

The GK-12 program at UNCG is funded by the National Science Foundation to partner graduate student Fellows from three departmental graduate programs (Biology, Chemistry and Biochemistry, and Geography) with teachers and students at three Guilford County Schools: Montlieu (elementary), Welborn Academy of Science and Technology (middle), and Andrews High School. All three schools are located in High Point, NC, and their campuses are in close proximity. Fellows, teachers, and students form discovery teams to scientifically investigate the biological, chemical, physical, health-related, and socioeconomic effects of changing land use patterns in the region. (NSF award: DGE 0947982)

Fellows and their partnering teachers work on three primary tasks:

1. the development and delivery of inquiry-based lesson plans,
2. greater quality and quantity of differentiated instruction, and
3. the creation of school-based teams to teach others science concepts and methods.

Fellows learn to communicate research to a wide variety of audiences, develop lesson plans, develop leadership skills, enhance their teaching capability, and engage in research activities with students. Teachers integrate new research into their teaching and learning and take part in professional development on inquiry-based science instruction and working with diverse student groups. K-12 students become engaged in new forms of science learning and research and are exposed to a variety of STEM careers.



## GK-12: GRADUATE STEM FELLOWS IN K-12 EDUCATION

**ADDRESSING THE PIPELINE.** The National Science Foundation developed the GK-12 program recognizing that, in addition to being competent researchers, STEM graduate students must be able to communicate science and research to a variety of audiences. As the graduate students bring their cutting-edge research and practice into the K-12 classroom, they gain skills that enable them to explain science to people of all ages, ranging from students to teachers. The graduate students also inspire transformation in the K-12 formal and informal learning environments and stimulate interest in science and engineering among students and teachers. NSF understands that STEM graduate students can contribute to the national effort to advance scientific knowledge through partnerships with K-12 communities.

UNCG's GK-12 program is funded for 5 years by a \$2.8 million grant from the National Science Foundation. Each year, 9 graduate STEM Fellows from UNCG work as resident scientists in local public schools. Their goal is to bring more hands-on science learning into the classroom and hopefully generate a new wave of scientists.

Within the walls of his lab at UNCG, Keivan Etefagh, a 2012 GK-12 Fellow and PhD candidate in medicinal biochemistry, studies natural substances like goldenseal. He hopes to lay the groundwork for new antibiotics that can fight drug-resistant bacteria like MRSA. But two days a week, Keivan becomes Mr. E, inspiring fifth-graders to embrace science. "Having to explain complex things at a fifth-grade level has taught me a lot," he says, flashing a shy smile. "I mean, I can explain to my family what I do now."

They have adopted the 2.5-mile greenway that runs behind all three schools as part of a hands-on environmental project. Picking up trash; planting trees, bushes and flowers; developing a butterfly garden; and studying water and soil quality have become part of their routine. Erica's fifth-graders have taken the project to heart, spending time outdoors on the greenway, arranging for a greenhouse facility paid for by GK-12, and writing letters to High Point Parks and Recreation officials. The kids even made a rap video about the greenway.

"There's a lot of service-learning involved," Keivan says. "We're really trying to reach out to the community and build something that will be sustainable throughout the year. It's so uplifting. We're seeing direct results, really making a difference in people's lives." GK-12 is designed to work with the standard public school science curriculum. For fifth-graders, that curriculum means studying how living things interact with their

environment, land forms, erosion, etc. *Read the rest of the story at [http://www.uncg.edu/ure/alumni\\_magazineT2/2011\\_spring/feature\\_tappinginto.htm](http://www.uncg.edu/ure/alumni_magazineT2/2011_spring/feature_tappinginto.htm) to learn more about the GK-12 resident scientists.*

GK-12 Teacher Christal MacLamroc and Resident Scientist and biology master's candidate Freddy Herrera, recently led their 7th grade class at Welborn Academy of Science & Technology through a dissection of a sheep heart. Building off of the standard curriculum, MacLamroc and Herrera hinted at the dissection for weeks, focusing on DNA, genes, anatomy, and physiology - with the capstone was actually getting to dissect a real sheep's heart. Students started by massaging the heart muscle to loosen it up, and everybody got to make a cut. They learned how blood moves from one chamber to another and the differences between oxygen rich and oxygen poor blood.

"When I first stepped into the classroom and was introduced as a scientist, I looked at the students and could tell they weren't looking forward to it." Said Herrera. "They thought science equated to memorizing definitions and taking difficult tests. We work with teachers to help reframe science to be cool - using a heart rather than just talking about it is so much cooler. They're really excited and want to learn. Now they really understand."

"If I give them a book, they can see the picture, but to be able to manipulate cutting open a heart and seeing it truly for themselves gives them the opportunity to retain that and explain it to their families," said MacLamroc. "I want to expose the kids to as much as possible and give them options for their future."

Kathy Melious, an 11th and 12th grade chemistry teacher at Andrews High School, has been working with the GK-12 program since it's inception, and she's been tracking her students' progress. "From 2006-2010, only 22% of my students went on to pursue a STEM major in college." Melious said. "From 2010-2012, and since my students started working with the GK-12 STEM Fellows, the number of students pursuing STEM majors has increased to 68%."

Since the project's inception in 2010, the GK-12 project has reached over 900 2-12th graders. 27 public school teachers have received professional development and assistance in building out an inquiry-based curriculum, and 27 graduate STEM fellows from UNCG have learned how to communicate their research interests to a broader audience.

Learn more by watching the GK-12 program's intro video at <http://www.youtube.com/watch?v=kk0GZ5uX7W4>.



WATCH THE GCS NEWS BREAK AT [HTTP://SCHOOLCENTER.GCSNC.COM/EDUCATION/COMPONENTS/SCRAPBOOK/DEFAULT.PHP?SECTIONDETAILID=366114](http://SCHOOLCENTER.GCSNC.COM/EDUCATION/COMPONENTS/SCRAPBOOK/DEFAULT.PHP?SECTIONDETAILID=366114)

### PROJECT WEBSITE

<http://www.uncg.edu/bio/gk12>

### IMPACT AREAS

Career and professional competencies; Children, youth, and family (non-school related); Education: higher education; Education: K-12; Environment and sustainability; STEM education; Student success

### MAIN PURPOSES OF THE PROJECT

Public service; Teaching/student learning activity

### FORMS OF STUDENT INVOLVEMENT

Fellowship; Graduate research

### FORMS OF ACTIVITIES:

Education; Educational resource or program; Public events; Service project

### ORGANIZATIONAL COLLABORATORS

Guilford County Schools



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