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## GreenSTEM@VCU: An Innovative Program for Integrating Service-Learning into Middle School Science, Technology and Mathematics Instruction

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# GreenSTEM@VCU: An Innovative Program for Integrating Service-Learning into Middle School Science, Technology and Mathematics Instruction

## **Abstract**

GreenSTEM integrates science, technology, engineering and math (STEM) education with a focus on energy and the environment using service-learning techniques for middle school science, mathematics and technology teachers.

## **Keywords**

GreenSTEM, STEM, VCU, service-learning, math, science, technology, mathematics, middle school, teaching

## **Disciplines**

Higher Education

## **Comments**

Presented at the International Conference for Service-Learning in Teacher Education, Duke University, Duke, NC.

### WHAT?

#### GreenSTEM@VCU

- A project funded by Learn and Serve America for three years to assist teachers from high-poverty middle schools with integrating STEM instruction into high-quality service-learning.
- A collaboration between VCU Life Sciences, School of Engineering, and the Division of Community Engagement.

#### Year 1 & Year 2

- Teachers attended a 5-day summer academy at VCU where they worked with VCU Engineering and Life Sciences faculty members, learned the standards for high quality service-learning, and developed integrated STEM service-learning unit plan outlines.
- Back in their schools, teachers and students collaborated with community partners throughout the following year to meet local community needs in energy conservation, alternative clean energy innovation, and green jobs exploration.
- Throughout the year, participating teachers communicated with each other and with VCU faculty through a project wiki, wrote reflections, and learned how to construct grant proposals to sustain their integrated STEM service-learning initiatives.
- Participating teachers earned 3 graduate-level credits and received up to \$2,000 in mini-grant funding to support their service-learning projects.

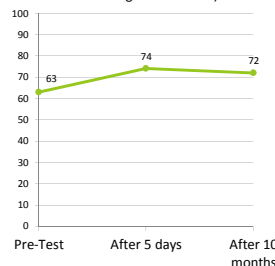
### SO WHAT?

#### Long-Term Gain in Self Efficacy Year 1 Teacher Participants

Substantial increases in the percentage of participants who felt moderately confident or very confident in their ability to...

- implement an integrated STEM service-learning project with their students
- establish and maintain community partnerships that support student learning
- work with media representatives to communicate your students' service-learning project outcomes to the broader community
- assist other teachers in learning to implement service-learning pedagogy
- collaborate with school and community leaders to build awareness of service-learning
- ability to teach students about "green" jobs

#### Long-Term Knowledge Gain Year 1 Teacher Participants (Average Score on Knowledge Assessment)



- 28 teacher participants over the first two years.
- 13 schools represented and approximately 1000 middle school students, with over 75 partners.
- Projects covering areas such as rainwater retention and community gardens, school and community recycling programs, stream assessments and cleanups, and riparian buffer zone repair.

#### Preliminary evaluation results indicate that:

- The summer academy is effective at increasing teacher knowledge.
- Program activities help to sustain knowledge during the subsequent academic year.
- The program is effective at increasing self-efficacy about teaching STEM concepts and green jobs, and using service-learning pedagogies.
- The program is effective at promoting positive attitudes and behaviors about teaching STEM concepts.

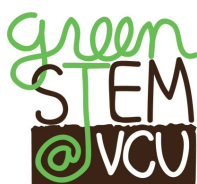
### NOW WHAT?

#### Year 3

- A major component of the grant is the production of 8 curricular units focusing on key service-learning and integrated STEM concepts. The curriculum will be available at <http://greenstem.vcu.edu>. Each unit includes a short video, using GreenSTEM@VCU projects to illustrate the theme, as well as lesson plans and resources to assist teachers in developing integrative STEM service-learning projects with their students.
- As we near the end of our 3-year Grant, VCU is using the 2012 GreenSTEM@VCU Academy to pilot a hybrid course with online and on-campus components. During the three on-campus days, teachers will spend 1 day each working with the VCU Engineering, Life Sciences, and Service-Learning faculty members. In the online portion of the course, teachers will utilize the GreenSTEM@VCU Curriculum and additional resources to develop an integrated STEM service-learning unit plan outline.
- Participating teachers will earn 3 graduate-level credits and receive GreenSTEM@VCU STEM Activity Kits to support the implementation of the curriculum in their classrooms.

**For more information about GreenSTEM@VCU,** contact Suzanne Kirk, Project Coordinator ([svkirk@vcu.edu](mailto:svkirk@vcu.edu)) or visit GreenSTEM@VCU on YouTube: <http://bit.ly/fGGny9>

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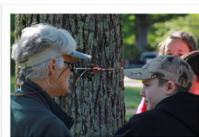
VCU School of Engineering



Teacher Academy  
Engineering Activity



School-Based Project



School-Based Project



School-Based Project



Teacher Academy  
Life Sciences Activity



VCU Life Sciences  
Rice Center Educational Building

