

## **2014-2017 NPS Programs Proposed for Funding:**

### **Environmental Initiatives and Sustainability**

#### **Innovation Lab (High Schools)**

Newton's Innovation Lab is an initiative for NPS students and faculty who are passionate about the integration of art, design, science, mathematics, engineering, digital media, and technology. This rewarding and rigorous program allows students the opportunity to engage in independent research and project-based learning as they develop skills in engineering, electronics, computer programming, data visualization, digital art/media, and design thinking. Students and faculty acquire valuable expertise in an integrated, hands-on environment designed to foster curiosity, creativity, and entrepreneurial skills. Utilizing the established resources from Greengineering (NN), Global/Sustainability Studies (NS), the Library Learning Commons model (developing at both high schools), students will apply their skills to complex, ill-defined problems in a real-world context while partnering with industry and universities to help students and faculty forge long-term relationships with professionals in a variety of fields.

This multifaceted pedagogical approach will offer NPS faculty unprecedented professional learning opportunities and will allow students the chance to examine issues from integrated perspectives, synthesize knowledge from disparate fields, and devise their own innovative solutions to global and local problems. NSF innovation funding will support faculty with the resources and training needed to facilitate this program at both NN and NS. Our faculty will work with Stanford University's famed design school and the Henry Ford Learning Institute on establishing the skills and instructional resources necessary for student success.

### **STEM (Science, Technology, Engineering and Math)**

#### **Bio Builder Curriculum (High Schools)**

BioBuilder is a cutting edge, SyntheticBio curriculum designed by Newton resident and MIT Professor Natalie Kuldell. BioBuilder empowers students to tackle real-world problems including biofuels, safer foods, anti-malarial drugs, less toxic cancer treatment and biodegradable adhesives. BioBuilder's curricula and teacher training capitalize on students' need to know, to explore and to be part of solving real world problems. Developed by an award winning team from MIT, BioBuilder is taught in schools across the country and supported by top leaders in the STEM community. The BioBuilding Professional Development Workshops impact teachers' understanding of biology and their approach to teaching. A mixture of classroom, laboratory and design activities provide a professional development experience that is both accessible and inspiring. For two years, Newton North Biology teacher Andy Dannenberg has been working with BioBuilders and using their curriculum within her class. Newton North High School has an amazing resource in their partnership with Professor Kuldell and are committed to do more work

with the Newton Public Schools, potentially leading to the development of an iGEM team (essentially the bioengineering version of LigerBots and FIRST Robotics). Funding from NSF will allow BioBuilders to add additional teachers and expand the program at North and South.

### **Renovation of the NSHS Greenhouse (Newton South)**

The greenhouse supports the learning of South students engaged in the ecology units of our biology courses, including all 11th grade biology courses, AP Biology, and the new elective Conservation and Environmental Biology. It also supports the work of the new Sustainability Fellows program, which has just recently been launched at South, and the new Sustainable Agriculture elective that will be coming on line in Fall 2014. In order to increase its functionality, the greenhouse needs a small renovation that would address some mechanical issues and to increase its storage capacity with tiered planters. Funds from NSF would pay for this renovation.

### **Equipment to support a revamped Biotechnology course (Newton South)**

Biotechnology is all around us. It seems almost nightly that on the news reports of breakthrough drugs, treatments or discoveries in science have been found that will have an impact on how we live. STEM and NGSS are leading the next wave of science education and encouraging exploration and independent discovery. Massachusetts is a leading area for biotechnology research and the demand for individuals with biotechnology research skills and knowledge is high. Offering Biotechnology at NSHS demonstrates NPS's commitment to being on the forefront of education in Massachusetts. Our recent collaboration with HHMI and Harvard receiving a Bruce Amgen grant to become a reagent partner with Harvard highlights our commitment to our students and their learning. With scientific process skills, independent research skills and learning cutting edge biotechnology theory and techniques, students from the biotechnology elective will have a foot up in continuing their education in science. As a school system, we need to support this type of learning by providing the basic equipment to learn and refine biotechnology techniques. Micropipettes are the most basic tool in biotechnology. We have a small amount of micropipettes. However, in order to expand our program, we need enough for all students who are enrolled in the class. The funds from NSF would allow us to buy more pipettes.

### **Musical Staircase (Newton North)**

The Honors Engineering 3 class at Newton North High School is conducting a yearlong project to build a functional musical staircase, similar to the one at the Museum of Science. When completed, each one of the 24 steps will play a specific note when stepped on, creating the range of exactly 3 musical octaves. In order to accomplish this, there will be one light sensor on one side of each step and a laser sensor on the other. When someone walks on the step, it will break the laser beam and a note will be played. NSF funding will allow the students to purchase lasers, wiring, and speakers.

## **Arts & Literacy**

### **Newton Content Reading Initiative (Middle and High Schools)**

Patterned after an initiative in Brookline, Newton schools want to implement the Content Reading Initiative (CRI). The goal of this initiative is to provide all Newton students, both struggling and proficient readers, with opportunities to improve their capacity for independent comprehension and communication by incorporating literacy instruction into all disciplines' content. The Content Reading Initiative provides intensive professional development to content teachers so that they, in turn, become more effective at teaching the gateway skills of content literacy. CRI also allows students who struggle with reading to have greater success in content courses, which require of them both generic and specialized reading skills. Even strong readers will benefit from more explicit and effective instruction in making sense of the specialized literature of our academic disciplines. NSF funding will help to launch this program by providing the needed professional development to teachers.

### **Summer Writing Institute K-5**

Fostering a love of writing and improving writing instruction for all students are priorities in Newton's elementary schools. For students to write well and to become capable and confident writers they need expert instruction.

As part of this effort, NPS will hold its Second Annual Writing Institute in Summer 2014. Following the National Writing Project model, the institute will develop teachers as leaders, support teachers as writers, and provide teachers with the kinds of experiences that lead to becoming expert teachers of writing. Using a team-based learning model, participants will read and explore the curriculum, analyze the goals and content of each unit, and examine the trajectory of lessons as well as the structure and components of individual lessons. Currently, teachers in every elementary school have implemented units of study in narrative and opinion writing. This summer, institute participants will plan for the successful implementation of two new units: information and research writing. In addition, teachers will bring their knowledge and perspective gained at the institute to the planning of professional development for the upcoming year.

The goal of this work is to build a sustainable model for continuously improving writing instruction so that all students are able to communicate their stories and ideas effectively. This promises to be a lively, engaging, thoughtful experience. Funding will be used to support the instructors for the institute and provide stipends for teacher participants.

## **Closing the Achievement Gap**

### **Pre-Season (High Schools)**

As we continue to encourage minority and low-income students to enroll in upper level classes at both high schools, we are increasingly interested in creating a pre-season for students. Similar to a pre-season for sports, this program allows students to prepare for the upcoming academic year. This model, used in a number of surrounding communities, gives students an opportunity to preview curriculum, learn organizational and study skills, and develop a cohort of students working to push themselves academically. Our plan for summer 2014 is to offer a two-day pre-season at both high schools for targeted students. NSF funding will allow teachers to develop the curriculum for this pre-season initiative, provide stipends to teachers to teach the pre-season, and provide funds to purchase materials for the program.

## **Social & Emotional Learning**

### **Responsive Classroom Training (Elementary Schools)**

The Responsive Classroom approach is a nationally used, research-and evidence-based way of teaching that improves students' social and academic skills and raises teachers' instructional quality. Developed by classroom teachers in 1981 and continually refined to meet schools' needs, the approach consists of practical strategies for helping children build academic and social-emotional competencies day in and day out. In urban, suburban and rural settings nationwide, educators using these strategies report increases student engagement, academic gains, and fewer discipline problems. Over the past several summers, a significant number of Newton elementary teachers have been trained in the Responsive Classroom approach. However, NPS has not been able to accommodate the demand for additional training. NSF funding will enable additional teachers to participate in this sought-after professional development program.

## **Additional Initiatives**

### **Mass Nine for the 9th: Hearts and Hands Rebuilding Hopes and Dreams (CVTE) (High Schools)**

Mass Nine for the 9th is a Career and Vocational Technical Education (CVTE) Community Service initiative that has been developed through the Newton Public Schools Innovation Lab. The goal is to collaborate with carpentry programs in nine vocational schools throughout Massachusetts to work on the same home in New Orleans for nine successive weeks. Work will include the renovation of the home in order for the family to move back in within the nine-week timeframe. This fosters our "Curriculum of Caring". So far the students and staff from Newton Public Schools have contributed over 1200 hours of skilled volunteer carpentry labor. In 2014, 22 students will bring their skills to New Orleans, and for the first time, we have another school joining us - Blue Hills Regional Vocational Technical High School, who is sending eight students and their carpentry teacher. As this initiative moves forward the intention is to seek ways to become more sustainable. We want to expand our ability to raise funds as we try to

build a *skilled student volunteer system* with other vocational schools across the Commonwealth. NSF funds will help us realize our goal to expand this program to six additional CVTE schools in Massachusetts.

### **Expansion of Culinary Arts Program at Newton South**

While Newton North has a long established Culinary Arts Program, Newton South now has a growing foods program with a significant amount of student interest. The interest in food is exemplified by the development of a garden, which is used in the program. South has also developed a strong relationship with the Newton Community Garden. The school now has the desire to offer an Exploratory in Culinary Arts; however the students need to be able to learn how to prepare food using commercial equipment.

While NPS has purchased some commercial equipment over the last couple of years, a hybrid commercial kitchen will give South students greater opportunities for foundational skills in culinary. We will need an architect to design the hybrid space and plan the construction. Newton Community Education is interested in such a space and would be willing to help with some of the cost.

### **Middle School Professional Development Initiatives**

As principals and coordinators plan for 2014-15, our common purpose remains the same - to improve student learning in middle schools. Our collaborative professional development work in the recent past has included Making Thinking Visible, promoting higher-order thinking skills, developing common assessments, and improving teachers' repertoire of strategies to engage students in learning.

In planning for the 2014-2015 school year, we note that many teachers who have taken our core course Studying Skillful Teaching (SST) have a broader range of strategies for instruction and assessment and are extremely positive about their experience. Our professional development program for 2014-2015 will build on the strong foundation of SST for a yearlong course - Extending the Study of Skillful Teaching. Working with Research for Better Teaching (RBT), the provider of the SST course, we will train a cadre of willing SST graduates this summer to be “teaching assistants” and mentors to their colleagues. They will serve as resources and guides to their building and department peers as together they implement the strategies and skills that improve student learning by improving instruction.