

PROJECT STEP: TRACK II

Inside this issue:

<http://www.eng.uc.edu/STEP/>

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About STEP	1
RET Summer Review	1
Family Science Academy Competition	2
PI Profiles	3
Teacher Profiles	3
Fellow Profiles	3
Coordinator Profiles	3
School Profiles	4



About STEP

Project **STEP - Science and Technology Enhancement Program** is a University of Cincinnati & National Science Foundation Grant designed to educate, nurture, and facilitate science, math, and technology graduate students into bringing their experiences and knowledge into middle and high school classrooms while preparing them to become

future educators.

We currently work with the Academy for Math and Science (CAMAS) at Hughes Center, Norwood High School, Newport High School, Western Hills Design Technology High School, and Withrow University High School.

STEP involves five graduate Fellows, 20 science and math teachers, a grant coordinator, an evaluation coordinator, a technology coordinator, and faculty members from the Colleges of Engineering and Education. Project STEP began at UC in July of 2002. A variety of lessons and activities are available on our website.



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<http://www.eng.uc.edu/step/>

The *Project STEP: Track II Building Stemcinnati City* newsletter is published nine times per year. For subscriptions, changes of address, or submitting news items and articles, please contact the Editor, Andrea Burrows, at 513-556-1029 or andrea.burrows@uc.edu

RET Summer 2007 Review

The RET program (Research Experiences for Teachers) involved 11 teachers in the summer of 2007. There are 3 main goals of the 6 week summer program. The first is to educate, facilitate, and cultivate 7th to 12th grade math and science teachers by exploring the scientific method of inquiry and the critical research skills that engineers use to solve open-ended real-world problems. The second is to facilitate the participants as they become role models by applying their research experiences in their classrooms and with their colleagues. The third is to enable 7th to 12th grade students to directly link their education to events and issues occurring within their community and encourage them to become effective citizens in a technology-driven society.

Eleven teachers participated in small group research activities. Ann Greely from Newport High School, Veronica Dunaway-Smith from Simon Kenton High School, and Martin Wells from LaSalle High School worked on Innovative Approaches to the Retrofit of Steel-Braced Structures. Yejide Mack from Withrow University High School and Carolyn Rost from Mother of Mercy High School studied the Elimination of Persistent Odorous Compounds from Drinking Water. Maria Lee-Alvarez from Western Hills Design Technology High School, Julie Hust from Saint Xa-

vier High School, and Belinda Perna from Roger Bacon High School researched the Evaluation of Biodiesel and Diesel Oxidation Catalyst on Diesel Pollutant Emissions. Stacie Dishman from Assumption School—Archdiocese of Cincinnati, Jaswinder Dhillon from Withrow University High School, and Anna Hutchinson from Hughes Center—CAMAS investigated Micro-Simulation-Based Impact Analysis of Transportation Infrastructure.

The basic approach used in RET is discovery through actual construction and experimental testing, field data collecting, observing, recording, computer simulations, synthesizing, and generalizations. Each teacher worked on the project mentioned above for six weeks under the mentorship of a faculty member and a graduate student. Lectures, seminars, demonstrations and four field trips were conducted to prepare the teachers for their research and to provide them with background training in Engineering. The RET teachers also worked with the STEP Fellows (look inside for more details on STEP and STEP Fellows), and created lessons for the students in their classrooms. The teachers will participate in a post-RET implementation program which includes classroom supplies and support. The project evaluation includes assessment of both teacher and students.

Family Science Academy Competition—Terrific Towers!

Date: Saturday, July 21, 2007

Location: University of Cincinnati

Pictures:



The top picture shows fellow Colleen McGannon working with a parent and student to begin the tower. The second picture shows a family with a completed tower. The third picture shows judging of a tower while pennies are placed in the cup on the platform.

Summary

In July 2007, Project STEP Fellows participated in the Family Science Academy. This encourages 4th-7th graders to explore science fundamentals through hands-on experiences shared by students and their families. This year students built towers (Terrific Towers!) with supplied pieces. The students competed to construct the highest tower that would hold the most weight.

Objectives and Rules of the Competition

The students will be able to design and build a structure that must be at least 5 inches tall with a platform to hold weight.

The structure could be taller than 5 inches. It had to have a platform to hold a paper cup. Adults could coach and help as directed by the student, but not construct. Students could only use the materials provided: 10 toothpicks, 6 paper clips, 10 Q-tips, 1 skinny stick, 10 popsicle sticks, 2 straws, 4 mailing labels, 3 hair pins, 10 marshmallows, and 6 index cards.

During the judging process the height (base to platform) of the structure was measured, a plastic cup was placed on top of the platform and pennies were added until the structure weakened enough to allow the pennies to fall out of the cup. The total number of pennies put into the cup were counted. The structure that supported the most pennies won.

Competition designed by STEP Fellows Carol Clinton, Aimee Frame, Safa Herfat, Colleen McGannon, and Michael Starr

Ohio Standards [From the Ohio Science Benchmarks]

Grade 7

Investigate how matter can change forms but the total amount of matter remains constant.

Describe how an object can have potential energy due to its position or chemical composition and can have kinetic energy due to its motion.

Grade 8

Explain that an unbalanced force acting on an object changes that object's speed and/or direction.

Demonstrate that whenever one object exerts a force on another, an equal amount of force is exerted back on the first object.

Grade 12

Describe how a physical, chemical or ecological system in equilibrium may return to the same state of equilibrium if the disturbances it experiences are small. Large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium.

Explain how all matter tends toward more disorganized states and describe real world examples (e.g., erosion of rocks and expansion of the universe).

More STEP lessons to use:

For more information, including lesson plans and handouts, visit the STEP website at <http://www.eng.uc.edu/step/activities/>.

STEP Participant Focus

Primary Investigators (PI's)

There are six principal investigators (PI) for the STEP Track 2 grant. The head PI, and director of the STEP Track 2 grant, is **Dr. Anant Kukreti**. He is the associate dean for engineering education at UC and a professor. **Dr. Ted Fowler**, educational professor emeritus at UC, is the director of the SW Ohio Center for Excellence in Science and Math and designs the educational experiences for the fellows.

Dr. Suzanne Soled, Chair of Teacher Education and School Leadership at Northern Kentucky University, leads the evaluation and data processes throughout the grant.

Dr. Richard Miller and **Dr. Dan Oerther**, both engineering professors and content experts, ensure that fellow lessons contain engineering content and connect to the STEMcinnati theme. **Mr. Ken Simonson** is the head of the Emerging Ethnic Engineers Program and helps to create a bridge between the fellows and summer observing and teaching opportunities.



Dr. Anant Kukreti

STEP Teachers

There are five schools and 20 teachers involved with the STEP Track 2 grant. Each school has four participating teachers with one acting as a coordinator. Representing the Hughes Center: Cincinnati Academy of Math and Science is coordinator **Sharon Bachman** along with teachers **Anna Hutchinson**, **Rebecca Richmond**. Newport High School's coordinator is **Carol Dunn**. Fellow teachers at Newport include **Ann Greely**, **Gabrea Bender**, and **Jean Becker**. Norwood High School's coordinator **Megan Urbaitis'** team is comprised of **Leslie Hadaway**, **Brad Hunt**, and **Sara Garrison**. The coordinator at Western Hills Design Technology is **Thess Lee-Alvarez**. Other STEP teachers at the school include **Lea Brinker**, **Kim Warfield**, and **Pam Truesdell**. Withrow University High School's coordinator **Jaswinder Dhillon**, is supported by **Tamara**

Johnson, **Dawn Williams**, and **Glorida Onoyne**. Each of these science and/or math teachers works as a team with one STEP fellow. The team collaborates with the fellow on how to solve student difficulties with the science and math content. Each of these teachers completed an extensive application and selection process.



Jaz Dhillon

STEP Fellows

There are five STEP fellows involved in the Track 2 grant. Each fellow holds a graduate degree in engineering and completed an extensive interview process.



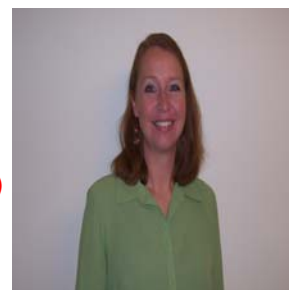
Aimee Frame

Fellows **Carol Clinton**, **Aimee Frame**, **Safa Herfat**, **Colleen McGannon**, and **Michael Starr** have recently been learning about how to tie engineering to education. In addition to their regular university work involving research and coursework in engineering, they are the link between the university and the secondary schools. The fellows spend about ten hours a week working at the secondary schools with teachers in their classrooms teaching and helping. They also spend an equal amount of time in educational training (either in class or working together to develop activities for the schools). By using research from their engineering background and collaborating with the teachers that they work with, fellows use real world examples to help alleviate the difficulties that the students are facing in science and math. The task of each fellow is to produce five new STEP lessons by the end of the school year.

STEP Coordinators

There are three coordinators connected to the STEP Track 2 grant. **Andrea Burrows** is the grant coordinator. She is the main liaison between the fellows, schools, teachers, and PI's involved in the STEP project.

Kimberly Strawska-Hackett is the evaluation coordinator. She is in charge of all assessments. **Chitabrata Ghosh (Chitto)** is the IT coordinator. He is responsible for any STEP technology related issues.



Andrea Burrows



5 Participating High Schools STEP Track 2 grant

Hughes Center is located next to the University of Cincinnati. It is a team-based magnet school dedicated to the Paideia philosophy. The Paideia philosophy is based upon the belief that all students can be successful in a rigorous college preparatory curriculum. Students are expected to exceed the district's minimum requirements for promotion/ graduation. Teams of teachers and students improve student learning through better student-teacher relationships, student accountability, and home-school communication. Team leaders, in conjunction with program facilitators, provide leadership to ensure that all students in their program achieve academic, personal, and social success. Hughes Center is proud to be a school community where every member contributes to a positive learning environment in which all students can flourish. To maximize personal growth, all members of the Hughes Center community must accept their respective responsibilities. The expectations can be achieved through commitment, acceptance of personal responsibility, hard work, and mutual respect.

Western Hills Design Technology High School is located near the University of Cincinnati. WHDTHS believes that engineering sparks progress and makes everyday life safer, more efficient—and more fun! The 21st century is opening a whole universe of exciting new opportunities for aspiring engineers. WHDTHS is an option in the Cincinnati Public School System and introduces students to the fascinating field of engineering. The mission of WHDTHS is to educate all students to meet or exceed Cincinnati Public Schools defined academic standards while exploring technology and pre-engineering principles. WHDTHS will create a climate where each individual is respected and valued. The educational process supports the development of the whole person.



**Western Hills Design
Technology High School**

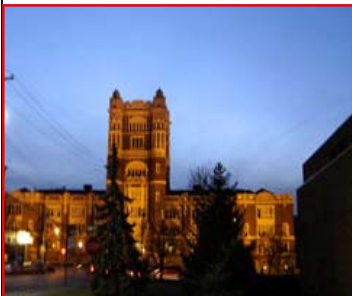
Withrow University High School, located by UC, believes that a college education is the key to a bright future. It's also a serious commitment that requires focus, preparation and support - beginning in high school. At Withrow University High School, every student is college bound. By creating an atmosphere of success, students reach their potential to earn a high school diploma and advance to higher education. In a structured yet caring environment, students receive personal attention, a custom designed academic plan, college application assistance, help applying for financial aid, and much more. Our mission is to empower students to be life-long learners by promoting high expectations, rigorous instruction, Cincinnati Public Schools academic standards, community service, and family support within a safe and disciplined environment.

Norwood High School is located in Hamilton County, Ohio. Norwood High School is encouraging students to show their "PRIDE." This is the slogan of the new Positive Behavior Support (PBS) program. This is a code that the students will live by at Norwood High School. NHS will also again be offering Project Success. This program provides students extra help in the four core academic disciplines. NHS offers a wide variety of quality programs and athletics.

Newport High School is located in Newport, Kentucky across the Ohio River from UC. Founded in the 1800's, Newport High School has long been the academic center of the thriving and diverse community that is Newport, Kentucky. With an enrollment of a little under 600 students in grades 9 to 12, NHS offers a curriculum that is designed to meet the needs of every student in an effort to help them become productive community members as they enter adulthood. The majority of staff has had the opportunity to attend a professional development seminar lead by Lisa Carter. The primary foundation of the training is directly linked to Larry Lezotte's research into *The 7 Correlates of Effective Schools*. Lazotte's research shows that academic outcomes are largely determined by the action, culture and organization of the school and school district. These correlates encapsulate the philosophy that drives our district's strategic plan.



Newport High School



**Hughes Center
High School**

**Look for spotlights on
STEP Track 2
participants and schools in our
upcoming issues.**