaching more than 4000 students, have participated in this program which utilizes teaching tools such as the the Food and Drug Administration/NSTA Science and Our Food Supply curriculum, and the Food Safety FIRST CD and Lab Kit to implement inquiry-based food safety activities and experiments in their classrooms.

A New Jersey teacher “found the activities in this program excellent for demonstrating the scientific method. For my students, this is not an easy idea. Looking for places of contamination and discussing how to make it a “controlled” experiment would really send the message to them.... I really liked the demonstration... it really highlighted the use of controls in an experiment, which is a concept that is difficult for most of my middle level students to grasp.”

Another teacher, from West Virginia, found that her students “were engaged, eager to present information, and willing to follow through on safety procedures...the facts will stick with them throughout their lives.”

Through discussion boards using UMassOnline, teachers were not only able to access University faculty and resources, but were also able to communicate with fellow practitioners from across the country and Canada. In North Dakota, one teacher acknowledged the efforts of instructor Dr. Patsy Beffa-Negrini “...of the six or so online classes I’ve taken, I think that this one and the way you monitor the websites, provide feedback and assistance and resources ranks right up on the top. You really do a great job.”

A teacher in Florida expressed her enthusiastic evaluation of the course and program: “Just want to let you know I’ve fallen in love...with this online course! I hope I’m not becoming addicted!”

With new mandates for schools across the country to implement food safety and wellness plans, Dr. Cohen believes that “secondary science teachers serve as a gateway to pass food safety knowledge and skills to children and families. In the US, there is a need for food safety education for youth as future foodservice workers.” She agrees with one Food Safety FIRST participant that this program “is coming at an excellent time for our students and children. Health risks, obesity, and other health related illnesses are increasing around the nation... and can’t think of a better way to address these issues than to begin teaching Food Science in our schools.”

To learn more about how you can train future workers in the real-life science of food safety, go to:

www.foodsafetyfirst.org
and click on “How to Enroll” for details about registering for the next classes.

Funded in part by USDA CSREES
Grant Number 2002-51110-01501. ■

STEMTEC PROGRAM NEARS END

The Science, Technology, Engineering, and Mathematics Teacher Education Collaborative, or STEMTEC, has been the STEM Education Institute's largest and most visible program. Funded in 1997 by the NSF Collaboratives for Excellence in Teacher Education program, it was an ambitious project designed to produce more, better prepared, and more diverse K12 science and math teachers.

The original \$5,000,000 grant was later increased by \$500,000 for scholarships and by \$80,000 for the support of an international conference on STEM education. The principal investigators were Morton Sternheim (STEM Ed), Allan Feldman (Education), Richard Yuretich (Geosciences), Sue Thrasher (Five Colleges Public School Partnership), and Charlene D'Avanzo (Ecology, Hampshire College).

The original collaborative included UMass, its Five College neighbors (Amherst, Hampshire, Mount Holyoke, and Smith Colleges), and Springfield Technical, Holyoke, and Greenfield Community Colleges. Subsequently other Massachusetts colleges and universities with science and math teacher education programs were invited to participate, raising the total to 21 colleges and universities, along with a large number of school districts. In 2002 we received \$600,000 for STEMTEC II, a three-year follow-on grant intended for summative evaluation and new teacher support. This grant ended in August, but residual funds will allow some activities to continue for another year.

One of two key elements of STEMTEC was an ambitious course redesign effort. The other was a "student program" designed to attract students to science and math teaching and to provide convenient pathways to licensure.

Both reflected the fact that most students who eventually become science or math teachers do not make that decision until late in their undergraduate careers or sometime after graduation.

We opted to focus on improving the courses future science and math teachers are likely to take in order to provide models of good teaching and to increase all students' interest in science or math and reduce the high attrition from STEM majors. Ultimately six groups of faculty participated in summer or academic year institutes with various formats. These explored student-active teaching methods, including inquiry-based teaching, cooperative learning, project and problem-based learning, and alternative assessment methods. Nearly 200 college faculty overall participated and revised at least one course. They were aided by the availability of minigrants for materials, equipment, and student assistants. Over 50 K12 teachers also took part, serving as pedagogy experts and helping in the course redesign efforts. A variety of academic year follow-up sessions and summer conferences allowed participants to share their ideas and successes. The impact of this effort is clearly visible today in many courses taught by STEMTEC faculty and others.

The student program had several components. We encouraged faculty

to include some kind of teaching experience as a course requirement or an option. We created courses on various campuses for STEM majors on teaching and learning. We awarded scholarships to students who had an interest in STEM teaching, and provided them with teaching experiences and various kinds of support. Finally, we created new pathways into science and math teaching, with new transfer programs at the community colleges, an education minor at UMass, new licensure options at the other four year colleges, and a summer/fall program for accelerated licensure.

As noted above, the follow on program, STEMTEC II, consisted of summative evaluation and new teacher support. Steve Sireci presents evaluation highlights in the accompanying article (see page 15). New teacher support has included new teacher dinner or lunch meetings, the Science and Engineering Saturday Seminars (see page 8), new UMass M.Ed. options including an online seminar course for new teachers, and the Tuesday STEM Ed seminars. All but the new teacher dinner or lunch meetings will continue for the foreseeable future. ■

PIONEER VALLEY PC USERS GROUP GRAND FINALE

As the article on UMassK12 explains, that service and ultimately the STEM Education Institute developed from the experience gained operating a PC based electronic bulletin board (BBS) for the Pioneer Valley PC Users Group (PVPCUG). This users group was founded in 1984 by Jeffrey Kane, who was then a faculty member in the UMass School of Management, Mort Sternheim, and others from UMass, the Five Colleges, and the community. It started meeting at UMass, and then moved to Amherst College, and finally back to UMass a year ago. It held its grand finale meeting in May of this year.

IBM PC's and personal computers in general were new in 1984. Today you can get help if you need it from knowledgeable coworkers or neighbors, and from the web, but at that time these options were unavailable.

The users group offered several kinds of support. There were informal special interest group meetings, many targeted at novices; plenary talks by locals and by visitors; a shareware library of software that could be legally shared and which required or suggested a registration fee; a newsletter; and a system of several electronic bulletin boards that connected

continued on page 15

The formal evaluation of STEMTEC wraps up this year. The evaluation has been conducted by Professors Stephen G. Sireci and Joseph B. Berger, UMass School of Education. Recently, evaluation efforts have built upon the comprehensive formative and summative assessments that have been conducted for the last five years. A variety of forms of data collection have been used including surveys of K-12 teachers, students, and principals; classroom observations of K-12 and postsecondary classes; and surveys of two special programs—the New Teacher Support Group and the Saturday Seminars. The evaluation has also looked back on the varied STEMTEC faculty development models to discuss their relative strengths and limitations.

Overall, the evaluation has focused on the degree to which STEMTEC has reformed the teaching of math and science in a manner consistent with its student-centered, active learning philosophy. The control groups of K-12 and postsecondary classes were added this past year and incorporated an additional dimension to help evaluate the “value added” of training teachers within the STEMTEC model.

A key feature of the evaluation conducted this year is a focus on the *enduring* effects of STEMTEC. That is, the evaluators revisited postsecondary teachers previously trained in STEMTEC to see if their teaching practices still reflected the STEMTEC ideals. Practicing K-12 teachers who were considered STEMTEC-trained were also visited. These visits and the associated surveys provided an important investigation regarding whether STEMTEC’s principles transfer to K-12 teaching practices.

Some of the key findings and recommendations that have emerged from these efforts include:

- Students in STEMTEC-trained teachers’ classrooms appear to be more highly engaged, relative to students in comparable classes.
- Smaller-scale endeavors such as the Saturday Seminars and New Teacher Support Groups appear to be effective in building camaraderie and perceived social support for teachers. The Saturday Seminars also appear to be effective as sources of usable activities and strategies for incorporating more active learning techniques in the teaching repertoire of participants.
- STEMTEC appears to be well known to its participants, but most K-12 teachers and principals are not aware of it or its positive influences and activities. STEMTEC should consider doing more to advertise what it has accomplished thus far and what opportunities still remain for students and teachers. Advertisement at the local level may be particularly helpful for K-12 teachers and administrators.
- STEMTEC used several faculty development models since 1997 and each model has particular strengths. The learning community model is intensive and seems to effectively

impact faculty teaching. The Pathways to Change (conference) model appears to be an effective way for generating peer support and networking opportunities on a larger scale. Additional reviews of the benefits of these models are currently being conducted to further inform how to fit the best models to specific project goals.

Many of the faculty development models used by STEMTEC over the past few years represent “best practices” in the field, such as capitalizing on local faculty expertise, identification of teachers interested in reformed teaching, and enhancing networking opportunities. It has been recommended that STEMTEC should explore ways to keep these networks in place for the long run.

Finally, given that several annual evaluations of STEMTEC (and the supplemental funding for STEMTEC-II) have been conducted, the evaluators are currently conducting meta-analyses and trend analyses on data gathered since the first year of the program to provide a more comprehensive and longitudinal assessment regarding the overall impact of STEMTEC. ■

continued from page 14

PIONEER VALLEY PC USERS GROUP GRAND FINALE

to each other and to a worldwide network of 30,000 FidoNet boards that shared messages, conferences, and downloadable shareware.

Like many PC users groups, the PVPCUG grew rapidly in the 80's, and shrunk dramatically in the 90's. It went from a peak of about 600 members to well under 100 by 1997. Unlike many larger groups, it avoided bankruptcy and total collapse for many years. It ceased printing a newsletter, operating bulletin boards, and offering shareware, and shifted to holding informal monthly meetings for 10 to 20 people. An email notice of meeting agendas and post-meeting write-ups offered a no-cost way of maintaining communications.

By this past year only a handful of people were attending meetings at which Bill Verts (UMass Computer Science) and others offered presentations on a variety of computer topics. The decision was made to hold a grand finale meeting. About 20 members attended to recall the early days and to acknowledge that the need for the group no longer existed. It had served its purpose well, giving a great deal of help to many people. An additional unexpected outcome was the number of new ventures, such as UMassK12, and new career directions that had resulted from participation in the PVPVUG. ■

STEM Ed Newsletter of the STEM Ed Institute



225 Hasbrouck Laboratory
University of Massachusetts
Amherst, MA 01003
119014

NON-PROF.ORG.
U.S.POSTAGE PD
PERMIT NO. 2
AMHERST, MA

CONTRIBUTORS:

Mort Sternheim, Irene Starr, Kathy Baker,
Joseph B. Berger, Bobbie Coleman, Rita Brennan Olson,
Stephen Sireci, Helen Sternheim, Tarin Weiss

DESIGN:

Emily Lewis,
Community Public Relations

CALENDAR

STEM Ed TUESDAY SEMINARS

4 PM in Hasbrouck Laboratory 138, usually the first and third Tuesday of the month. Refreshments at 3:45. No charge; parking is in the Campus Center Garage. For more information, check www.umassk12.net/calendar.

- | | |
|--------------|--|
| September 20 | Evaluating Science Education Projects. Mary Moriarty, Springfield Technical Community College. |
| October 4 | What is Singapore Math? What can we learn from it? Richard Bisk, Mathematics, Worcester State College. |
| October 18 | Tablet PC's in the Classroom. Gino Sorcinelli, Isenberg School of Management, UMass. |
| November 1 | K-4 Reading And Math Literacy Program. Martha Nevin Cyr, Engineering, Worcester Polytechnic Institute. |
| November 15 | To be announced. |
| December 6 | Equity in Science Education. S. Maxwell Hines, Secondary Science Education, Hofstra University. |

SCIENCE AND ENGINEERING SATURDAY SEMINARS (see page 8)

A free program for K12 teachers, funded by the NSF and UMass Amherst. Saturdays at UMass, 8:30 AM to 1 PM. Free educational materials, refreshments, parking, PDPs, option of 3 grad credits at reduced cost. For more information or to register, see www.umassk12.net/stem/sess0.html or contact Mort Sternheim, mort@umassk12.net, 413-545-1908.

- | | |
|--------------|---|
| September 10 | Forest Ecology Basics. Gini Traub, MA Dept. of Environmental Management. Forest Ecosystems - observing habitat and related activities and discussion. |
| September 24 | The Equinox. Steve Schneider and Judy Young, Astronomy, UMass Amherst. Astronomical rhythms related to our seasons. |
| October 1 | Nanotechnology. Mark Tuominen, Physics, UMass Amherst. Materials and applications. |
| October 15 | Insulin in the Biology Class. Brandon Poe, Springfield Technical CC. Models as a teaching tool. |
| October 29 | Acting and Teaching. Rod Hart, School of Education, UMass Amherst. Use the tools of the theater director to set the stage for student achievement. |
| November 19 | Weather cancellation makeup date. |
| December 3 | Additional class for those registered for graduate credit. |
| February 4 | Transportation Engineering |
| February 11 | Universal Design for Learning |
| March 11 | Solar Cars |
| April 1 | Schoolyard Science |
| April 8 | GPS/Mapping |

STEM ADVENTURES SCIENCE SATURDAYS (see page 5)

1:45-5 PM, October 15 and November 19. For girl scouts in grades 4-9. See our website for details; in early January check spring dates: www.umassk12.net/adventures.

2006 DEADLINES Late applications will be accepted if funds or space are still available.

- | | |
|----------|--|
| March 15 | Nanotechnology Summer Institute (see page 6) www.umassk12.net/nano |
| March 15 | Earth Central Summer Institute (see page 7) www.umassk12.net/earth |
| April 15 | Noyce Scholars Program (see page 4) www.umassk12.net/bridge |