Project Description:

(a.) Results of Relevant Prior Funding:
The PI, Robert Styer, participated in the Middle Atlantic Consortium for Mathematics and Its Applications Throughout the Curriculum project, a five year $5+ million NSF project [9552464] in which he developed a successful team-taught freshman physics and calculus course. This grant also provided numerous opportunities to interact with colleagues in science and engineering departments. The PI was the principal author of the Villanova University portion of the Mathematics and Science Partnership of Greater Philadelphia (MSPGP) grant, and currently serves as an MSPGP disciplinary faculty member, having received a teaching reduction to work with teachers in the Norristown Area School District (NASD).

Co-PI Victor Donnay is also a co-PI for the Mathematics and Science Partnership of Greater Philadelphia (MSPGP), a five year, $12.5 million, NSF-funded project 0314806 that aims to improve secondary math and science education. The MSPGP is a consortium of 13 Institutes of Higher Education (IHE) and 46 school districts with 1500 secondary teachers serving about 117,000 students. This semester, he supervised 10 MSPGP disciplinary faculty from 6 IHEs who worked with partner school districts. He is the PI for the $700,000 MSPGP subaward to Bryn Mawr and Haverford Colleges in which role he organized and facilitated a year long pedagogy seminar for 20 high school and college math/science faculty and a one day pedagogy workshop for 55 faculty from 6 of the MSPGP IHE’s. He has developed and taught a service learning course titled “Changing Pedagogies in Math and Science Education” to attract math and science majors into education. He has given presentations and written an article (see References) on these experiences.

Co-PIs Gennaro Maffia, Viorel Nitica, Barry Selinsky, and Susan White have had numerous research grants (see Biographical Sketches), and have supervised many graduate students.

(b.) Goals and Objectives:
The project leadership team will assign each Graduate Teaching Fellow (GTF) to support one of the K-12 math science initiatives (see section (c.) (6) below) being undertaken by the NASD. The GTF will be paired with a Disciplinary Faculty Adviser (DFA) and with a team of two classroom teachers (CTs). During the summer, the GTF and CTs will receive training from the MSPGP that supports the specific initiative they are involved with. Together with the DFA, they will also participate in workshops involving general issues of math science pedagogy and K-16 collaborations. During the school year, the GTF will assist their CTs in the classroom 10 hours a week, plus spend 5 hours per week in preparing for their classroom work, planning with their CTS, journaling, reading pedagogical literature, and attending workshops. They will send weekly journal reports to their DFA and meet with their DFA to discuss their activities. There will be monthly Saturday morning meetings for more intensive discussions, planning and reflection among participants.

Here are project goals for each group:
The Graduate Teaching Fellows (GTFs):
  1. provide GTFs with communication and teaching skills.
2. expose GTFs to a variety of alternative teaching styles.
3. promote the value of a K-12 teaching career.
4. promote their ability to translate research results into simpler levels appropriate for the general public, enhancing their eventual role as influential leaders and citizens.
5. provide GTFs with knowledge of the public school environment that will serve them when they become prominent leaders and citizens.

The Classroom Teachers (CT):
1. provide them with content resource persons.
2. provide them classroom resource assistants to support the new professional development tools the teachers will be gaining from their MSPGP connection.
3. build relationships with university faculty that will lead to future interactions.

The Classroom Students:
1. identify over time with a role model of a STEM professional.
2. learn about STEM careers from the GTF, and what course choices lead to STEM careers.
3. have additional content knowledge support in the classroom.
4. improve learning as a result of extra support for the professional development training of their teachers.

The Disciplinary Faculty Advisor (DFA) and faculty co-PIs:
1. provide opportunities to interact with and develop relationships with the public school community.
2. become familiar with exemplary teaching practices.
3. through reading the GTF journals, will gain insights into public education.
4. become a promoter of K-12 education as an intellectually respectable career choice.

The Schools-Universities:
1. build relationships between individuals at the public schools and at the universities that will result in future joint activities.

(c.) Project Plan
We will discuss the key project steps, outcomes, and institutions:
(1.) Recruiting the Graduate Teaching Fellows, disciplinary faculty advisors, and classroom teachers.
(2.) Initial training and clarifying expectations of GTFs, DFAs, and CTs.
(3.) Continuing training and supervision.
(4.) Assessment.
(5.) Outcomes from Previous K-16 activities.
(6.) Norristown Area School District’s Educational Reforms.
(7.) Description of IHE Partners.

We will note throughout the synergistic relationship between this Graduate Teaching Fellows in K-12 Education of Greater Philadelphia (GTFGP) proposal and the Mathematics and Sciences Partnership of Greater Philadelphia (MSPGP) project.

(1.) Recruiting is discussed in section (d.) below, and (4.) Assessment in section (f.) below.

(2.) Initial Training:
The GTFGP manager will recruit training experts, using the existing resources and contacts of the MSPGP staff, to provide five days of orientation and pedagogical training for the Graduate Teaching Fellows in the late summer (tentatively August 14-18 in 2006).

The first day of the workshop will focus on clarifying expectations and building relationships among the GTFs, DFAs, classroom teachers, and co-PIs. Each GTF, DFA, and team of classroom teachers will together develop a “memorandum of understanding” to clarify expectations. Our three page outline draft to guide these discussions is based on that used by the GK12 projects at St. Joseph’s University and at University of Pennsylvania, and the one used by co-PI Victor Donnay for the students in his Pedagogies class.

Earlier in the summer, each participant will receive a copy of How People Learn, published by the National Academy Press. The second and third days will explore pedagogical ideas using How People Learn as the springboard for discussion. The presence of both classroom teachers and disciplinary faculty members will give varied but definitely concrete illustrations of the pedagogical concepts, opening valuable discussions for the graduate students.

The final two days will concentrate on the graduate students. These sessions will provide the background needed so students can accompany the classroom teachers to the inquiry-based workshops sponsored by MSPGP. To expand the base laid at this workshop, the MSPGP education specialists will develop discipline-specific reading lists for the GTFs on basic educational strategies and materials. A timetable will accompany the reading list, to allocate the reading load throughout the academic year, approximately an hour per week of reading. The weekly GTF journal will reflect on these readings as well as on their experiences in the classroom.

(3.) Continuing Training and Supervision:

Our experience is that education pre-service majors have quite varied experiences in their student teaching, and many wish they had closer supervision. Given that the GTFs are not education specialists, they have an even greater need for close supervision. Supervision of each GTF is shared by the classroom teachers and the Disciplinary Faculty Advisor, which directly contributes to the goals of both the GTFGP program and the MSPGP program to build bridges between the K-12 and higher education communities. The program manager will also play a major role in supervising the GTFs.

Each GTF will chronicle his or her experiences via a written or email journal, to be submitted to the program manager and to the DFA weekly. Each DFA will read the GTF’s weekly reflective journal and respond to the student, in person and in writing. Copies of all correspondence go to the project manager. This journal allows the student to reflect critically on what he or she is experiencing, as well as providing valuable formative and summative evaluation material. As a formal part of the journal, the students would write a brief review of the assigned readings and their response. Materials the students develop for the classroom would also be submitted as part of the evaluation process. Each GTF will also give a short classroom presentation on their research to encourage students to consider STEM careers, and will use the journal to reflect on how they are influencing students.
The MSPGP has numerous workshops for disciplinary faculty as well as in-service training for teachers, and the graduate students would attend six to eight hours per semester of these MSPGP workshops that are related to the project they are undertaking. For example, if the GTF is supporting the implementation of the Math in Context (MIC) curriculum at the middle school, then she or he would attend MIC workshops during the year. The large number of available training opportunities provided by MSPGP could overwhelm the GTFs, so the project manager will be responsible to strategically advise the GTFs in consultation with the DFA and classroom teacher.

Once a month, the GTFs and classroom teachers will participate in a workshop directed by one math and one science presenter recruited from the MSPGP network. The co-PIs will attend one, and the DFAs will attend two of these meetings, building relationships with the classroom teachers as well as gaining the pedagogy training. The PI for this proposal has discussed the best timing for these workshops with teachers at Norristown, and they prefer Saturday mornings. Many of the teachers have childcare issues after school, so late afternoons are not good, evenings are busy with their children’s activities, and Saturday afternoons are filled with “soccer parent” duties.

Saturday Morning Workshop Schedule
8:00 am Administrative announcements.
8:10 GTFs and Teachers meet separately to discuss what is going well, what is not.
8:30 Entire group meets to discuss what is going well, what is not.
9:00 Group discusses pedagogy article from the GTF reading list.
9:45 Group splits into mathematics and science subgroups for discipline-specific pedagogical training.
10:45 am Fill out evaluation forms.

In the spring semester, each DFA will arrange for the GTF to give a talk to faculty and graduate students in their home department. In addition to assisting recruiting efforts for the following year, these talks disseminate the exemplary pedagogical tools the GTF has learned, and symbolically, the talk implies the value of K-12 education as a career choice.

Also, in May when the MSPGP holds its annual day long workshop on math and science pedagogy for IHE faculty, co-PI Donnay will organize a panel consisting of GTF, DFA and CTs to discuss the GTFGP project.

In early summer, the teachers, the disciplinary faculty, and the Fellows will meet with the project manager, the PI, and the project evaluator for both formative and summative evaluation. Later in the summer, the CTs and their GTFs will attend a summer workshop (average 30 hours) sponsored by the MSPGP related to the specific project they are implementing.

(5.) Outcomes from Previous Relationships:

As an indication of the outcomes that we expect to arise from this project, we present two vignettes arising out of earlier work undertaken by our GTFGP partners as part of the MSPGP.
The first recounts the experience of an undergraduate student in the "Changing Pedagogies in Math and Science Education" taught by co-PI Victor Donnay as part of the joint Bryn Mawr-Haverford Education Program. The goal of this service-learning course was to interest math and science majors in education by exposing them to the exciting new developments in math and science teaching (see article by Donnay in References). In addition to the classroom component of the course, students spent four hours per week observing and assisting teachers who are undertaking some sort of pedagogical change.

Julie S, a senior economics major and woman of color, had not taken any education courses before this course but was considering going into elementary education. She was placed with an elementary teacher in the Norristown Area School District. In her placement, Julie learned about the NSF supported Everyday Math curriculum and helped her teacher implement it by working with students one-on-one and in small groups. At the end of the semester, Julie's teacher remarked, "Having Julie for the past weeks was a great benefit for my students in terms of learning. Her excitement and spontaneity brought the same to the students. I feel extremely fortunate to have had Julie placed in my room!" After graduation, Julie contacted Professor Donnay to get advice about getting certified in secondary school mathematics and going on for a Masters in Education. She commented, "This class is what made me even more sure of my decision to pursue a career in teaching math." In fall 2005, Donnay will again teach his Changing Pedagogies course and is working with co-PIs Mitchell and Loewenstern to arrange placements for his undergraduate students in Norristown schools.

A second example arose from a very successful year-long pedagogy seminar for math and science faculty from Bryn Mawr, Haverford, and four high schools in the MSPG. Among the participants were co-PI Dr. Susan White (Bryn Mawr Chemistry), and Norristown high school teachers Mr. Carl Rieffanaugh (Math) and Mr. Max Geisler (Biology). Victor Donnay organized and facilitated this monthly seminar, with discussions sparked by readings from the books *How People Learn* and *Assessment for Learning* which culminated in the participants’ trying out new pedagogical strategies involving Formative Assessment in their classrooms.

The participants then reported on their initiatives at the May 2005 MSPGP pedagogy workshop that was attended by 55 faculty from six of the IHEs in the MSPGP. Rieffanaugh was a speaker on a panel of high school teachers that described the challenges they face teaching in the secondary school environment. As an outgrowth of this seminar, Rieffanaugh and Haverford mathematics professor Dr. Joshua Sabloff have arranged to partner in spring 2006 for a service learning course on mathematics education. Sabloff’s Haverford and Bryn Mawr students will make weekly visits to work with the students in Rieffanaugh’s geometry class.

As another outgrowth of the seminar, Geisler has become a leading proponent of Formative Assessment at Norristown High School and is receiving additional training at a three day series of workshops led by Dylan Wiliam and organized by the MSPGP. The seminar participants were so energized by the experience that they plan to continue running the seminar next year. A lesson learned from the seminar is that college and high school educators face similar pedagogical challenges, have much to learn from each other, and enjoy working together in a collaborative setting.
(6.) Norristown Area School District’s Educational Reforms:

The Norristown Area School District serves over 6800 students, about 50.2% black, 10% Hispanic, 2.1% Asian, and 37.7% white. About 51.7% are from “economically disadvantaged” families, 6.1% are English language learners, and 16.6% have disabilities. The district is improving its reading and mathematics proficiencies, though they are still below state levels (see supplementary data document from http://www.schoolmatters.com for more details).

The Norristown Area School District (NASD) has a number of recent or pending initiatives to improve student learning:

a.) Small Learning Communities in the high school starting Fall 2005.
b.) block scheduling in the high school starting Fall 2005.
c.) phasing in the Math In Context at the curriculum in the middle schools and the Everyday Math curriculum in the elementary schools (to be completed in 2006-2007).
d.) planning to introduce hands-on science kits in the elementary and middle schools by 2007.
e.) implementing Professional Learning Communities among the teachers.
f.) special education math and science support.
g.) new middle school gifted child mathematics program.
h.) moving the fifth grade students to the middle school buildings.

These exciting initiatives provide many opportunities for GTF involvement. A Fellow can support the new engineering technology team projects or the health sciences labs, work in elementary and middle school classrooms to support teachers who are learning the new math and science curricula, work with the special education teachers who will especially appreciate support to fulfill NCLB expectations in math and science, or work with the new gifted child math program.

With so many new initiatives underway, it is not clear at this point which initiatives can benefit most from GTF support. The Project Coordination Team will determine which projects the GTFs should focus on, relying heavily on the input of co-PIs Vivian Loewenstern (NASD Mathematics Supervisor) and Arthur Mitchell (NASD Science Supervisor).

a.) Small Learning Communities (SLCs)

Beginning this fall, NASD will implement Small Learning Communities, working with “First Things First”, a national educational initiative. SLCs strengthen the relationships among students and adults and reduce class size. Groups of students stay with the same teachers and staff for longer periods during the day and for multiple years. Two of the high school’s six SLCs will have a STEM theme: health sciences, and engineering technologies (based on Project Lead the Way guidelines). Dr. Charles Nippert, chemical engineering professor at Widener University and an MSPGP disciplinary faculty, has discussed designing the upper level courses and the team projects that will be offered to the engineering technology community students starting in Fall 2006. We will recruit engineering Graduate Teaching Fellows to assist with these new courses and the engineering team projects.
As Norristown finalizes the scheduling for Fall 2005, problems have arisen with the distribution of science teachers over the six learning communities, for instance, how will the single teacher certified in physics be able to serve students in all six diverse communities? The Graduate Teaching Fellows will offer support to the stretched science teachers during the adjustment.

b.) Block Scheduling
Concurrent with the new learning communities, the Norristown high school will introduce “AB” block scheduling. Via block scheduling, the NASD administration explicitly aims to encourage more active learning techniques. The MSPGP offers over 60 summer workshops in mathematics and science, emphasizing concrete ways to introduce active learning into the classroom. The teacher stipends of this GK12 program will encourage a greater number of NASD teachers to attend the summer workshops and to improve their use of active learning. The GTF will attend such workshops with their CTs and help support the CTs as they work to implement these new approaches in their classroom. It is one thing to learn about a new technique at a summer workshop but quite another to actually implement it in the classroom. The support the GTF provides will be crucial in helping teachers get comfortable using these new methods into their classrooms.

c.) Math in Context (MIC)
Last year, NASD introduced the Math In Context curriculum into the sixth grade, with the MSPGP providing in-service workshops for the teachers on using MIC. By Fall 2006, MIC will be used in all the middle school grades. Some teachers have mentioned that they would welcome a mathematics Graduate Teaching Fellow to assist with the new group work and interactive exercises. The elementary schools began phasing in the Everyday Mathematics two years ago, and those teachers also welcome GTF assistance as they learn the new interactive curriculum.

d.) Elementary and Middle School Hands-On Science
Last year, the state published science standards, added science to the state standardized assessment (PSSAs), and very soon is expected to publish concrete anchors in science education. Anticipating this heightened level of testing for science proficiency, NASD plans to implement more hands-on science learning at the elementary and middle school levels via research based pedagogical tools such as the FOSS Toolkits. Again, the elementary and middle school teachers would welcome a graduate student to assist them in the classroom as they learn these new hands-on experimental science tools.

e.) Professional Learning Communities
Yet another new development in Norristown this fall will be Professional Learning Communities in each school. The teachers’ union argued that they had no say in professional development, so the administration worked with the union to form Professional Learning Communities in each school. Starting this fall, a lead teacher in each school will coordinate ways for teachers to assist each other in best teaching practices. Our proposal is consonant with this new structure. Each Graduate Teaching Fellow will work with a team of at least two teachers, enhancing teachers’ cooperation on professional development issues.

f.) Special Education
With the No Child Left Behind act, school districts must pay close attention to the unique needs of the special education students. This spring, the PI has worked with Norristown middle school special education teachers to prepare them for the middle school mathematics praxis exam. Beginning this fall, middle school teachers must pass the new middle school content area praxis exams. The special education teachers are in a particular bind: they teach every subject, and hence must pass all the middle school praxis content areas, including mathematics. The mathematics supervisor (Co-Pi Vivian Loewenstein) and the PI are using these praxis review sessions to emphasize the role of non-algorithmic problem solving approaches and multiple mathematical representations. The special education teachers have told the PI that they would welcome a GTF to assist with the new non-algorithmic exploratory math and science lessons.

g.) Gifted Students
Another district need is appropriate mathematics for elementary and middle school gifted students. The district is currently designing a mathematics curriculum for gifted students, centered on the Math Olympiads For Elementary and Middle Schools (MOEMS) program, using the excellent book by George Lechner, Creative Problem Solving in School Mathematics. Although the MOEMS program will be the heart of the curriculum, the advertised name of the course is “Puzzles, Puzzles, Puzzles.” About half of the gifted math curriculum will utilize various puzzles that emphasize ideas from topology (rope tricks), number theory (speed math and card tricks), combinatorics (domino puzzles and Nim-type puzzles), and logic puzzles.

The PI is very familiar with MOEMS, having taught the MOEMS program for five years (because his children are in it). He is now working with Norristown elementary and middle school teachers to prepare them for this challenging contest. The district looks forward to using Graduate Teaching Fellows to assist with the gifted program in Fall 2006.

h.) Fifth Grade Students Moving to Middle Schools
In Fall 2006, the district will move the fifth grades from the elementary school buildings to the middle school buildings. This will move teachers around and probably create new needs for GTF support in the elementary schools. Currently, two elementary schools lack a genuinely mathophilic teacher, but the reorganization could mean other elementary schools lose math-loving teachers.

(7.) Background for Institute of Higher Education Partners:

Four of the thirteen IHE partners in the MSPGP have STEM graduate programs: Bryn Mawr College, Villanova University, West Chester University, and Widener University.

- Bryn Mawr College---Chemistry, Mathematics, Physics.
- Villanova University—Applied Statistics, Biology, Chemistry, Computer Science, Mathematics; Chemical, Civil, Electrical, Mechanical Engineering.
- Widener University---Chemical, Civil, Electrical, Mechanical Engineering.

These four universities enroll 450 graduate students in the math and science programs, and 200 more in engineering. Our graduate deans have a strong interest in recruiting excellent full-time graduate students, and see this project as a natural fit to their current programs and the institutional commitments to quality education.
Bryn Mawr College was founded in 1885 to give women access to educational opportunities that had long been denied them, including the first Ph.D. programs at a women's college. Bryn Mawr's undergraduate college has a student body of about 1,200 women who hail from 49 U.S. states and 63 foreign countries; almost a quarter of its students are women of color. The physics department is often second or third in the country for the number of female physics graduates. Bryn Mawr has Ph.D. programs in the STEM fields of chemistry, mathematics, and physics. Co-PI Victor Donnay is a co-PI on the MSPGP grant and also former chairperson of the Mathematics Department, while co-PI Susan White is chairperson of the Chemistry Department.

Founded in 1842 by the friars of the Order of St. Augustine, Villanova is a comprehensive Roman Catholic institution that welcomes students of all faiths. The University offers a wide variety of degree programs through four colleges: the College of Liberal Arts and Sciences, the College of Commerce and Finance, the College of Engineering, and the College of Nursing. A medium-sized comprehensive university, Villanova has over 6000 undergraduates and about 400 graduate students. It offers Masters programs in the STEM fields of: Applied Statistics, Biology, Chemistry, Computer Science, and Mathematics; Chemical, Civil, Electrical, and Mechanical Engineering; plus an interdisciplinary Ph.D. in Engineering. PI Robert Styer co-administrates the Villanova portion of the MSPGP grant, as well as serving as an MSPGP disciplinary faculty member working with the Norristown Area School District. He is former chairperson of the Mathematical Sciences Department. Co-PI Barry Selinsky is current chairperson of the Chemistry Department.

West Chester University, the second largest of the 14 institutions of higher learning that compose the State System of Higher Education of the Commonwealth of Pennsylvania is a comprehensive and multipurpose university. Total enrollment at West Chester includes over 10,500 undergraduate students and about 2,000 graduate students, about 13% minorities. West Chester University was West Chester Teachers College until 1983, and still is the leading area provider of public educators. In the last four years, NASD has hosted 91 West Chester University student teachers, and has hired several of its graduates. West Chester University has several STEM Masters’ programs: Applied Statistics, Biology, Computer Science, and Mathematics. Co-PI Viorel Nitica is very active in the West Chester graduate Mathematics program, and has enjoyed NSF funding to pursue his research in dynamical systems, ergodic theory, and functional analysis.

Founded in 1821, Widener University is a multcampus, independent, metropolitan university located southwest of Philadelphia. It enrolls over 6000 students, with more than half of these in its professional graduate programs. Widener University’s School of Engineering has Masters programs in the Departments of Chemical, Civil, Electrical, and Mechanical Engineering. Co-PI Gennaro (Jerry) Maffia is chairperson of the Chemical Engineering Department, is a Lindback Award winner, and has worked with the Widener Engineering Summer Camp, local science fairs, Junior Achievement, and other activities aimed at young students.

(d.) Recruiting Graduate Teaching Fellows, Disciplinary Faculty Advisors, and Classroom Teachers:
We will provide 27 student-years of fellowships. Each year we will recruit 9 Fellows. Because NASD is in the midst of several big changes (the new Small Learning Communities, block scheduling, phasing in the MIC middle school math program, new elementary hands-on science programs, new professional development communities, new gifted children programs, etc.), we need to maintain maximum flexibility on how we place the GTFs. But we expect most GTF placements to be in middle schools, with about half of the GTFs from math and half from science and engineering. We expect to impact 15-20 distinct graduate students and disciplinary faculty, and more than double that number of K-12 teachers and classrooms.

The distribution of the GTFs among the four IHEs and among the various disciplines will of course depend on the strength of the applicants as well as the immediate needs of the school district. But our philosophy is to broaden the impact of the grant, hence we will strive to maximize geographic breadth by ensuring that each IHE has roughly the same number of students and disciplinary faculty involved (about two each year from each IHE). This promotes more extensive networks of relationships among the IHE partners. Similarly, we want to impact a maximum number of departments, so we will strive to choose GTFs from distinct disciplines, to the extent that this coincides with the needs of the school district and the quality of the graduate applicants.

The GTFGP manager will coordinate posting of web pages linked to each university’s graduate school web site that advertise the program, as well as coordinate advertising in the education section of the Philadelphia Inquirer. A brochure explaining the GTFGP program would go to all applicants of math and science graduate programs at the four IHEs. To increase the base of applicants, we will specifically encourage STEM undergraduates from the 13 partner IHEs of the MSPGP to apply to the math, science, and engineering graduate programs at our four colleges. One of the MSPGP partners is Lincoln University, the nation’s oldest HBCU. The PI will personally visit Lincoln University to recruit potential graduate students from there.

The graduate chairperson for each STEM program at Bryn Mawr, Villanova, West Chester, and Widener will be invited to nominate one or more candidates for the Graduate Teaching Fellowships. The Project Coordination Team reviews the nominations, conducts phone or personal interviews, selects the Fellows, and then notifies the appropriate graduate office. Contingent upon final approval by the university’s graduate program, the Graduate Teaching Fellows position is offered to the successful applicant. Since the universities and departments have varying deadlines, the committee would in effect use a rolling admissions policy.

Each Graduate Teaching Fellow will have a Disciplinary Faculty Advisor. Some of these faculty already might be involved with the MSPGP activities, in which case we would negotiate with the MSPGP to realign the faculty activities, usually by helping to pay a portion of their course release time. As a rule, however, we will choose interested faculty who are not yet heavily involved in MSPGP activities, to increase the base of disciplinary faculty who are interacting with the K-12 system. The MSPGP disciplinary faculty time commitment is rather large, and funding limits the number of faculty members that can participate. The GTFGP project will allow active research faculty to participate without the large time commitment that the MSPGP disciplinary faculty are expected to invest.
Each Disciplinary Faculty Advisor will read the GTF’s weekly reflective journal and respond to it as well as discuss it with the student. Each DFA will be required to attend three days of the summer workshop and at least two of the monthly Saturday morning workshops, partly to be exposed to exemplary learning models, and partly to build relationships with the classroom teachers. The MSPGP will also provide a modest stipend to any DFA who chooses to attend an MSPGP workshop. The DFAs will be the long-term bridges between the public school and university communities.

The Norristown co-PIs (Dr. Rogers, Assistant Superintendent, Vivian Loewenstern, Mathematics Supervisor, and Arthur Mitchell, Science Supervisor), will recruit teams of classroom teachers to host each GTF. They expect that the offer of a content specialist to help in the classroom, of extra professional development, and the generous stipends, will attract the interest of many of their teachers.

(e.) **Organization and Management:**

Many of our organizational themes come out of the “GK-12 Nuggets” and “Advice and Suggestions for GK-12 Projects” posted by the NSF. For instance, the Nuggets recommend hiring a full time project manager with teaching experience, beginning the project with a summer workshop, clearly defining expectations in writing, and using journals.

The PI is responsible for the broad oversight and adherence to the goals of the program. He is assisted by the Project Coordination Team, consisting of:

Norristown Assistant Superintendent Clifford Rogers,
Norristown Mathematics Supervisor Vivian Loewenstern,
Norristown Science Supervisor Arthur Mitchell,
Bryn Mawr mathematician Victor Donnay,
Bryn Mawr chemistry chair Susan White,
Villanova chemistry chair Barry Selinsky,
West Chester mathematician Viorel Nitica,
Widener chemical engineering chair Jerry Maffia.

Note that five of the six college members of the Project Coordination Team are current or former departmental chairpersons.

The Project Coordination Team has these responsibilities:

1.) hire the Project Manager, in consultation with the MSPGP.
2.) provide on-campus liaisons with their graduate program directors and deans.
3.) review all applications and determine the recipients of Graduate Teaching Fellowship awards.
4.) assist the Project Manager to locate Disciplinary Faculty Advisors or teams of classroom teachers.
5.) determine the project assignments for the GTFs.
6.) review the evaluation reports and approve the yearly NSF reports.

The Project Coordination team will meet once in the fall semester to review progress, have extensive phone and email conferencing in the spring, plus at least two physical meetings to
review GTF applications, and an end-of-the year evaluation meeting. They also attend the first day of the August workshop and at least one Saturday morning workshop.

The daily administrative work will devolve to the Project Manager, who will potentially be a teacher retiring from one of the MSPGP partner school districts. The project manager will coordinate recruiting of the classroom teachers and the disciplinary faculty advisors. The manager will organize the August training workshop with help from the MSPGP staff as well as assisting the GTFs to attend appropriate MSPGP workshops and in-service trainings during the school year and the summer. The project manager will receive and read the GTF journals and the DFA responses to the journals, organize the Saturday morning workshops, and the end of year evaluation meetings. The manager will coordinate the recruiting process and the advertising with the graduate offices, as well as soliciting minority candidates from the MSPGP IHE partners, with an onsite visit to IHE partner Lincoln University, the nation’s oldest HBCU. The PI works with the project manager to draft the yearly NSF report who submits it to the Project Coordination Team for approval, with a copy going to the MSPGP staff. The PI also oversees dissemination, which is greatly enhanced by the fact that the MSPGP and GTFGP activities are closely aligned so that dissemination of one will often include the other.

Sustainability is a key feature of the GTFGP. At the school district level, the projects the GTFs undertake are all part of the district’s systemic change plans. Thus, the work that the GTFs do to support the implementation of new curriculum and pedagogies and increased teacher content knowledge will pay dividends to the district for many years to come. For the graduate programs, we expect that the contacts the IHE faculty members make with the school teachers will lead to future interactions, although we cannot predict the exact effect of these connections. One of the organizing principles of the GTFGP is “planned serendipity”: as our participants interact with one another, unexpected but valuable activities will occur. An example of such planned serendipity is the partnership that has developed between Norristown math teacher Rieffanaugh and Haverford mathematics professor Sabloff.

At the institutional level, the GTFGP program will provide for interaction between the IHEs and NASD that will strengthen connections with other parts of the IHEs and Norristown. Indeed we will be actively working to encourage such extensions. Bryn Mawr’s relationship with Norristown is illustrative of the possibilities for evolving and expanding institutional relationships. Several years ago, under the leadership of members of the School of Social Work, the Community Service Office and the Service Learning Office, Bryn Mawr began building a focused relationship with the Norristown community, as represented by the Norristown Interagency Council, which has resulted in the formation of a joint college – community group called Community Partnership in Action. It was these efforts that led Co-Pi Donnay to place some students from his Changing Pedagogies course in the Norristown schools, which in turn was a contributing factor in the choice of Norristown as the school district partner for the GTFGP. A School of Social Work intern helps coordinate a program sponsored by the NASD, local businesses and churches, “Count Down the Days to the PSSAs” in which community members, including now Bryn Mawr and Villanova undergraduates, tutor students in preparation for the state PSSA tests. The Bryn Mawr Community Service Office runs an America Counts program in which students can receive their federal work-study money for tutoring elementary school children in math. Members of the Project Coordination Team will keep in contact with the
community service programs at the IHEs, as well as the Community Partnership group and look for ongoing ways to build synergies between our respective projects.

(f.) Evaluation Plan:

Research for Better Schools (RBS) engages in evaluation projects with multiple organizations throughout the Mid-Atlantic region of Delaware, the District of Columbia, Maryland, New Jersey, and Pennsylvania. The evaluation team at RBS combines expertise in qualitative and quantitative methods to evaluate all aspects of K-16 education. In particular, RBS is the principal evaluator for the MSPGP project, and can leverage its existing MSPGP database to strengthen the GTFGP project evaluation.

RBS has expertise in large and small-scale evaluations, survey design and development, document review and analysis, personal and group interviewing, focus groups, on-site observations, and student achievement (e.g., standardized and portfolio) analysis. RBS provides prompt and clear feedback to clients in a variety of formats such as written reports, oral presentations, and debriefing sessions with stakeholders. All services are tailored to the needs of the client and provided in partnership with the client to assure that the evaluation results are relevant and useful.

The evaluation of the Graduate Teaching Fellows in K-12 Education in Greater Philadelphia project will address the goals for each of the five categories of stakeholders: the graduate teaching fellows, the classroom teachers, the classroom students, the disciplinary faculty advisors, and the schools and universities. The data collection will focus on the measurement of the project’s processes and outcomes (see the three page table in the Supplementary Documents Section).

Evaluation activities will commence in August 2006 with the development and revision of instruments. Each objective will be measured by qualitative and/or quantitative methods. The collection of the data will take place continuously beginning in September 2006. The RBS evaluators, Dia Sekayi and Jill Feldman, in accordance with the project’s goals and objectives, will design and/or revise all evaluation tools and conduct the evaluation.

Data will be gathered across the five aforementioned categories of stakeholders. A mixed methodology approach will guide the collection of the data. Methods of qualitative analysis will include document review (of journals and activity logs), observations (of teachers and graduate teaching fellows, in the classroom), and interviews (of teachers and disciplinary faculty advisors). The primary source of quantitative data will be the surveys of GTFs, disciplinary advisors, students, and teachers. The evaluation team will begin by utilizing or adapting surveys that have been created for similar GK12 programs. Original instruments will be developed as needed.

Each objective will be measured by qualitative and/or quantitative methods. Qualitative data management software will be used to manage the textual data. These data will be analyzed using methods of open and axial coding (Strauss, 1990). The quantitative data will be entered into
SPSS. Descriptive statistics will be used, as the sample size will be inappropriate for inferential statistics.

Both written and oral reporting have been factored into the evaluation process. Early on, the project PI will be involved in the approval process for each of the instruments. Near the conclusion of the project, the evaluator will meet with the PI to debrief the report. The evaluator will be available throughout the project to provide informal feedback.

A mixed-methods approach to the collection of evaluation data should ensure a thorough analysis of the project activities (Russ-Eft and Preskill, 2001). Both process and outcome data will be measured across all phases of project.

Graduate Teaching Fellows Guided Journal / Activity Log Structure:
1. Date and brief description of the day’s class topics.
2. Brief description of your classroom activities on this day.
3. The successful and unsuccessful aspects of the day’s activities.
4. Specific materials you developed.
5. Reflections on what you are learning about communication and teaching skills.
7. Summary of assigned reading.
9. Questions or comments for the disciplinary faculty advisor or project manager.

(g.) Faculty Participants
Victor Donnay, Bryn Mawr College, Mathematics.
Susan White, Bryn Mawr College, Chemistry.
Barry Selinsky, Villanova University, Chemistry.
Robert Styer, Villanova University, Mathematical Sciences.
Viorel Nitica, West Chester University, Mathematics.
Jerry Maffia, Widener University, Chemical Engineering.

plus Disciplinary Faculty Advisors recruited from these four institutions.

(h.) School District Involvement
The administration of the Norristown Area School District has been very active in the MSPGP grant, and are very supportive of this GTFGP proposal. Assistant Superintendent Dr. Clifford Rogers is a co-PI on this proposal, along with the mathematics supervisor, co-PI Vivian Loewenstern, and the science supervisor, co-PI Arthur Mitchell.

Graduate Teaching Fellows in K-12 Education of Greater Philadelphia timetable

Mid Fall 2005: prepare recruiting brochure, create web links on graduate school web pages to GTFGP recruiting information, canvas MSPGP partners for minority senior STEM majors, mail recruiting brochures to minority STEM students, visit Lincoln University to recruit.

Late Fall 2005 and Early Spring 2006: Procure nominations for GTFs from graduate program directors, collect and distribute applications to Project Coordination Team, interview promising applicants, award first round of Graduate Teaching Fellowships.
Spring 2006: Hire Project Manager, assess Norristown school district needs, locate appropriate classroom placements, locate DFAs, enroll participating classroom teachers in MSPGP summer workshops. Attend NSF GK12 meeting.

Summer 2006: Teachers take MSPGP workshops, project manager works with MSPGP staff to choose August workshop presenters, arrange August workshop facilities and program, hold summer workshop, assessment team gathers baseline data from project participants.

Fall 2006: Assessment team gathers baseline data from classrooms. Project Manager sets up monthly Saturday workshops in consultation with MSPGP staff. Update and print recruiting brochures, canvas MSPGP partners for minority senior STEM majors, mail recruiting brochures, visit Lincoln University to recruit, prepare year-end report for NSF.

Late Fall 2006 and Early Spring 2007: Procure nominations for GTFs from graduate program directors, collect and distribute applications to Project Coordination Team, interview promising applicants, award second round of Graduate Teaching Fellowships.

Spring 2007: Project Manager sets up monthly Saturday workshops, attend NSF GK12 meeting.

Late Spring 2007: Reassess school district needs, locate new classroom placements if appropriate, locate DFAs, enroll classroom teachers in MSPGP summer workshops.

Summer 2007: Assessment team meets with all persons, Teachers and continuing GTFs take MSPGP workshops, project manager works with MSPGP staff to choose August workshop presenters, arrange August workshop facilities and program, hold August workshop.

Fall 2007: Assessment team gathers baseline data from classrooms. Project Manager arranges Saturday workshops. Update and print recruiting brochures, canvas MSPGP partners for minority senior STEM majors, mail recruiting brochures, visit Lincoln University to recruit, prepare year-end report for NSF.

Late Fall 2007 and Early Spring 2008: Procure nominations for GTFs from graduate program directors, collect and distribute applications to Project Coordination Team, interview promising applicants, award third round of Graduate Teaching Fellowships.

Spring 2008: Project Manager sets up Saturday workshops. Attend NSF GK12 meeting.

Late Spring 2008: Reassess school district needs, locate new classroom placements if appropriate, locate DFAs, enroll classroom teachers in MSPGP summer workshops.

Summer 2008: Assessment team meets with all persons, Teachers take MSPGP workshops, work with MSPGP staff to choose August workshop presenters, arrange August workshop facilities and program, hold August workshop.

Fall 2008-Spring 2009: Assessment team gathers baseline data from classrooms. Project Manager sets up monthly Saturday workshops, prepare year-end report for NSF.

Late Spring 2009: Assessment meeting with all persons, write final NSF report.