# Abstract

Brooklyn College Fellows are working in five different high schools in Brooklyn, New York. While the ongoing projects at each of these schools are unique, they emphasize the communication of science, technology and math skills to high school students in the urban environment. In general, the projects utilize a 'city-as-lab' focus, whereby projects are designed to help students better understand important factors regarding their own communities. The Fellows' purpose within these schools is to help teach young minds to think scientifically about issues of interest. Each group of Fellows and teachers aid their students in identifying empirical questions and designing experimental approaches to address these issues. Students then work towards the collection, representation and analysis of data. The communication of student work is also of great importance to our program, as past groups have given oral presentations to their fellow classmates and community. For instance, our groups in Brownsville and East Flatbush study air quality by examining asthma rates and estimating the levels of NO<sub>2</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub> and particulate matter. Presentation of this research promotes air quality awareness in the school communities. Students in Flatbush track nutrient loading into an urban fresh-water lake using a relational database and GIS technology. Working in small groups, students collect and test water samples. Then, as a class, they analyze and interpret the data. A living environment class in East Flatbush is investigating food sources which adds to the knowledge on possible causes of the high rates of diabetes. In Bushwick, the students are becoming tree stewards by adopting trees in their neighborhood. They study the health of the trees and present their findings by creating interactive online maps of their data. With mentors around the city, Prospect Heights students are working on research skills and developing projects such as investigating factors affecting the intensity of Atlantic basin hurricanes and soil characteristics associated with the migration of invasive plants.

### **Benefits to Fellows**

The "City as Lab" project at Brooklyn College has benefitted the Fellows in all of the areas of our project's goals: improvement in communication skills, application of effective STEM pedagogy, increased proficiency in leadership and team building, and mastery of various forms of technology. For example, in the area of communication, Fellows have developed posters and oral presentations on the project and in the development of educational materials to be used in the classroom. They also attended a grant writing seminar offered by a professional consultant and have started to assist project staff on writing follow-on proposals for the project. As the poster documents, the Fellows have been instrumental in implementing place-based, inquiry learning projects that involve students and their teachers in activities that supplement the NYS science standards. In the classrooms where they are working, the Fellows have learned the importance of structuring presentations to capture and maintain the interest of very demanding and distractible high school students. Fellows have worked side by side on teams with other Fellows, with high school principals, teachers, and staff and with high school students, taking a leading role in the STEM activities that the project is introducing to our partner schools. In some cases, they have also partnered with community organizations to spread the results of the projects more broadly. Fellows have also improved their mentoring skills as they bring the excitement of science to a diverse high school population. Finally, although many were already highly computer-literate, all the Fellows have become comfortable with the use of GIS software to map and analyze data, as well as becoming expert at helping under-resourced schools use computers and networks more effectively.

## **Brooklyn Academy of Science and the Environment (BASE)**



Using the resources of Brooklyn Botanic Garden and Prospect Park, the BASE Science Research Program is designed to engage high-school sophomores, juniors and seniors in scientifically relevant research with topic-relevant mentors. During the first year of the program, sophomores participate in a variety of projects designed to provide fundamental research skills and expose them to a range of topics and methodologies. This year, the GK12 Fellows introduced technologies such as GPS and GIS that were used by students to map data for a Prospect Park earthworm study and as part of a unit on forensic science, where students created crime maps for their local precincts and analyzed patterns of incidents based on NYPD statistics. The junior and senior years of the research program focus on developing their chosen study through in class research skills training and after-school mentorship. Along with BBG staff, Fellows are working to map the growth trends of several invasive plant species found in the Tri-State area and explore factors affecting the intensity of Atlantic basin hurricanes.

## Science, Technology and Research HS (STAR)



# http://bridges.sci.brooklyn.cuny.edu/cal/

Students in Living Environment and Chemistry classes are carrying out experiments measuring nutrient loading into Prospect Lake, an artificial water system in Prospect Park. Currently, these classes are sampling and mapping lead concentrations in tap water throughout Brooklyn. In the spring, these students will also be working on a geospatial survey of the tree health in the park, as well as other in-class projects. GIS technology is incorporated into all of these activities.



#### Fellows

Valerie Andrewlevich Vinn Campese Michael Grinshtein Marek Marcinkiewicz Matthew Meyer Natasha Nadler Katherine Nutter-Upham Janina Scarlet Suzanne Tamang Maxim Titley

## Coordinator Michelle O'Dea

Teachers Julius Buh-Mbi Calvin Byers Susannah Ceraldi Amy Defelice Michael Duggan Conrad Reyes Adam Schwartz Carmen Simon Katherine Soverall Marcus Watson



Based in Bushwick of Brooklyn, New York, the Academy of Urban Planning helps students develop and apply leadership skills while achieving academic success. The Academy's urban planning, theme-based curriculum draws students out of the classroom and into their communities to develop skills that will move them toward higher education and professional careers. With New York City as a laboratory, students tap into their innate curiosity for the world around them.

#### **Urban Forest Study:**

- Students adopt a tree in their neighborhood and collect data and make observations about the tree throughout the year.
- Students map data using GIS and use this information to form questions about the urban forest
- Students write hypotheses, design experiments and analyze results to deepen their understanding of the urban forest.

## The Academy of Urban Planning HS (AUP)





#### **Project Summary (School Level):**

Teachers Preparatory School in Brownsville, Brooklyn is dedicated to preparing tomorrow's educational leaders. This is the second year that Teachers Preparatory School has taken part in the Brooklyn College NSF-GK12 program. All materials purchased as well as labs and lesson plans created through the GK12 program are designed to be reused year after year. The goal is the creation of a "science track" education curriculum within T.P. based on longitudinal science projects conducted by students.

#### **2008-2009 Project Theme (Air Quality):**

This year students at the school are studying neighborhood air quality. Following a series of introductory lectures and skill-building workshops, students are conducting experiments using data gathered in their own neighborhood. Collectively, the projects examine and attempt to quantify the pollution sources, pollutants and effects of air pollution in and around their school. The projects are also designed to give back to the community by promoting air quality awareness in Brownsville.

#### F CHU St V

Two regents' classes from ITAVA have been applying the formal methods of scientific inquiry to several studies that affect their community. The Living Environment class has embarked on experiments investigating how food sources and food choices affect the health of residents in the East Flatbush area of New York. For example the Caribbean food project is comparing the nutritional value and average meal size before and after immigration to Brooklyn and exploring how availability of traditional foods may affect this situation. Students in both classes have learned how to use GPS devices and Google maps to enable a geospatial component to their research. Students also learn Excel and PowerPoint to facilitate in the collection, analysis and presentation of data.





Marine Park Golf Course

Mill Creek

Brooklyn College of the City University of New York, is the home base for the GK12 "City-As-Lab" project. Many of the GK12 Fellows teach and conduct research on campus, and college facilities including advanced computer labs are available to the participating schools.



**Canopy Condition vs Tree Pit Size** 

## **Teachers Preparatory HS (TP)**





It Takes a Village Academy (ITAVA)



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