MOVING TOWARD SUSTAINABILITY

Summer Research Experiences for Teachers

RET-PLUS

Northeastern University

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www.stem.neu.edu

Building Sustainable Education Outreach Programs

"Scientists and engineers working in partnerships with local teachers represent an essential new force that will be required for effective science education reform... But to be effective, we scientists must first be willing to be educated about the opportunities and problems in our schools. This means that we must approach this problem with a humility that reflects how little most of us really understand about how children learn, as well as our respect for the tremendous energy, devotion, and skill required to be a successful K-12 teacher in today's schools."

Bruce Alberts, Former President, National Academy of Sciences

"RISING ABOVE THE GATHERING STORM"

Program efforts, informed by research….

What actions should federal policy makers take to enhance the science and technology enterprise so the United States can successfully compete in the global community of the 21st century?

TEN THOUSAND TEACHERS, TEN MILLION MINDS

Increase America's talent pool by vastly improving K-12 mathematics and science education.

Recommendations For Teachers

- Summer Institutes
- Science and mathematics master's programs
- AP and pre-AP training
- K-12 curriculum materials modeled on world-class standards

Recommendations for Students

- Statewide specialty math/science high schools
- Inquiry-based learning
- Summer internships and research opportunities

CRITICAL COMPONENTS TO SUPPORTING AN EDUCATION OUTREACH PROGRAM

Leadership committed to education outreach

Diversified Funding (NSF (dedicated programs and "Broader Impacts" Career Awards, DHS, Corporate and Foundation Support)

Recognition for faculty, students and teachers engaged in program activities

Relationships funding and support to sustain long term relationships between and with program participants, faculty and staff and school and district partners.

Critical to the success of the K-12 enterprise …. Value added for all partners…. Students, teachers, university faculty and industry

For Teachers…

- ***Deepen content knowledge***
- Develop ***leadership and innovation skills***.
- Expand teacher's knowledge of ***STEM pathways*** for their students

For the University….

- Increase ***faculty awareness*** of K-12 pipeline
- Support the university's educational mission for its students through ***experiential learning opportunities*** on campus and in partner schools.

For Both…

- ***Broader Impacts… introduce cutting edge research into the classroom***
- ***Institutionalize these changes*** so that the partnership's structure and work will be valued and sustained.

Launched in 2001 in collaboration with the Gordon Center for Sub-Surface Sensing and Imaging (CenSSIS), the NU RET program now supports up to twenty teachers and/or Community College Faculty annually.

GOALS OF NU-RET PROGRAM AT NU

- Implement a comprehensive RET program that includes engineering research and supporting professional development.
  - *Minimum of six weeks in a research setting*
  - *Long term follow-up and support for program participants*

- Develop curriculum material as an effective professional development strategy and integrate research experiences into classroom instruction.

  - Process and product – not a curriculum development project

- Build and support a STEM K-16 community: a dynamic partnership between secondary teachers, undergraduate and graduate STEM students, higher education faculty and private industry.

  - Relationships, Relationships…..

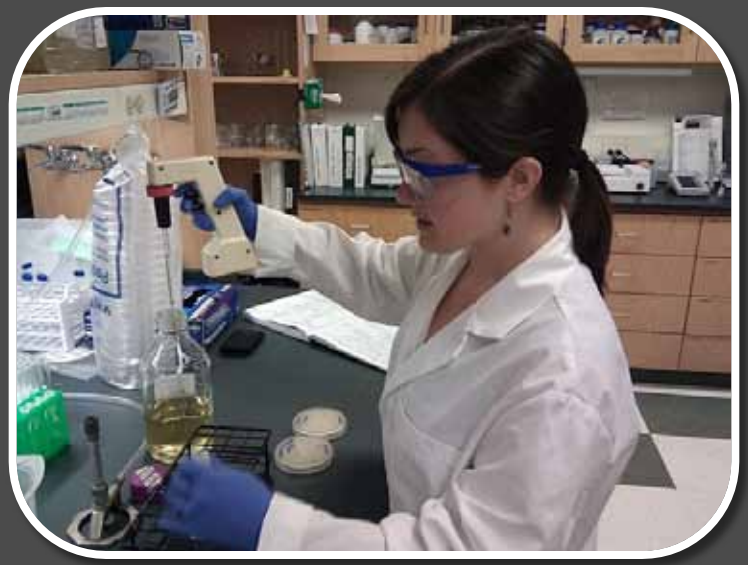
RET-PLUS NORTHEASTERN UNIVERSITY

- 108 teachers to date have spent their summers conducting research at Northeastern University.

- Over 7000 students

- 32 public school districts, seven community colleges

- spanning six states



FROM LABORATORY TO THE CLASSROOM

"Students need hands-on experience, and they need real-world connections, We want students engaged and taking part in anything that has to do with learning. They have to feel like they're a part of it, like they have a way to express themselves and have some control over it." RET provided me the skills to make this a reality.

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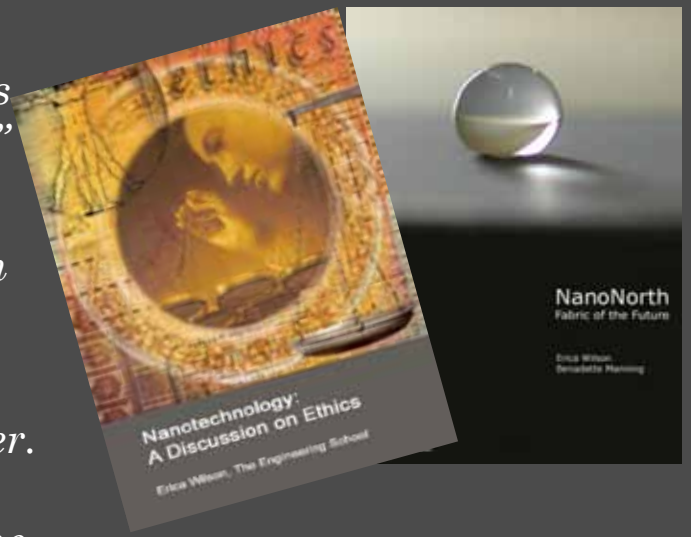
RET - BACK IN THE CLASSROOM

- *"I now truly understand the importance of higher learning and the incorporation of 'real life' application."*
- *"I now place more focus on inquiry and thus my students are participating in a more question-driven curriculum."*
- *"I try to work engineering into my curriculum more often than I used to"*
- *"Personally, the program has rejuvenated me as a teacher. Although I have only been teaching for five years now, I was at a point where I was feeling bogged down by all the standardized tests and administrative "red tape" so to speak. This program has again made me realize why I love to teach. There is nothing better than being able to educate, evoke understanding, and inspire individuals."*
- *RET rekindled a love of research. Science is about solving problems that no one knows the answer to. I sometimes lose [sight of] that in all of the mess in public education.*



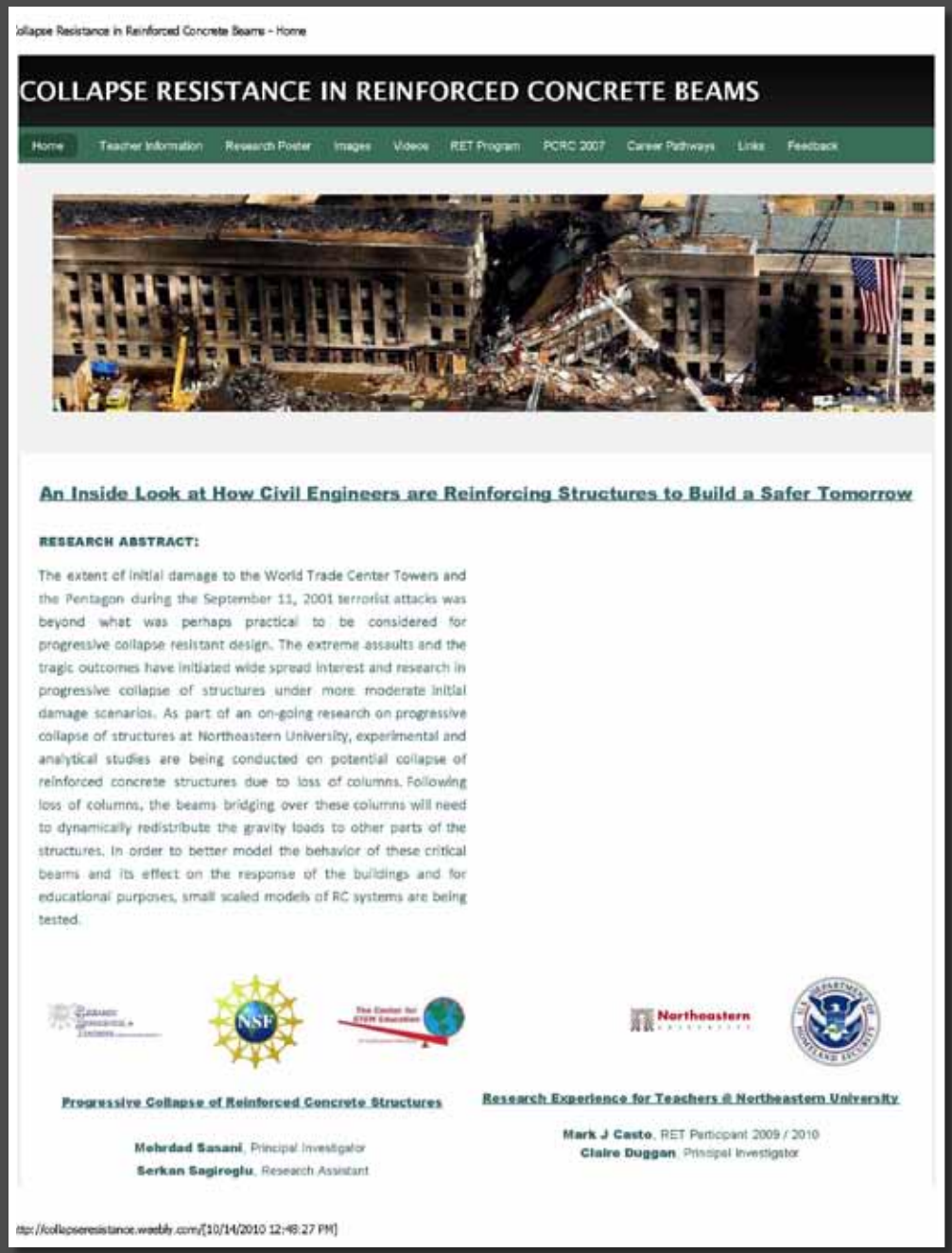
Responses from participants on what impact participation in the RET program had on how and what they taught.

IMPACT ON STUDENTS

- *The impact on my students is through me and how I determine how to teach my content. I now place more focus on inquiry and thus my students are participating in a more question-driven curriculum.*

- *I have a couple students this year for a second time (they did not pass the course the preceding year). They have brought to my attention that they have noticed I am "not teaching the same." I think that students are benefiting from my constant willingness to change and improve what and how I teach.*

- *I have a broadened awareness of STEM fields resulting in a better sense of required skill sets my students will need for post secondary education. This awareness helps guide my classroom planning and instruction. RET materials money has provided for instrumentation and materials my students would not otherwise have access to. These materials greatly enhance instruction and student understanding.*



Resources….

Sharing of resources and curriculum material through the RET web site (www.ret.neu.edu)

RET toolkit https://sites.google.com/site/rettoolkit/

In addition to teacher developed web pages utilized throughout the academic year.

http://collapseresistance.weebly.com/

In addition to sharing videos

http://www.youtube.com/watch?v=3JClV0kjiIE&feature=player_embedded

Continued Support is provided through meetings, additional program offerings and electronic support.