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Amherst

Final Report to NSF

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Final Report for Period: 09/2008 - 08/2009

Principal Investigator: Feldman, Allan

Organization: U of Massachusetts Amherst

Submitted By:

Sternheim, Morton - Co-Principal Investigator

Title:

STEM Bridge for Noyce Scholars

Submitted on: 09/11/2009

Award ID: 0434110

Organizational Partners

Springfield Technical Community College

Helps to recruit minority and nontraditional students for the program.

Greenfield Community College

Helps to recruit minority and nontraditional students for the program.

Holyoke Community College

Helps to recruit minority and nontraditional students for the program.

Other Collaborators or Contacts

UMass University Without Walls - programs for nontraditional (older) students - helped with recruiting

Multicultural Services, UMass - helped with minority recruiting

Advisory Committee

The Advisory Committee includes representatives from Springfield Technical Community College, Holyoke Community College, Greenfield Community College, the University Without Walls, the UMass Admissions Office, and the Multicultural Services Office. Prospective scholars are encouraged to contact members of the advisory committee for information and advice.

Brian Adams, Greenfield Community College adamsb@gcc.mass.edu

Gary Bernhard, University Without Walls, UMass, bernhard@uww.umass.edu

Elizabeth Brinkerhoff, University Without Walls, UMass, ebrinkerhoff@uww.umass.edu

Stephanie Chapko, Admissions, UMass, schapko@acad.umass.edu

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Bob Dickerman, Springfield Technical Community College, dickerman@stcc.edu

Carl W. Satterfield, Jr., Holyoke Community College, csatterfield@hcc.mass.edu

October 2006 update

The advisory committee has been modified to reflect personnel changes. The current board is

Brian Adams, Greenfield Community College adamsb@gcc.mass.edu

Elizabeth Brinkerhoff, University Without Walls, UMass, ebrinkerhoff@uww.umass.edu

Stephanie Chapko, Admissions, UMass, schapko@acad.umass.edu

Doris Clemmons, Multicultural Services, UMass, dc@acad.umass.edu

Bob Dickerman, Springfield Technical Community College, dickerman@stcc.edu

Dr. Xian Ran Duan, Holyoke Community College, xranduan@hcc.mass.edu

September, 2007

There have been no changes in the advisory board.

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September, 2008

There have been no changes in the advisory board.

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August, 2009

We have added Professor Sandra Madden, a new UMass Math Education Assistant Professor, to the advisory board.

Activities and Findings

Research and Education Activities:

Distribution of grants: the initial grants were aimed at juniors and seniors interested in becoming teachers in STEM fields at MS or HS level.

October 2006

In accordance with discussions with the program officer, we have now also made grants to recent UMass graduates who need an additional year to as grad students to complete teacher education requirements.

September 2007

We have established a rolling deadline for applications, this increased our applications over the year as students who enrolled over the summer for education programs were still eligible to apply. The change in cohort that we instituted in 2006 has also increased our applications.

In consultation with the program officer, Joan Prival, we have decided to increase the awards up to the cost of education, or \$20,000 in most cases. This doubling of the awards is expected to make the program attractive to more students. It will also serve a genuine need.

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September 2008 additions

The original three year Noyce grant expired in August 2007. Because of the timing of the grant, we did not get started with the award of scholarships until the second year. Accordingly we requested an automatic no-cost extension for an additional year ending August 2008. Subsequently, since we had substantial scholarship funds remaining, we requested and received a second no-cost extension in the spring of 2008. The grant will now end in August 2009.

With the permission of the program officer, last fall we changed the award to be the 'cost of education' and not less than \$10,000, in place of the earlier \$7500-10,000. This is much more realistic. Our undergraduates must pay tuition and fees of up to \$12,000, not counting room, board, books, etc. Thus we awarded the undergrads \$20,000 for the past year and for the coming year.

Graduate students with Noyce stipends enrolled in the traditional campus M.Ed. secondary teacher education program ('STEP') have received waivers for tuition and most of their fees, so we have awarded them the basic \$10,000. Other graduate students are enrolled in site based year-long internship and master's programs in Springfield (the '180 days program') or in Franklin County ('Bridges to the Future') and pay full Continuing Education tuition and fees. We have awarded these students the full \$20,000.

These increased stipends have been well received. Several students have told us that without the support they could not have afforded to enter the teacher preparation program or that they would have had to spend much more time at low paid part time jobs, slowing their progress. As a result, we have awarded all the available funds for 2007-2008 or 2008-2009.

September 2009

The STEM Bridge for Noyce Scholars program has ended. Over the past four school years, 31 undergraduate and graduate students have received up to \$20,000 in annual support for one or two years. In return, they have agreed to teach middle or high school mathematics or science for at least two years in a high-need district for each year that they received a scholarship.

As noted in last year's annual report, increasing the award to a maximum of \$20,000 instead of \$10,000 has made a real difference. The increased award attracted more students, including some who could not have otherwise completed the teacher preparation program. This was especially true for undergraduates, who are not eligible for the tuition waivers received by many of the graduate students. We were better able to recruit community college transfers, one of our target groups, because of this increased funding. This effort was also aided by an advisory committee which included faculty members and administrators from UMass and from Greenfield, Holyoke, and Springfield Technical Community Colleges.

The program has provided support in addition to the usual academic program and counseling. We held twice annual dinner meetings with the scholars, PI's, and advisory committee members. We offered occasional workshops on request from the Scholars, including one in December, 2008 on classroom management. Scholars were also welcomed during and after their studies at our other programs, including the Tuesday afternoon seminars on STEM Education topics, the Science and Engineering Saturday Seminars and the various summer institutes: STEM Earth Central (NASA), IPY STEM Polar Connections (NSF), and Nanotechnology (NSF). We also included them in our email list which broadcasts numerous opportunities for professional development.

Many of the Scholars told us that the awards were instrumental in their efforts to become teachers. Here are some comments from a recent survey:

- If it were not for the support from the Noyce Scholar Program, I might not be a teacher. It was the financial boost I needed in order for me to fulfill my student teaching experience.
- The scholarship allowed me to reduce my tuition costs as well as was an incentive to work in a high-needs school district.
- I would not have been able to complete my program without the financial support of the Noyce program. Thanks!

We are hopeful that we will be able to resume this program in the future.

Findings: (See PDF version submitted by PI at the end of the report)

Extensive outreach resulted in about 25 inquiries and 10 applications. Eight met all the criteria and were accepted. Of those two did not accept the awards, one deferred due to illness, and one student died.

The four undergraduate students currently in the program are math and geoscience majors with a broad range of backgrounds. Three of these students are older than traditional undergraduates as they worked and/or attended community college before UMass. One recipient is a member of an underrepresented group (Latino).

Apparently, we overestimated the number of sophomore STEM students who decided to become teachers. After discussion with our NSF program officer and our advisory board, we have expanded the program to include one year grants for recent UMass graduates who are currently enrolled in suitable programs at the SOE. Four students have been accepted. In addition, we will expand the program to part time undergraduate students in STEM areas.

October 2006

We continued our aggressive recruiting plan again this year as described under outreach.

We found even less interest among undergraduates in this past year than before. Although we had some inquiries, no undergraduates followed through with applications. We have awarded seven scholarships, all for graduate study. This includes an award to a student who had a scholarship as a senior last year, and is now a graduate student.

Two more graduate students have expressed an interest in applying, and may receive awards in the coming weeks.

An evaluation report is attached.

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September, 2007

The evaluation report is below:

Overview

The Noyce Program was developed to encourage undergraduates to select teaching as a career, to provide resources in high needs school districts and attract people who may not have considered teaching, or teaching in high needs school districts. Most students initially heard about the scholarship, in class, from faculty or from other students; then learned more about the program on-line.

The National Science Foundation defines a high need district as one that meets at least one of the following criteria:

- A minimum of 50 percent of the enrolled students are eligible for free or reduced lunch
- More than 34 percent of the academic classroom teachers at the secondary level do not have an undergraduate academic degree with a major or minor in the academic field in which they teach the largest percentage of their classes
- At least one school whose teacher attrition rate has been 15 percent or more over the last three school years.

A scholarship is available to UMass juniors, seniors and graduate students with a major in math, science or engineering and to those in related fields such as public health or natural resources and environment. Minority students, community college transfers, part-time students and UWW (University Without Walls) and other nontraditional students are encouraged to apply.

Awards range from \$7500 to \$10,000 a year for full time students and part time students receive reduced awards. Graduate students receive fee waivers and may receive a second year of funding. If they received a bachelors' degree from UMass a year's funding is available for the completion of certification requirements.

Once scholars are in the classroom additional supports are offered and the opportunity to enroll in M.Ed. programs for math and science teachers.

At this time there are a number of scholarships available that do not require a lengthy a teaching commitment in low paying districts making the Noyce scholarships less attractive than they were initially.

Participants

All Noyce Scholars agreed that the greatest advantage the program offers are the scholarships which make it possible for them to attend school full-time.

They also agree that although teachers in high needs districts earn about \$5,000 less than teachers in other districts, they generally liked their practicum positions and will remain in high needs areas if they are able to find suitable jobs.

Efforts are continuing to increase the number of students participating in the program. A few professors have invited scholars to speak about the program in math classes, math teachers have been asked to provide information to their students and program information is posted online. The online information seems most effective in encouraging inquiries about the program.

Twenty-three students have participated in the Noyce Scholarship Program. They come to the program with a variety of backgrounds, interests and experiences. Some are University of Massachusetts undergraduates; others attended Community Colleges and may be non-traditional students, while others may be individuals who are changing careers.

This year six students were accepted into the Program.

Students accepted into the program must complete a Bachelor's degree at the University of Massachusetts. Without the financial support offered by a scholarship most would be unable to attend the university and devote the time necessary to develop the skills needed to become public school teachers. All will spend at least three years at the university as full or part-time student.

During the academic year the Noyce Scholarship Program offers opportunities for the scholars to meet and discuss their experiences. Educational researchers and speakers are invited to the university to share their experiences and expertise with students.

Dinner Meetings

Two Noyce dinner meetings took place during this year, October 2006 and May 2007.

Eighteen students participating in the Noyce Scholarship Program attended these meetings and had opportunities to informally exchange ideas and experiences. All attendees spoke of their experiences, their hopes and expectations.

One student spoke of her experiences negotiating for a part-time position to teach biology in a Fitchburg Charter School. Each time the position was discussed the classes she was being hired to teach changed. She spoke of the differences when applying for a position in a charter school and a similar position in the city's public schools.

Another student working on his practicum at a Springfield high school would stay in the district if a biology position were available. He would like to remain in western Massachusetts but is looking elsewhere for a teaching position.

A graduating senior who taught at a Collaborative Program prior to becoming a Scholar, expects to work for at least a year, before attending graduate school full time. He interviewed at a Brockton H.S and is looking into a Boston teaching residency. He would like to teach inner city students and spoke of the challenges and rewards. Never having taught in a structured setting, he believes a guidance mentor will be helpful.

Another scholar, teaching 8th grade science at a middle school, is looking for an interdisciplinary position that includes community service. She is currently involved in a variety of educational-community projects at the Discovery Center in Turners Falls that focus on critical thinking skills. The participating students are keeping journals and answering questions about community service. She is also writing a grant with the Pioneer Valley Educational Collaborative for the River Culture Project.

An undergraduate student completing a BA in geology has applied for acceptance in the program. She has been active in many community-based organizations as a volunteer and expects to develop an activity based curriculum for the American Mineralogical Society. Currently she is working with middle and high school students with social deficits.

One of the students attending the dinner is a graduating senior who has completed parts of the STEP program. Although he is not a student teacher and will be working during the coming year, he is considering applying for a scholarship in 2007.

A Scholar who taught in a rural school spoke of her experiences teaching biology; of classroom lessons and of an outdoor focus on the environment. She enjoyed teaching and was excited by student interest as she introduced new ideas and pleased with the collegial atmosphere of the regional school. However, for personal reasons she is looking for a position in Connecticut. After reimbursing the program for her scholarship she will be taking home a salary commensurate with one she would receive in a western Massachusetts high needs district.

Another scholar with experience working in physical engineering found that relatively few schools in Western Massachusetts offer high school courses in either engineering or physics. He has been teaching math and general science to individual students and small groups. He plans to investigate positions where he can continue working with individuals and small groups of math and science students.

Scholars Perceptions

Scholars spoke of: Their experiences in schools, the time needed to prepare lessons, the assistance of teachers; and the struggles their students have at home and at school. Some scholars were initially hesitant going into high needs areas. Their perception was that students and families would not be invested in education and that financially limited schools and districts have limited resources. However, they said that their experiences reflect those of all teachers. They learned that many families in their districts are invested in education and that 'difficult students' respond well to individual or small group teaching.

Scholars had concerns and questions about their ability to develop curriculum and to locate the resources needed to increase their own knowledge. They asked about finding resources and curriculum on-line for their classrooms and to increase their own base of knowledge. Although the Springfield School District mapped out the curriculum to be covered, teachers develop their own lesson plans and have opportunities to be creative. MCAS testing and the integration of math into all subjects also emerged as areas of concern.

Related Issues

There was a general discussion of economic class and its effects on the quality of neighborhood schools, the courses schools offer and the job/career expectations of students and their families.

School choice can have the effect of further depressing the educational quality of high needs schools. It is not unusual for low performing schools to lose students with greater scholastic ability. The parents of these students are interested in education and often relatively affluent making it possible for them to provide the transportation needed for an out of district placement. Students in the low performing schools lose peer role models and the school loses advocates for change.

If equal educational opportunity is to become a reality, the state must provide all schools with the necessary funding to insure a recognized level of excellence. Teachers must be knowledgeable and prepared to teach in their subject area and all parents encouraged to become knowledgeable and responsive to their children's education. At this time, parents who are able to access schools of choice are generally more educated and affluent.

Evaluator Comments

Graduate and undergraduate students interested in public school teaching who are participating in the program expressed their satisfaction with the courses and opportunities offered. They are enthusiastic about the program, which provides a scholarship, the opportunity to attend the university and work toward a degree and a teaching credential.

The number of participants is not a reflection of the program but of the profession. Teacher preparation programs statewide are having similar difficulty attracting students. A 2006 survey of UMass math students revealed that many would consider teaching as a career if the pay scale provided the opportunity for a higher standard of living. Nevertheless, students who enroll complete the program and attain a credential.

Submitted by: Sylvia Cuomo
September 10, 2007

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September, 2008

The evaluation report follows:

The STEM Bridge for Noyce Scholars Program at UMass, Amherst
Year End Evaluation Report - September, 2008
Submitted by Holly R. Hargraves

The goals of the evaluation process are:

1. Evaluate the effectiveness of STEM Bridge in attracting, preparing, and retaining STEM individuals in teaching
2. Evaluate the effectiveness of Noyce Scholarship recipients as teachers
3. Provide formative information for the improvement of the STEM Bridge project
4. Track scholarship recipients during the period in which they are fulfilling their service obligation.

Goal 1

Evaluate the effectiveness of STEM Bridge in attracting, preparing, and retaining STEM individuals in teaching

Despite a rigorous advertising campaign, attracting individuals to the STEM Bridge program has been challenging. Most students initially heard about the scholarship, in class, from faculty, from advisors, or from other students; then learned more about the program on-line. The program website, <http://umassk12.net/bridge> provides information about the requirements, the application process, the benefits, contact information, and other details. Two bulletin board displays in the hallway of the STEM ED program in Hasbrouck Laboratory Building are attractive and inviting advertisements for the program for the many science and engineering students who walk by daily. Flyers and posters are

sent to community colleges, and information about the program is placed in the annual STEM ED Institute newsletter, which is given to all participants the various programs offered within the STEM community at UMass.

At issue with undergraduate recruitment includes the long term commitment required by the program. Not all juniors and seniors, twenty-somethings, want to sign contracts which obligate them to teach for two years in a high needs district; the requirement that they complete this within five years or 'repay the scholarship' might be another deterrent for a young person who has difficulty seeing past the next twelve months.

The existing Noyce Scholarship recipients agree that the greatest advantage the program offers are the scholarships which make it possible for them to attend school full-time.

The personal and professional support offered to Noyce Scholars is extensive. During the academic year the program offers opportunities for the scholars to meet and discuss their experiences. Many of the scholars are mentored by the professionals involved in the project who have an open-door policy when it comes to allowing them to drop by for advice, information, or just for a chat. They also receive numerous STEM related information via email and are often invited to a number of seminars, summer institutes, and lectures. They have access to much that is offered by the Science Teacher Education Program and the STEM Ed Institute on campus which further enhances and refines both their content knowledge and their teaching skills.

The two-year commitment to teaching in a high-needs districts has a few benefits. Retention of teachers is a subject often discussed, but this obligation mandates that new teachers remain on the job for two years, long after many have fled. Social and professional access to other newly hired teachers in STEM fields certainly provides a support system for the scholars.

Goal 2

Evaluate the effectiveness of Noyce Scholarship recipients as teachers

This goal has been difficult to accomplish. It involves the complicated process of tracking the scholars, who are all at different stages of the program, and making direct and formal contact with them during their student teaching and first and second-year teaching experiences. It would include observations and meetings with supervisors and follow-up visits. We will do some of this in the final year within our limited resources.

Goal 3

Provide formative information for the improvement of the STEM Bridge project

Two Noyce dinner meetings took place during this year, in November, 2007 and April, 2008 and served in part as focus groups for the program.

Eleven students participating in the Noyce Scholarship Program attended the fall dinner meeting held at the Panda East restaurant in downtown Amherst. STEM director Morton Sternheim, STEM Program Manager Marie Silver, newly-hired Evaluator Holly Hargraves, and Advisory Committee member Doris Clemmons also attended. Scholars shared information about their course work, their student teaching experiences, and made suggestions to one another regarding workshops, job opportunities, and other professional development opportunities.

The spring dinner, also held at Amherst's Panda East, was held on April 17, 2008 and was attended by eleven people, again including Mort Sternheim, Holly Hargraves, and Marie Silver. Also present were Advisory Committee member Bob Dickerman, from Springfield Technical Community College, John Francisco from the UMass Math Teacher Education Program, and Lead PI, Allan Feldman. One undergraduate, two Noyce Scholars who are now teaching, and two graduate students scholars attended. All expressed appreciation in receiving the scholarship. The undergraduate said that she learned about the program at a bulletin board at Holyoke Community College. When she read the flyer, she was pregnant, single, and broke. Without the scholarship, she would not have been able to further her education at the University of Massachusetts.

When asked what more could be done to support their endeavors, one suggested more dinners. Even though that suggestion was followed by laughter, he went on to say that he enjoyed being able to sit down in a casual atmosphere and just chat with like-minded emerging science teachers. Another said he really appreciated the email notices sent around by both Lead PI Feldman and Co-PI Sternheim regarding seminars, lectures, and other professional development opportunities. That led to discussion about summer courses for science teachers in the UMass STEM ED program.

The plan for the 2008-2009 school year - the final year of the program - will investigate the impact and effectiveness of the Noyce Scholarship program at the University of Massachusetts. Summative feedback will gather data about their respective career paths, and formative data will

document attitudes, plans for the future, beliefs about teaching, and the effectiveness of their preparation for teaching as it relates to the Noyce offerings.

Goal 4

Track scholarship recipients during the period in which they are fulfilling their service obligation.

An extensive database has been maintained rigorously to accomplish this goal. Because the Noyce Scholars are obligated to maintain contact with Program officials, they do respond to emails and phone calls sent with requests for updates on their status. In addition, scholars do tend to 'drop by' the various offices on campus, so that an informal tracking system is also in place.

September, 2009.

A compressive report by the evaluator, Holly Hargraves, is in an attached file.

Training and Development:

The current group of students are pursuing their STEM course work and student teaching with additional support from project faculty and each other.

They are able to focus on their goals since the scholarship enables them to have fewer outside commitments such as jobs.

October, 2006

The first cohort of scholars is now in the classroom. Details have been submitted in a separate report.

The STEM Education Institute has a variety of programs that are available to all STEM teachers in the area, and especially to new teachers. Some of the scholars have availed themselves of these opportunities, attending half day seminars on various science and engineering topics.

September 2007

One of our graduate student scholars, attended a 2 week NASA Earth Science workshop sponsored by our organization, STEM ED Institute.

A former scholar attended the national PI meeting in Washington D.C. this spring and wrote an article for our newsletter about the experience.

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September, 2008

Several present and past scholars attended one or more of our Saturday Science and Engineering Seminars during the year. Lindsey White (2007-8) attended our summer Nanotechnology Institute, and Wayne Kermenski (2006-2007) attended the Nanotechnology and IPY STEM Polar Connections Institutes. Wayne also had participated in 2006-2007 in our STEM RAYS afterschool science program. Feedback on these experiences was very positive. The scholars learned a lot and enjoyed the contact with experienced teachers.

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September, 2009

Joshua Copen, who completed his degree in May 2008, attended the NSF PI meeting in June. He also attended our Nanotechnology and IPY

STEM Connections summer institutes. He found all of these experiences very useful.

Wayne Kermenski, who graduated two years ago, participated again as a teacher in our STEM RAYS after school science program.

Outreach Activities:

Our outreach goal was to promote the Noyce scholarships as widely as possible and especially to non-traditional, minority, and low-income students. We used these methods of outreach:

1. Email messages to 2,375 UMass students who fit our criteria.
2. Email to advisors in Natural Sciences and Mathematics (NSM) at UMass.
3. Press releases to the almost 300 newspapers listed on this site: <http://nepa.org/Newspaper%20Directory/massachusetts.htm>
4. Online notices posted at related sites.
5. Bright green laminated signs posted in the 40 Pioneer Valley Transit Authority (PVRTA) buses serving our area.
6. Half-sheet handouts at the UMass departments' majors fair and the UMass Campus Center.
7. Three different types of signs that were posted throughout the UMass campus. UMass Housing Services posted signs on each of 400 dormitory floor bulletin boards.
8. STEM Ed Institute staff met with faculty members at area community colleges including Holyoke, Greenfield, and Springfield Technical Community Colleges.
9. STEM Ed Institute staff had meetings with UMass professional staff in the departments of University Without Walls (UWW), Admissions, and Committee for the Collegiate Education of Black and Other Minority Students (CCEBMS) to disseminate information about the Noyce Scholarships.
10. Sent information to all Massachusetts state community college transfer advisors about the Noyce Scholarships.
11. Our web site: <http://www.umassk12.net/bridge/>

October, 2006.

This past year we continued all the activities above. We have also attended majors and career fairs.

September, 2007

The School of Education has streamlined their advising program and now has a single point of contact that works initially with students interested in teaching. We educated this person about the scholarships and she is speaking of it to all students who come in to her office. We have seen a doubling in inquiries since then.

We visited the teaching science methods class of over 30 students to explain the scholarship and got several interested inquiries. This class is the entry level gateway for all students interested in teaching science at UMass.

We have also continued all previous recruiting efforts.

September 2008

We have described our extensive recruiting efforts in earlier reports, and they continued this past year. One welcome change was the

restructuring of advising in the School of Education noted in last year's report. As a result, more students are being made aware of the Noyce Scholarships and are making inquiries and applications. We are still getting inquiries now that our funds are gone.

September 2009

Since no funds remained, we did not have a recruiting effort this past year. However, we continue to get inquiries, even though our web site says that the program is ended. For a variety of reasons, we did not submit an application for renewed funding this year. We hope to be able to do this next spring.

Journal Publications

Books or Other One-time Publications

Web/Internet Site

URL(s):

<http://www.umassk12.net/bridge/>

Description:

It has information on these topics:

- Benefits, Requirements
- Application forms
- Contact Information
- People such as PI's, staff, and advisory board
- STEP Program and STEM Education Institute
- Examples of High Need Districts
- Licensure Requirements abd the School of Education

Other Specific Products

Contributions

Contributions within Discipline:

Not applicable to scholarship money distribution.

Contributions to Other Disciplines:

Not applicable to scholarship money distribution.

Contributions to Human Resource Development:

Not applicable to scholarship money distribution.

Contributions to Resources for Research and Education:

Not applicable to scholarship money distribution.

Contributions Beyond Science and Engineering:

Assisted math, science, and engineering students in becoming STEM middle and high school teachers.

Conference Proceedings

Categories for which nothing is reported:

Any Journal

Any Book Any
Product Any
Conference

The STEM Bridge for Noyce Scholars Program at UMass, Amherst
Year End Evaluation Report - September, 2009
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The goals of the evaluation process are:

1. Evaluate the effectiveness of STEM Bridge in attracting, preparing, and retaining STEM individuals in teaching
2. Evaluate the effectiveness of Noyce Scholarship recipients as teachers
3. Provide formative information for the improvement of the STEM Bridge project
4. Track scholarship recipients during the period in which they are fulfilling their service obligation.

Goal 1

Evaluate the effectiveness of STEM Bridge in attracting, preparing, and retaining STEM individuals in teaching

As the program was in its third and final year, there was no recruitment this year.

The personal and professional support offered to Noyce Scholars is extensive. During the academic year the program offered opportunities for the scholars to meet and discuss their experiences. They also received numerous STEM related announcements via email and were invited to a number of seminars and lectures. Several after-school sessions were offered to them: including "Structuring Classrooms for Success" on Dec 3, 2008 presented by UMass Prof. Bill Matthews; "Designing Professional Development to Support Discussion and Writing in the Inquiry-Based Elementary Science Classroom," presented by Jeffrey Winokur and Karen Worth, Center for Science Education, Education Development Center in Newton, MA; and "Engaging Stakeholders in Evaluating the Impacts of Climate Change: An Example from the Pacific Northwest" presented by Richard Palmer, Dept. of Civil and Environmental Engineering, University of Massachusetts.

They have had access to much that is offered by the Science Teacher Education Program at the University and at the STEM Ed Institute on campus which further enhances and refines both their content knowledge and their teaching skills. These programs included a series of Saturday Seminars, a STEM RAYS after-school program for middle school students in which several of the Scholars participated, and two STEM ED summer institutes at UMass, including Polar Connections (www.umask12.net/ipy) and Nanotechnology (www.umask12.net/nano)

Goal 2

Evaluate the effectiveness of Noyce Scholarship recipients as teachers

The plan for the 2008-2009 school year, the final year of the program, was to investigate the impact and effectiveness of the Noyce Scholarship program at the University of Massachusetts. In the spring of 2009, an effort was undertaken to compare results from student teaching evaluations to current professional evaluations of those scholars who had begun their teaching careers. The evaluation instrument (See Appendices, File A) was one that is used by the UMass School of Education Science Department. It has six sections, including:

Plans Curriculum and Instructions
Delivers Effective Instruction
Management Classroom Climate and Operation
Promotes Equity
Meets Professional Responsibility
NSTA/NCATE Indicators

In addition, both surveys had spaces for supervisor comments. The Student Teaching surveys included a comment section for the Cooperating Teacher and for the UMass Supervisor. The NOYCE Scholar Supervisor Survey had a Preliminary Comment section and a Final Comment Section.

Using the database maintained at UMass, the evaluator sent surveys to sixteen scholars who were known to be in their first or second year of teaching. The scholars were then to give the surveys to their respective supervisors. To ensure cooperation in completing the survey, supervisors were offered an incentive of a gift card from Barnes and Noble to be sent upon receipt of the completed surveys. Fifteen surveys were returned, with one scholar reluctantly reporting that she had yet to find employment in the teaching field.

Once the surveys were returned, the results were compiled and compared to the student teaching files. One compared the comment made by the supervisors of the scholars, and the other compared the summative evaluations. (See Appendices, File B and File C)

Summative evaluation results showed a slight decline in scores overall in four of the five sections. Analysis of this decline could be explained by the nurturing and protective attitudes of the cooperative teachers and University supervisors towards their students compared to the more “real world” attitude of the supervisors of the scholars in professional positions where the standards and expectations are appropriately higher. The weakest areas of the current teachers were from the “Promotes Equity” section, involving their understanding of cultural differences and their impact on learning (scores dropped from 1.9 to 1.4 on average) and their ability to help students understand American civic culture and its underlying ideas (scores dropped from 1.9 to 1.3 on average).

Formative evaluations overall showed expected and anticipated professional growth, and were generally very positive. Most scholars struggled some with classroom management, but were making gains in this area. Supervisors were impressed with the content knowledge of these teachers and were in some cases proud to be associated with them. “I can’t say enough about what an asset she has been to our team.” And “From the weaker student to the most gifted, he has found a way to challenge both levels in heterogeneous classes.”

A notable exception included the negative evaluation of one scholar as compared to the generally positive evaluations previously written by both the cooperating teacher and the UMass supervisor. This scholar is clearly struggling as a teacher. “... is a teacher with great, yet untapped, potential... [who has] experienced significant challenges this year as related to classroom management, teaching in a standards based environment, and collaborating with colleagues. His response to these challenges indicates a lack of enthusiasm and understanding of professional responsibilities.” This scholar’s negative evaluation was unique among the other fourteen scholars; it is unknown as to whether personal circumstances or other life events contributed to his respective decline.

Goal 3

Provide formative information for the improvement of the STEM Bridge project

Two Noyce dinner meetings took place during this year, December, 2008 and May, 2009 and served as focus groups for the program.

Eleven students participating in the Noyce Scholarship Program attended the December dinner meeting held at the Panda East restaurant in downtown Amherst. STEM director Morton Sternheim, STEM Program Manager Marie Silver, and Co PI Professor Allan Feldman also attended. Scholars shared information about their course work, their student teaching experiences, and made suggestions to one another regarding workshops, job opportunities, and other professional development opportunities.

The spring dinner, held at Bertucci's in Amherst was held on May 13, 2009 and was attended by eleven people, again including Mort Sternheim, Holly Hargraves, and Lead PI, Allan Feldman.

In the summer of 2009, a final survey was sent to all NOYCE Scholars for the purposes of obtaining updated contact information. Scholars were also asked:

How likely are you to continue your career in teaching?
How effective has the NOYCE/UMass training been in preparing you for a teaching career?

Preliminary results of this survey report that the 80% of the scholars are "very likely" to continue their career in teaching, and 80% state that their preparation for a teaching career was "very effective."

Comments on overall experience with the NOYCE Scholar Program included:

If it was not for the support from the Noyce Scholar Program, I may not be a teacher. It was the financial boost I needed in order for me to fulfill my student teaching experience.

The scholarship allowed me to reduce my tuition costs as well as was an incentive to work in a high-needs school district.

I would not have been able to complete my program without the financial support of the Noyce program. Thanks!

Goal 4

Track scholarship recipients during the period in which they are fulfilling their service obligation.

An extensive database was maintained of the ever-changing whereabouts of the Noyce Scholars as they shifted through their last years of college, their practicums, and their first teaching jobs. Scholars were required to provide the NOYCE administrators with up-to-date contact information.

APPENDIX

File A Supervisor Evaluation Form



STEM Bridge for Noyce Scholars



Dear Noyce Scholar Supervisor,

The STEM Bridge for Noyce Scholars program is currently seeking information on recipients of the Robert Noyce Scholarship Program who have completed educational course work and are currently teaching in a high needs district in the state of Massachusetts. The STEM Bridge for Noyce Scholars is funded by the National Science Foundation to encourage capable **Science, Technology, Engineering, and Mathematics** students to become teachers. Headed by faculty in mathematics, science, and education, it is a joint program of the Secondary Teacher Education Program and STEM Education Institute.

You have been identified as a supervisor of Noyce Scholar

(Name of scholar) _____

Attached is a teacher evaluation form we have developed using the Massachusetts Professional Standards for teachers and in meeting the thirteen NSTA Program standards.

We ask that you complete this form to assist us in the evaluation of our program. We know you are busy and we appreciate your taking the time to complete this form: *Therefore, upon receipt of the completed form, we will send you a gift card for \$50.00 to acknowledge your professional effort.*

Thank you for your interest in our program and in our endeavors to improve the teaching of STEM educators. This evaluation will assist us in making our final report to the National Science Foundation.

Please note: This evaluation will be held confidential and will only be used for the purpose of reporting data to the National Science Foundation on the Noyce Scholars Program.

Should you have questions, please contact me at:

NOYCE Project Evaluator, Holly Hargraves
194 No. Maple Street
Florence, MA 01062
Voice: 413-584-0785 Email: holly@hollyhargraves.com

Sincerely,

Holly Hargraves, Noyce Evaluator
CC. Allan Feldman, Morton Sternheim



STEM Bridge for Noyce Scholars



Follow-up Evaluation Form Directions

It is recommended that the Noyce Fellow and his or her supervisor fill out this form jointly.

Put a check mark in the appropriate box in the ratings table (Level 0 is unacceptable, Level 1 is acceptable, and Level 2 is target – See below for definitions and criteria for performance levels). In addition, please provide feedback in the comment section following the table. Note areas for which the Noyce Fellow has set goals, and areas which require improvement. (Use extra paper if necessary)

Levels of Performance

Target: The Noyce Fellow who performs at the target level demonstrates the level of expertise that is typically associated with a teacher in his or her first years. More specifically, the Noyce Fellow reflects a thorough understanding of the purpose of this standard, demonstrates an advanced level of skill in this area, and has built a strong foundation for further professional development. The Noyce Fellow's language is consistently appropriate to the developmental levels of the students and to the purpose of the lesson; the interaction between the Noyce Fellow and the students and among the students is consistently focused on developing a high level of critical thinking and is especially supportive of students' ideas; the classroom has been purposefully organized to facilitate learning and organization is clearly consistent with the objectives of the lesson; the Noyce Fellow is aware of and attentive to the students' level of engagement; in addition, Noyce Fellow explores responses to students' level of engagement. **(Rating = 2)**

Acceptable: The Noyce Fellow who performs at this level is successful in his or her teaching, but has not achieved the level of performance typically associated with a teacher in his or her first years. More specifically, the Noyce Fellow demonstrates reflects an initial understanding of the purpose of this standard, demonstrates early development of skill in this area, and has built a foundation for further professional development. The Noyce Fellow's language reflects an awareness of the developmental levels of the students and communicates the purpose of the lesson; the interaction between the Noyce Fellow and the students and among the students provides opportunity for critical thinking and is supportive of students' ideas; the classroom organization reflects some attention to facilitating learning and coincides with the purpose of the lesson; the Noyce Fellow is aware of and attentive to the students' level of engagement. **(Rating = 1)**

Unacceptable: The Noyce Fellow shows little evidence of understanding the purpose of this standard, and does not demonstrate development of skill or adequate performance in this area. The Noyce Fellow's language is neither appropriate to the age of the students or to the purpose of the lesson; the interaction between the Noyce Fellow and the students and among the students is not focused nor conducive to the purposes of the lesson; the organization of the classroom is random and not connected to the purposes of the lesson; the Noyce Fellow is neither aware of, nor attentive or responsive to the students' level of engagement with the lesson. **(Rating = 0)**



STEM Bridge for Noyce Scholars



Contact Information

Supervisor's Name: _____

Supervisor's Position: _____

Today's Date: _____

The following information is in regard to the Noyce Scholar:

Noyce Teacher _____

Grade Level(s) Taught _____

Subject(s) taught this year _____

Full Name of School _____

Administrator (Principal) _____

Please use this space for any preliminary comments on the Noyce Scholar, including any unusual circumstances he or she faced, his or her impact on students, etc. Anecdotal information is appropriate here.

Massachusetts Professional Standards for Teachers

A. Plans Curriculum and Instruction	0	1	2
1. Draws on content standards of the relevant Curriculum Frameworks to plan sequential units of study, individual lessons, and learning activities that make learning cumulative and advance students' level of content knowledge.			
2. Draws on results of formal and informal assessments as well as knowledge of human development to identify teaching strategies and learning activities appropriate to the specific discipline, age, level of English language proficiency, and range of cognitive levels being taught.			
3. Identifies appropriate reading materials, other resources, and writing activities for promoting further learning by the full range of students within the classroom.			
4. Identifies prerequisite skills, concepts, and vocabulary needed for the learning activities and design lessons that strengthen student reading and writing skills.			
5. Plans lessons with clear objectives and relevant measurable outcomes.			
6. Draws on resources from colleagues, families, and the community to enhance learning.			
7. Incorporates appropriate technology and media in lesson planning. Uses information in Individualized Education Programs (IEPs) to plan strategies for integrating students with disabilities into			
B. Delivers Effective Instruction	0	1	2
Communicates high standards and expectations when <u>beginning the lesson</u> : i. Makes learning objectives clear to students. ii. Communicates clearly in writing and speaking. iii. Finds engaging ways to begin a new unit of study or lesson. iv. Builds on students' prior knowledge and experience.			
Communicates high standards and expectations when <u>carrying out the lesson</u> : i. Uses a balanced approach to teaching skills and concepts of elementary reading and writing. ii. Employs a variety of content-based and content-oriented teaching techniques from more teacher-directed strategies such as direct instruction, practice, and Socratic dialogue, to less teacher-directed approaches such as discussion, problem solving, cooperative learning, and research projects (among others). iii. Demonstrates an adequate knowledge of and approach to the academic content of lessons. iv. Employs a variety of reading and writing strategies for addressing learning objectives. v. Uses questioning to stimulate thinking and encourages all students to respond. vi. Uses instructional technology appropriately.			
Communicates high standards and expectations when <u>extending and completing the lesson</u> : i. Assigns homework or practice that furthers student learning and checks it. ii. Provides regular and frequent feedback to students on their progress. iii. Provides many and varied opportunities for students to achieve competence.			

Communicates high standards and expectations when <u>evaluating student learning</u> : i. Accurately measures student achievement of, and progress toward, the learning objectives with a variety of formal and informal assessments, and uses results to plan further instruction. ii. Translates evaluations of student work into records that accurately convey the level of student achievement to students, parents or guardians, and school personnel.			
C. Management Classroom Climate and Operation	0	1	2
1. Creates an environment that is conducive to learning.			
2. Creates a <u>physical environment</u> appropriate to a range of learning activities.			
3. Maintains appropriate standards of behavior, mutual respect, and safety.			
4. Manages classroom routines and procedures without loss of significant instructional time.			
D. Promotes Equity	0	1	2
1. Encourages all students to believe that effort is a key to high achievement.			
2. Works to <u>promote achievement</u> by all students without exception.			
3. Assesses the significance of student differences in home experiences, background knowledge, learning skills, learning pace, and proficiency in the English language for learning the curriculum at hand and uses professional judgment to determine if instructional adjustments are necessary.			
4. Helps all students to understand American civic culture, its underlying ideals, founding political principles, and political institutions, and to see themselves as members of a local, state, national, and international civic community			
E. Meets Professional Responsibilities	0	1	2
Understands his or her legal and moral responsibilities.			
Conveys knowledge of and enthusiasm for his/her academic discipline to students.			
Maintains interest in current theory, research and developments in the academic discipline and exercises judgment in accepting findings as valid for application in classroom practice.			
Collaborates with colleagues to improve instruction, assessment, and student achievement.			
Works actively to involve parents in their child's academic activities and performance, and communicates clearly with them.			
Reflects critically upon his or her teaching experience, identifies areas for further professional development as part of a professional development plan that is linked to grade level, school, and district goals, and is receptive to suggestions for growth.			
Understands legal and ethical issues as they apply to responsible and acceptable use of the Internet and other resources.			

NSTA/NCATE Standards

(Standards are stated in terms of target level of performance)

Level 0 is unacceptable, Level 1 is acceptable, and Level 2 is target

Indicators	Rating		
	0	1	2
5. (a) The Noyce Fellow varies his/her teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding.			
5. (b) The Noyce Fellow successfully promotes the learning of science or mathematics by students with different abilities, needs, interests, and backgrounds.			
5. (c) The Noyce Fellow successfully organizes and engages students in collaborative learning using different student group learning strategies.			
5. (d) The Noyce Fellow successfully uses technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science or mathematics.			
5. (e) The Noyce Fellow understands and builds effectively upon the prior beliefs, knowledge, experiences, and interests of students.			
5. (f) The Noyce Fellow creates and maintains a psychologically and socially safe and supportive learning environment.			
8. (a) The Noyce Fellow uses multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students.			
8. (b) The Noyce Fellow uses the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process.			
8. (c) The Noyce Fellow uses the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work.			
10. (a) The Noyce Fellow engages actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements.			
10. (b) The Noyce Fellow reflects constantly upon his or her teaching and identify ways and means through which he or she may grow professionally.			
10. (c) The Noyce Fellow uses information from students, supervisors, colleagues and others to improve his or her teaching and facilitate his or her professional growth.			
10. (d) The Noyce Fellow interacts effectively with colleagues, parents, and students; mentor new colleagues; and fosters positive relationships with the community.			



STEM Bridge for Noyce Scholars



Please use this space to make any additional comments:

Again, this evaluation will be held confidential and will be used only for the purpose of reporting data to the National Science Foundation on the Noyce Scholars Program.

Upon receipt of your completed evaluation, we will send you a \$50 gift card as a way of expressing our appreciation of your time and effort in helping us with this Noyce Report. Please return this survey as soon as possible, or by **May 15th**.

Should you have questions, please contact me at:

NOYCE Project Evaluator, Holly Hargraves
194 No. Maple Street
Florence, MA 01062
Voice: 413-584-0785 Email: holly@hollyhargraves.com

Please send completed forms in the enclosed stamped and addressed envelope by **May 15th**.
Thanks again!

File C NOYCE SCHOLAR EVALUATION SUMMARY

Student Teaching Evaluation Comparison to Current Teaching Evaluation

<i>(Level 0 is unacceptable, Level 1 is acceptable, and Level 2 is target)</i>	Average Score Student Teaching	Average Score Currently Teaching
A. Plans Curriculum and Instruction		
1. Draws on content standards of the relevant Curriculum Frameworks to plan sequential units of study, individual lessons, and learning activities that make learning cumulative and advance students' level of content knowledge.	2.0	1.9
2. Draws on results of formal and informal assessments as well as knowledge of human development to identify teaching strategies and learning activities appropriate to the specific discipline, age, level of English language proficiency, and range of cognitive levels being taught.	1.8	1.7
3. Identifies appropriate reading materials, other resources, and writing activities for promoting further learning by the full range of students within the classroom.	1.8	1.6
4. Identifies prerequisite skills, concepts, and vocabulary needed for the learning activities and design lessons that strengthen student reading and writing skills.	2.0	1.8
5. Plans lessons with clear objectives and relevant measurable outcomes.	2.0	2.0
6. Draws on resources from colleagues, families, and the community to enhance learning.	2.0	1.7
7. Incorporates appropriate technology and media in lesson planning. Uses information in Individualized Education Programs (IEPs) to plan strategies for integrating students with disabilities into	1.9	1.9
B. Delivers Effective Instruction		
1. Communicates high standards and expectations when beginning the lesson: i. Makes learning objectives clear to students. ii. Communicates clearly in writing and speaking. iii. Finds engaging ways to begin a new unit of study or lesson. iv. Builds on students' prior knowledge and experience.	1.9	1.6
2. Communicates high standards and expectations when carrying out the lesson: i. Uses a balanced approach to teaching skills and concepts of elementary reading and writing. ii. Employs a variety of content-based and content-oriented teaching techniques from more teacher-directed strategies such as direct instruction, practice, and Socratic dialogue, to less teacher-directed approaches such as discussion, problem solving, cooperative learning, and research projects (among others). iii. Demonstrates an adequate knowledge of and approach to the academic content of lessons. iv. Employs a variety of reading and writing strategies for addressing learning objectives. v. Uses questioning to stimulate thinking and encourages all students to respond. vi. Uses instructional technology appropriately.	1.9	1.7

3. Communicates high standards and expectations when extending and completing the lesson: i. Assigns homework or practice that furthers student learning and checks it. ii. Provides regular and frequent feedback to students on their progress. iii. Provides many and varied opportunities for students to achieve competence.	2.0	1.7
4. Communicates high standards and expectations when evaluating student learning: i. Accurately measures student achievement of, and progress toward, the learning objectives with a variety of formal and informal assessments, and uses results to plan further instruction. ii. Translates evaluations of student work into records that accurately convey the level of student achievement to students, parents or guardians, and school personnel.	2.0	1.8
C. Management Classroom Climate and Operation		
1. Creates an environment that is conducive to learning.	1.9	1.8
2. Creates a physical environment appropriate to a range of learning activities.	2.0	1.8
3. Maintains appropriate standards of behavior, mutual respect, and safety.	1.9	1.7
4. Manages classroom routines and procedures without loss of significant instructional time.	1.8	1.6
D. Promotes Equity		
1. Encourages all students to believe that effort is a key to high achievement.	2.0	1.9
2. Works to promote achievement by all students without exception.	2.0	1.9
3. Assesses the significance of student differences in home experiences, background knowledge, learning skills, learning pace, and proficiency in the English language for learning the curriculum at hand and uses professional judgment to determine if instructional adjustments are necessary.	1.9	1.4
4. Helps all students to understand American civic culture, its underlying ideals, founding political principles, and political institutions, and to see themselves as members of a local, state, national, and international civic community	1.9	1.3
E. Meets Professional Responsibilities		
1. Understands his or her legal and moral responsibilities.	2.0	1.9
2. Conveys knowledge of and enthusiasm for his/her academic discipline to students.	2.0	1.7
3. Maintains interest in current theory, research and developments in the academic discipline and exercises judgment in accepting findings as valid for application in classroom practice.	1.9	1.7
4. Collaborates with colleagues to improve instruction, assessment, and student achievement.	2.0	1.8
5. Works actively to involve parents in their child's academic activities and performance, and communicates clearly with them.	1.7	1.7
6. Reflects critically upon his or her teaching experience, identifies areas for further professional development as part of a professional development plan that is linked to grade level, school, and district goals, and is receptive to suggestions for growth.	2.0	1.7

7. Understands legal and ethical issues as they apply to responsible and acceptable use of the Internet and other resources.	2.0	1.8
NSTA/NCATE Indicators		
5. (a) The Noyce Fellow varies his/her teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding.	1.9	1.6
5. (b) The Noyce Fellow successfully promotes the learning of science or mathematics by students with different abilities, needs, interests, and backgrounds.	1.9	1.9
5. (c) The Noyce Fellow successfully organizes and engages students in collaborative learning using different student group learning strategies.	1.9	1.7
5. (d) The Noyce Fellow successfully uses technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science or mathematics.	2.0	1.5
5. (e) The Noyce Fellow understands and builds effectively upon the prior beliefs, knowledge, experiences, and interests of students.	2.0	1.7
5. (f) The Noyce Fellow creates and maintains a psychologically and socially safe and supportive learning environment.	1.9	1.7
8. (a) The Noyce Fellow uses multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students.	1.8	1.6
8. (b) The Noyce Fellow uses the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process.	1.8	1.5
8. (c) The Noyce Fellow uses the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work.	1.9	1.4
10. (a) The Noyce Fellow engages actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements.	2.0	1.7
10. (b) The Noyce Fellow reflects constantly upon his or her teaching and identify ways and means through which he or she may grow professionally.	2.0	1.8
10. (c) The Noyce Fellow uses information from students, supervisors, colleagues and others to improve his or her teaching and facilitate his or her professional growth.	2.0	1.8
10. (d) The Noyce Fellow interacts effectively with colleagues, parents, and students; mentor new colleagues; and fosters positive relationships with the community.	1.8	1.7