2015

STEM Ed Strategic Plan

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STEM Education Institute
Strategic Plan
December, 2015

This strategic plan has been created in response to the memo dated January 9, 2015 from Provost Katherine Newman and Vice Chancellor Michael Malone concerning the STEM Education Institute Self Study dated February 10, 2012. As requested, we have had conversations with CNS Associate Dean Sally Powers and Dean Steve Goodwin. This plan reflects those conversations and responds to some of the issues noted in the memo.

As noted below, we have filled the vacant Associate Director positions and created an Advisory Committee. This plan reflects their comments and suggestions.

1. The Vision

The Science, Technology, Engineering, and Mathematics Education Institute (STEM Ed) has as its goal enhancing and fostering the University's teaching, research, and academic outreach missions in these fields. Activities include coordination, encouragement and support of research, curriculum development, dissemination, and program implementation.

Formally approved by the Faculty Senate in April, 1996, the Institute is an outgrowth of a Science After School Task Force established in March, 1992 to consider how we might make it possible for Western Massachusetts teachers to take science, technology, engineering and mathematics courses at the University. The task force included faculty and staff from the University and from area schools. We soon discovered that there were related issues waiting to be addressed, including preservice teacher education. We also learned that there are many members of the University community working in the area of K16 science, technology, engineering, and mathematics education. They are spread across the campus in various departments and in many cases are not even aware of other local programs related to their own interests.

The Institute brings these people together, facilitating joint efforts and avoiding unnecessary duplication. Above all, it plays a major role in meeting the University's goals in academic outreach, teaching and learning, research, diversity, and multiculturalism. The synergistic effects of coordinating these efforts increases the opportunities to obtain external grants and allows the University to play a leadership role in the national and state efforts to reform and improve science, technology, engineering, and mathematics education.
The Mission
The basic mission or goal of STEM Ed is to improve K16 education by fostering interactions among school and college faculty interested in outreach, teacher improvement, educational research, and curriculum development. The population served by the Institute includes students in elementary and secondary schools and their teachers, community college, college, and university students enrolled in STEM courses, college students interested in education or issues concerning learning, and college and university faculty and staff.

Over the past two decades STEM Ed has sponsored a wide range of programs for a variety of audiences and involving many faculty members from UMass and other institutions. The future programs will depend on the perceived needs and the availability of resources.

2. Faculty Involvement and Governance

Many faculty members have recently been engaged as PI’s, co-PI’s or faculty participants in STEM Ed grant funded proposals and programs. Below is a partial list; it does not include some faculty who were involved in grant proposals that were not funded or who made presentations in the Science and Engineering Saturday Seminar (SESS) series.

- Education: Allan Feldman, Joe Berger, Martina Nieswandt, Sandy Madden
- Geosciences: Julie Brigham-Grette, Ray Bradley, Richard Yuretich
- Physics: Mark Tuominen, Benny Davidovitch, Jun Yan, Jennifer Ross
- Engineering: Jonathan Rothstein, Neil Forbes, Boris Lau, David Reckhow
- Chemistry: Julian Tyson
- Astronomy: Steve Schneider
- Biology: Bruce Byers
- Environmental Conservation: Curtis Griffin, Charles Schweik
- Computer Science: Rick Adrian
- Nutrition: Nancy Cohen

Associate Directors
The position of STEM Ed Associate Director has been vacant for some time. Julian Tyson (Chemistry) and Steve Schneider (Astronomy) have agreed to serve as Associate Directors. They will contribute to the management of the Institute and will help to ensure its long term viability.

Staff
STEM Ed presently employs several people part time or as needed to support its programs or for technical support. Some of these are experienced active or retired middle school or high school teachers. There are no full time personnel at this time.

Advisory Committee
A new Advisory Committee has been formed. The committee will help to identify priorities and opportunities. Its membership includes:
The Advisory Committee will meet occasionally to make recommendations and to review documents such as this one, which includes some suggestions its members have made.

3. Current Programs

K12 Education
Most programs offer teachers the opportunity to receive free Professional Development Points (PDP’s) needed for continued certification and/or reduced cost graduate credits.

- STEM Digital (Sternheim; Schneider, Astronomy; Tyson, Chemistry; Reckhow, Engineering) summer institutes.
- Online education. The STEM DIGITAL summer institute materials have been used to create an online professional development continuing education course offered as part of the Science Education Online (SEO) program.
- Nanotechnology Summer Institutes (under the Center for Hierarchical Manufacturing (CHM) grant, Tuominen, Physics). Also, nanotechnology workshops at National Science Teacher Association annual meetings and other venues. Over 600 teachers have participated over a nine year period.
- Science and Engineering Saturday Seminars for K12 teachers are now offered five times each spring semester and feature presentations by UMass and other faculty members. These seminars introduce teachers to new pedagogical materials and methods on an eclectic mix of topics. Originally funded by grants, they are now supported by registration fees. The program also presents a forum for faculty with CAREER or other research grants to carry out activities included in their broader impact statements. Twenty-six series have been presented since 2001; over 1000 teachers have participated. Sixty teachers registered for one or more sessions of the spring 2015 series.
- UMassK12.net was a pioneering Internet service for teachers when it was started in 1993, replacing an earlier PC based bulletin board network. Few people outside academia and corporate environments had Internet access at that time. UMassK12 offered access regionally, and for a while, statewide via modems. The service was initially free and later supported by modest fees. Ultimately we were able to phase out
the modem pools as broadband connections became widely available. Today we use the server for websites, discussion forums related to our programs, and mailing lists. At its peak UMassK12 had several thousand accounts. Today a few teachers still pay for email accounts on UMassK12.

Out-of-School-Time (OST) support
- With the aid of a Pipeline (DHE) grant, STEM Ed organizes science and technology workshops for teachers in after school and other OST settings.
- The “wow” program funded by the annual Pipeline network maintenance grant fosters interactions of K12 students with regional STEM resources and college students. Examples of programs include visits of K12 students to colleges, businesses, museums, and other places with engaging STEM activities and visits of college student groups to classrooms and OST programs to offer hands-on STEM activities and to serve as young role models. Over 2000 students participated during the 2014-15 school year. The program will be renewed this year when funding is received.

Outreach
- STEM Ed manages the Pioneer Valley STEMNET, one of nine regional networks funded by the Board of Higher Education Pipeline grants. Activities include newsletters, a web site, symposia, an email list, and the “wow” program above.
- We frequently advise representatives of other schools and colleges who want advice on STEM education related matters.
- The UMassK12 internet server sends out email announcements of educational programs and opportunities to over 2500 educators. These announcements are forwarded into other local, regional, and national mailing lists and websites. This is a very popular service which is free to the providers and the recipients. It represents the primary recruiting medium for STEM Ed programs and for many others.
- STEM Ed assists other colleges, universities, and nonprofits in staging teacher development programs. This past year the MassBioEd Foundation offered four one-day and multi-day biotechnology programs on the UMass campus with STEM Ed assistance. This partnership is expected to continue. Also, STEM Ed helped to find partners for the Springfield Technical Community College program, Through My Window: Engaging Children and Young Teens in Engineering Through Narrative.
- Tuesday afternoon STEM talks, supported by overhead. Talks by UMass faculty and visitors on STEM education topics.
- The STEM Ed newsletter is published annually, with information on Institute programs and other STEM education related topics. It is distributed electronically and in paper format.

Broader Impact
- STEM Ed helps faculty members in developing their broader impact statements and the associated educational outreach components of their research proposals.
These broader impact statements have received very positive reviews whether or not the proposals were funded.

- CAREER Grants. STEM Ed works with many faculty developing CAREER proposals. Grants have been awarded to Boris Lau, Benjamin Davidovitch, Sheila Patek, and Nilanjana Dasgupta.
- STEM Ed manages summer workshops for Davidovitch’s CAREER grant.
- As noted, STEM Ed offers Nanotechnology Summer Institutes for teachers for the CHM. Outreach to the K12 community is an important part of their mission as a research center.

4. Impact

The STEM Ed impact can be assessed in terms of numbers and in feedback. Some recent numbers:

- **110 teachers** participated in the three STEM DIGITAL summer institutes or the online version of the program. Many others attended half day programs offered by this project as part of the Science and Engineering Saturday Seminars (SESS). This online course is now a part of the Science Education Online program offered by Continuing Education.
- The nanotechnology program offered nine summer institutes at UMass and one at Rensselaer Polytechnic Institute. Many others attended nanotech SESS programs and workshops at the National Association of Science Teachers annual meetings and the fall meetings of the Massachusetts Association of Science Teachers. A total of approximately **600 teachers** have attended these sessions.
- Sixty teachers attended one or more SESS programs in the spring, 2015 semester. Over **1000 teachers** have participated since the first series in 2000.
- More than half the teachers in these programs registered for graduate credit, representing a significant revenue source for Continuing and Professional Education.

As noted above, the broader impact components of research programs have received very positive reviews.

The great impact of the K12 oriented STEM Ed programs is demonstrated by the formative and summative evaluations of grant funded programs and by informal feedback from multiple sources. Teachers usually consider the programs to be the best they have attended. Some representative examples:

Recent teacher comments on the STEM Ed email list:

- Thank you so much for some quality intel about science offering for teachers and students around the region. These are the most useful activities I get.
- Thank you sooooo much for your continued support of teachers!! I have applied to take a course from the most recent Tufts Online K-12 Engineering email that you forwarded. Thanks to you, I am on track for my recertification. I
can't wait for the Spring Saturday workshops. (you can count me in now) Looking forward to attending classes with such anticipation is relatively new in my experience. Seems like you are the driving force making classes so magnetic. Thanks a bunch!!

- From a workshop provider, 3 hours after a mailing: Thank you, Mort - Your magic worked once again - two responses already! With appreciation,

From the formative evaluation of the 2015 Nanotechnology Summer Institute:

- I found this institute to be one of the best professional development experiences I’ve experienced.
- Normally I’m quite leery of PD that purports to “have something for all levels.” However the nanotech institute succeeded in this respect.
- The Nanotechnology Institute was a great learning experience for me. I know that I will be able to translate many of the concepts that I learned into useful classroom applications. There is an excitement that comes with this new understanding. I have already started gathering some of the supplies that I will need to run some of the student laboratory investigations.

From the STEM DIGITAL evaluation report by SageFox, Inc.:

- **Program Leadership.** The STEM DIGITAL leadership is held in high regard. Several of the participants applied to the institute because of its stellar reputation or because they had attended one with Dr. Sternheim in the past. One offered, “They are experts at this point” and another said “there is not one bad thing I’ve ever gone to with STEM Ed.” One person said, “Mort really knows how to put together a program, he knows how to plan things, he’s a magician.” Participants are mindful that daily feedback even about the smallest detail gets integrated into the program immediately noting, for example, that teachers requested coffee in the afternoon and it was provided the next day.

Also, from this SageFox report: The following quotes best reflect the sentiment of the group.

- Professional development through high school or other places I have found have gotten to a point that I dread some of them... With these you walk away excited about what you can try, you walk away with ideas of how to apply it. This is the opposite of a waste of time. Not only do I use the stuff, it reinvigorates me in my teaching...
- What was missing is sometimes a litany of professors telling you what you’re doing wrong and why kids are not prepared. There’s none of that here – it’s all about enhancing your own curriculum.
- ...everything is presented in a way you can see the wider application...
- I’ve done a bunch of these and worked closely with Mort and Marie and Jennifer with other programs ... I liked them all but they get better and better.
They must take our feedback. … For activities they gave us, they thought about who we’re teaching. In other programs they think we’re teaching college kids.

From a report by Professor Joseph Berger (Education) on the Science and Engineering Saturday Seminars:

- **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 teachers feel they can use those demonstrations with the students and that they affect the kids positively. Participants perceive that this seminar addresses content with inquiry-based techniques and is very valuable because there are a lot of projects out there being passed off as inquiry-based that only keep the students busy, but do not really teach the concepts.**

### 5. Funding

The Institute currently receives no financial support from the University except for the usual overhead return funds. It received over $11,000,000 in grants prior to 2006. More recent grants in 2006-15 total $4.8 million:

<table>
<thead>
<tr>
<th>Year</th>
<th>Program</th>
<th>Purpose, PI/Co-PIs</th>
<th>Source</th>
<th>Total award</th>
<th>overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2008</td>
<td>STEM Earth Central</td>
<td>Earth science teacher ed (Sternheim, Yuretich, Schneider)</td>
<td>NASA</td>
<td>659,000</td>
<td>196,000</td>
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<tr>
<td>2005-2007</td>
<td>Alternative Certification Conference</td>
<td>Meeting of researchers (Sternheim, Feldman, Berger)</td>
<td>NSF</td>
<td>200,000</td>
<td>26,800</td>
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<td>2006-2016</td>
<td>Nanotech</td>
<td>Teacher workshops (Tuominen)</td>
<td>NSF (CHM)</td>
<td>700,000</td>
<td></td>
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<tr>
<td>2006-2009</td>
<td>STEM RAYS</td>
<td>Afterschool science clubs (Sternheim, Feldman, Tyson; Adams – GCC)</td>
<td>NSF</td>
<td>800,000</td>
<td>85,601</td>
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<tr>
<td>2007-2010</td>
<td>Pipeline grant</td>
<td>Pipeline Network maintenance (Sternheim)</td>
<td>BHE</td>
<td>292,000</td>
<td>26,560</td>
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<tr>
<td>2007-2010</td>
<td>IPY STEM Connections</td>
<td>Polar curriculum (Sternheim, Bradley, Brigham-Grette)</td>
<td>NSF</td>
<td>600,000</td>
<td>126,000</td>
</tr>
<tr>
<td>2008-2011</td>
<td>Pipeline STEM RAYS</td>
<td>Afterschool science clubs (Sternheim, Feldman)</td>
<td>BHE</td>
<td>313,000</td>
<td>43,000</td>
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<tr>
<td>2010-2015</td>
<td>PV STEMNET</td>
<td>Network support (Sternheim)</td>
<td>DHE</td>
<td>200,000</td>
<td>22,000</td>
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<tr>
<td>2010-2015</td>
<td>STEM DIGITAL</td>
<td>Use digital images for research (Sternheim, Schneider)</td>
<td>NSF</td>
<td>967,619</td>
<td>251,227</td>
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<tr>
<td>2012-2013</td>
<td>Outreach resources</td>
<td>Database of volunteers etc (Sternheim)</td>
<td>DHE</td>
<td>40,000</td>
<td>4,400</td>
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<tr>
<td>2013-2015</td>
<td>Out of School Time</td>
<td>Teacher professional development (Sternheim)</td>
<td>DHE</td>
<td>40,000</td>
<td>4,400</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>4,811,619</strong></td>
<td><strong>785,988</strong></td>
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</table>
Unsuccessful Proposals

Educational grant funding has become increasingly more competitive and proposal preparation has represented a great many hours of work. The following proposals were submitted with various PI’s and co-PI’s in recent years. Many received good reviews but, with one exception noted, were not funded.

- STEM Ocean and Atmosphere. 2008. NOAA, $642,000. Sternheim, PI; Richard Yuretich, Geosciences, co-PI. *The funds disappeared and no programs were funded.*
- STEM RAYS II, NSF ISE, November, 2009. $3,000,000 requested. Sternheim, PI; Julian Tyson, Chemistry, co-PI.
- Visualizing Our World: Mapping Technology Experiences for Students & Teachers (MTEST). NSF ITEST. 2009. $896,000 requested. Sternheim, PI; Charles Schweik, Natural Resources Conservation, co-PI.
- STEM Digital Imaging in the Science Classroom (STEM DISC). NSF ITEST, $2,500,000 requested. Sternheim, PI; Paula Reese, Water Resources, co-PI; Barry Rock, University of New Hampshire, co-PI. *This was funded the following year as STEM DIGITAL.*
- Bringing Cellular Engineering to Middle School Classrooms. 2010. NSF GK12. $3,000,000. Surita Bhatia, Chemical Engineering, PI; Susan Roberts, Chem. Eng, co-PI; Sternheim, co-PI. Note: Two earlier GK12 proposals were also submitted in 2008 and 2009 and declined. STEM Ed did have a $1,500,000 GK12 grant in 2001-2005.
- Pioneer Valley Improving Teacher Quality (PV-ITQ). January 2010. MA Dept. of Higher Ed. Sternheim, PI; Sandra Madden, Education, co-PI; Anne Herrington, English, co-PI. $495,000 requested. Good reviews but not funded.
- Northeast Climate Change Education Partnership (NECCEP). March 2010. NSF. Sternheim, PI; Ray Bradley, Geosciences, co-PI. $1,000,000 requested. Good reviews but not funded.
- STEM Research Academies for Young Scientists II (STEM RAYS II), ONR, 2011, Sternheim, PI; Julian Tyson, Chemistry, co-PI. $615,000 requested.
- STEM Research Academies for Young Scientists II (STEM RAYS II). January, 2012 NSF. Sternheim, PI; Julian Tyson, Chemistry, co-PI. Six UMass faculty participants. $3,000,000 requested.
- Sustaining Elementary Engineering with Robotics (SEER). December 2012. NSF Sternheim, PI; Martina Nieswandt, Education, co-PI; John Heffernan, Williamsburg Schools, co-PI. $1,400,000 requested.
- STEM Solar Lab, September 2013. US Department of Education. Martina Nieswandt, PI. Sternheim, faculty participant. $1,000,000.
- Computer Science Education, 2014. Sternheim was listed as a faculty participant in two proposals submitted by Rick Adrion but not funded.
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- Climate Change Institute, 2015. NSF institute proposal with a large educational component. PI, Ray Bradley; Rob Deconto, Julie Brigham-Grette, co-PIs. Sternheim was listed as a faculty participant. Not funded.

**FY 16 Funding**

No UMass funding other than overhead return is presently expected. We anticipate the following resources:

- Nanotechnology (CHM/NSF) grant
- NSF STEM Digital Images in Geoscience Investigations: Teaching Analysis with Light (STEM DIGITAL) grant
- Pipeline (DHE) Out of School Time grant
- Pipeline network maintenance grant (DHE) renewal anticipated
- Workshop fees
- Overhead return
- Balances in trust and overhead accounts

Note that the first two grants expire in FY16. Hopefully one or both of the pending NSF proposals will be funded.

**6. A Vision for the Future**

STEM Ed plans to continue and expand its present activities to the extent that resources will allow. Two NSF proposals are currently pending, and will be described below. It will also seek other opportunities to improve STEM Education.

Our efforts discussed below are organized in several areas: Broader Impact, K12 Teachers and Students, Community Outreach, and Diversity.

**Broader Impact**

- STEM Ed will continue to assist in the development of broader impact outreach components for research and CAREER proposals. Some of these grants may offer a role for STEM Ed in implementing their outreach components. As noted above, these outreach programs have received very positive feedback by the grant reviewers. The existence of a strong campus unit that can help PI’s to develop broader impact plans and to facilitate outreach activities is a major plus in the efforts of the University to obtain grant funding.
- A high priority is creating partnerships on campus and beyond: acting as a broker or facilitator in fostering synergistic interactions. The educational component STEM Ed provided for a decade to the Center for Hierarchical Manufacturing (CHM) offers an excellent example of how it can strengthen research proposals while advancing STEM education.
- In FY15, STEM Ed was included as a major K12 educational outreach component in computer science, climate, and nanotechnology proposals as listed above. The
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Institute will attempt to develop similar arrangements, hopefully with more success.
- We will continue to work with Barbara Pearson in helping faculty to develop Broader Impact components of their research proposals.
- We will continue to seek ways to partner with the School of Education. In recent years we have submitted a proposal with Sandra Madden (Math Education) to the Massachusetts Department of Elementary and Secondary Education and two proposals with Martina Nieswanrdt (Science Education) to NSF and the US Department of Education. We are planning to offer our Tuesday Seminars as webinars in the spring semester as a support activity for their Noyce Scholars program.
- Specific programs related to Broader Impact statements are discussed in the next section.

K12 Teacher Professional Development

- NSF Proposal. Michael Rawlins has submitted a $383,746 NSF Arctic Research Opportunities proposal entitled Temporal and Spatial Variability in Water and Carbon Exports from the Western Arctic. It has a teacher workshop component to be managed by STEM Ed; Sternheim is a faculty participant.
- Science and Engineering Saturday Seminars. These popular seminars are supported by fees and will continue indefinitely.
- MassBioEd Programs. We will cosponsor several workshops on campus with the Massachusetts Biotechnology Education Foundation for biology teachers
- Faculty Broader Impact.
  - We will again assist Professor Benny Davidovitch (Physics) in organizing a summer institute on Patterns in Nature as part of his CAREER grant.
  - We will work with Professor Frank Sup (Mechanical and Industrial Engineering) in developing workshops as part of the Broader Impact for his research grant.
  - Similarly, we will aid Professor Alice Y. Cheung (Biochemistry and Molecular Biology) in offering a workshop as a component of her pollen biology grant.
  - We will aid Professor Boris Lau (Environmental Engineering) in offering workshops as part of his CAREER grant.

K12 Teacher Graduate Education

- Many of the teachers in our summer institutes and the Science and Engineering Saturday Seminars are working on advanced degrees or on Masters + 30. They can register for graduate credits in these programs, usually through Continuing and Professional Education. The courses are listed as response courses with reduced tuition fees, since there is no cost to CPE. In FY 2015 this represented CPE revenue of approximately $18,000. Teachers also have the option of earning Professional Development Points (PDPs) needed for continued accreditation.
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- STEM Ed has had two earlier programs with major impact on graduate students in Education, Science, Math, and Engineering. An NSF Noyce program (2004-2008) supported grad students preparing to be secondary math or science teachers. An NSF GK12 program (2002-2005) placed STEM MS and PhD graduate students in science classrooms, where they helped teachers and their students to do original environmental research.

- STEM Ed has supported a large number of grad students as fellows or research assistants over the years. Most recently, STEM Ed provided assistantships to four education and science graduate students in the STEM DIGITAL program (2010-2015). No programs aimed at STEM graduate students are presently anticipated.

K12 Students

- Science Quest. We will continue to be a sponsor and supporter of the UMass Science Quest programs for high school students.

- Biology Career Day. We worked with the Massachusetts Biotechnology Education Foundation to host a November 18, 2015 career day for 185 high school biology students.

- Geek is Glam. We sent four staff presenters and several women undergraduates to this annual STEM event in October at WPI for 600 girls organized by the Girl Scouts of Western Massachusetts. We will continue to support this and other Girl Scout STEM efforts.

- “wow.” The anticipated pipeline funding will support the continuation of the “wow” program connecting students with STEM programs and sites.

- Summer College: We are exploring offering two courses for high school students next summer based on our earlier teacher summer institutes: Nanotechnology and STEM DIGITAL.

- Making Connections. We help teachers to make contacts with UMass faculty and others in arranging campus visits or locating speakers or other resources.

- Home Schooling. We respond to requests for assistance in locating resources from home schooling groups.

K12 Out-of-School-Time (OST)

OST STEM providers generally have much more flexibility than classroom teachers to allow children to explore the natural world and to get excited about STEM.

- The present Pipeline OST grant will support workshops for OST teachers this fall.

- The anticipated Pipeline Network Operations renewal will fund the “wow” program which includes OST providers as eligible recipients.

- Other avenues for supporting OST programs, including private foundations, will be explored. Partnerships with the Girl Scouts and possibly 4H are anticipated.

Undergraduate STEM Education

- The $5,000,000 NSF/STEMTEC project (1997-2005) focused on reforming the teaching of introductory courses at 21 colleges for STEM majors who might
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become teachers. It also awarded $500,000 to undergrads considering STEM teaching. Subsequently, the NSF/Noyce grant (2004-2008) funded scholarships for undergraduates and fellowships for graduate students who were in STEM teacher preparation programs and who agreed to teach in underserved school districts.

• More recently, STEM Ed staff has participated in the NSF/CHM project’s development of multimedia modules on nanotechnology related topics designed for community college and other students.

• The NSF ARSENIC proposal below includes funding requested for an undergraduate research experience.

• As opportunities appear, STEM Ed will offer other programs aimed at undergraduates.

Community Outreach

• NSF ARSENIC Proposal. In November Tyson (PI) and Sternheim (co-PI) submitted a proposal to NSF entitled Arsenic in Rice Studies: Experiments and Narratives Involving Citizen-scientists (ARSENIC). It is a two-year, $300,000, Advancing Informal Science Learning (AISL) grant proposal. The project would recruit volunteer citizen science volunteers to measure arsenic levels in locally purchased rice. The Museum of Science in Boston will be a sub-contractor. Events related to this proposal would be held at the Museum of Science, Boston Public Market, the new UMass Springfield site, and at Holyoke Community College.

• Pipeline. STEM Ed will continue to lead the Pioneer Valley STEM Network (PVSTEMNet) for the state Pipeline program. It will continue to assist the Pipeline’s @scale initiative; recent efforts included aiding the MassBioEd programs and the WOW program that brought STEM professionals into classrooms to discuss career opportunities.

• Tuesday Afternoon Seminars will continue to offer stimulating talks on current STEM topics by a diverse group of presenters. As noted above, we plan to offer these as webinars.

• UMassK12.net will continue to maintain web sites with a wealth of educational resources. It will host the Pioneer Valley STEM network web site, www.pvstem.net and the extensive mailing lists for announcements of STEM programs.

• Community STEM Support. We will continue to work with school districts, regional collaboratives, and businesses in seeking grant funds and implementing STEM programs. We anticipate serving on the advisory committee for a Makerspace program at the Easthampton High School. In recent years we have partnered in an NSF proposal from the Collaborative based in Northampton and with a US Department of Education solar energy project managed by Diversified Construction, Inc.

• Newsletters. Electronic and paper versions of the STEM Ed and PVSTEMNet newsletters will be distributed widely. They will offer information about STEM programs and issues.
Diversity

- Typically over half the teachers and students in our programs come from schools with large minority and/or low income students.
- In the 2014-15 academic year we organized a symposium at Holyoke Community College on underrepresented minorities and women in STEM and a networking event at the UMass Springfield site. We anticipate further programs this year.
- We will look for ways to organize or support other programs and events at the UMass Springfield site as a way of reaching diverse groups.
- The pending ARSENIC proposal will target minority groups that typically include large amounts of rice in their diets. Events related to this proposal would be held at the Museum of Science, Boston Public Market, the new UMass Springfield site, and at Holyoke Community College in an effort to reach these demographic groups.