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Announcements:

- Free **Technology Workshop** being offered on Nov 11th, 2005 from 8 AM- 3 PM. Email Kelly Obarski at kobar-ski@cinci.rr.com to sign up.

- Everyone is welcome to the **STEP Open House** on March 30th, 2006. Come and get a glimpse of what we do!

Issue 1 — <http://www.eng.uc.edu/STEP>

September 26, 2005



About Project STEP

Project **STEP - Science and Technology Enhancement Program** is a University of Cincinnati and 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.

Project STEP also recognizes that effective science and mathematics education requires standards-based, authentic, hands-on, inquiry-based learning. STEP believes that students must be able to link the relevance of their education with events and issues occurring within their community as well as experience participation as

an effective citizen in a technology-driven society.

Fellow's, teachers and university faculty collaborate to design, develop and implement lessons that not only generate interest in math, science and technology but also engineering. Each lesson or set of lessons focuses on the Ohio Content Standards and the city theme in order to incorporate engineering principles into the experience.

Although Project STEP has worked with various suburban schools, we currently work with four high schools in the Cincinnati Public School District.

STEP involves eight graduate Fellows from the University of Cincinnati, nine secondary science and mathe-

tics teachers, a project coordinator, an evaluation Fellow, a web designer and ten faculty members (from the College of Engineering and College of Education).

Project STEP began in July of 2002, this is our fourth year. A wide variety of lessons are available on our website.

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



Students working in a class at Hughes High School

Upcoming Event

The **Technology Workshop** will have 5 sessions which include:

Digital story telling: If a picture is worth a thousand words - just think how effectively your students could communicate when they can include audio, motion, written words, and emotion as well?



Session from Last year's Technology Workshop

Excel: Excel is a powerful spreadsheet program. Learn how useful spreadsheets can be for classroom administrative duties and to teach math and/or science topics.

Internet Resources including Web Quests for teachers: Explore some of the great resources on the Internet that are available to teachers for free. Create a list of resources to take back with you for future use. This session will also introduce you to Web Quests and how to use them, where to locate them, and free resources to create and host your own.

Concept Mapping: A concept map is a special form of a web diagram for exploring knowledge as well as gathering and sharing information. It enhances thinking and learning, which helps students to synthesize information.

Microsoft Word for Teachers & Graphic Use: Find out about some tools of Word that can be utilized by teachers and students alike. Learn how they can assist students in the support of reading, writing, understanding and learning.

Viva Las Vegas – An Energy Project

Hughes Center High School- Paideia Program

Spring 2003

Lesson Information

Grade Level

9

Subject areas

Physical Science

Duration

Six to eleven 50-minute class periods

Setting

Standard classroom

Computer laboratory

Materials

Approximately 50 books from library

Poster materials

Computer, w/ LCD projector

Background Knowledge

Students will need some experience with: watts, joules, energy, work, and energy transformations.

Additional Resources

<http://www.bls.gov/oco/ocos227.htm#outlook>

www.howstuffworks.com

www.doe.gov

Many other websites

Developed by Fellows:

Matthew Barber
Nicholas Harth

Summary

Students act as representatives from competing energy production concerns attempting to sell the Las Vegas City Council a new power plant. The students research their own power generation technology, the technologies of other groups, and the Las Vegas area, in order to write and present a detailed report describing how their power plant will best fit the Las Vegas community.

Students are required to learn not only the mechanical facts of how power is generated, but also to evaluate the costs and benefits of such generation.



A student presents her research on wind power to the class.

Objectives

Students will be able to:

- Evaluate a power plant technology and its effects on a community.
- Demonstrate their ability to research, analyze, and evaluate a topic in a written report and a presentation.

Ohio Standards

From the Ohio Science Benchmarks:

Earth and Space Sciences

- Describe how Earth is made up of a series of interconnected systems and how a change in one system affects other systems.
- Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future.

Physical Sciences

- Demonstrate that energy can be considered to be either kinetic (motion) or potential (stored).
- Explain how energy may change form or be redistributed but the total quantity of energy is conserved.

Science and Technology

- Explain the ways in which the processes of technological design respond to the needs of society.
- Explain that science and technology are interdependent; each drives the other.
- Predict how human choices today will determine the quality and quantity of life on Earth.
- Design a solution or product taking into account needs and constraints (e.g., cost, time, trade-offs, properties of materials, safety, and aesthetics).

Scientific Ways of Knowing

- Explain how societal issues and considerations affect the progress of science and technology.

Fellow Profile

Ms. Amy Dimmerling

Graduate Research Assistant
Structural Engineering
Department of Civil and Environmental Engineering



Mr. Bartley Richardson

Doctoral Student
Computer Engineering
Department of Electrical and Computer Engineering and Computer Science



Ms. Michelle Daniel

Masters Student (completed BS in Civil Engineering)
Secondary Education
College of Education, Criminal Justice, and Human Services

Mr. Michael Rust

Doctoral Student
Electrical Engineering
Department of Electrical and Computer Engineering and Computer Science

Ms. Bethany Vice Bowling

Doctoral Student
Interdisciplinary Biology and Education
College of Arts and Sciences



Mr. Jim Allen

Doctoral Student
Structural Engineering
Department of Civil and Environmental Engineering



Mr. Matthew Estes

Doctoral Student
Department of Biomedical Engineering

Ms. Sarah Pumphrey

Masters Student
Environmental Engineering
Department of Civil and Environmental Engineering

Participating Schools & Teachers

There are four schools participating in Project STEP, **Hughes Center** being one of them.

It opened in 1847 was the first secondary school in Cincinnati. It is now located at 2515 Clifton Ave, Cincinnati, OH-45219.



The two teachers from this school who are a part of Project STEP are **Sharon Bachman** and **Matt Bye**.

Sharon is a biology, physics and biochemistry teacher for the 11th and 12th grades and Sarah works with her. Matt Bye teaches 10th grade mathematics and works with Bethany.

Shroder Paideia Academy located at 3500 Lumford Place Cincinnati, Ohio 45213, opened in 1956 as the first Paideia School in Cincinnati.



The Paideia philosophy emphasizes a liberal arts course of study with active student learning, mastery of skills, and conceptual understanding.

Kelly Poulin teaches 9th, 10th and 11th grade math, **Michelle** works in her class. **Jim** works with **Harry Voll** who teaches 11th grade environmental science.

Western Hills University High School started on September 10, 1928 and can be found on 2144 Ferguson Road, Cincinnati, OH-45238.

Two Teachers from Western Hills University are participating in Project STEP activities.

Emma Massie, is a 10th grade math teacher who works with Amy.

Rita Seifert teaches 12th grade pre-calculus, college algebra at Western Hill University, Matt works with her class.



Western Hills Design Technology High School opened in August 2002 as a pre-engineering program that features a project-based curriculum and develops creative problem solving skills in their students.

It is located in the same building as Western Hills University.

Bartley works with **Kim Warfield**, a 9th grade math teacher.

Michael works with two teachers, **Lea Brinker** an 11th grade algebra teacher and **Thess Lee-Alvarez** who teaches chemistry to 11th graders.

STEP Team

The NSF STEP Principal investigators are faculty members at the university from the College of Engineering and the College of Education who wrote the NSF STEP proposal during the 2001-2002 school year. They continue to support the Fellows and guide the direction of the grant through bi-weekly meetings and seminars with the Fellows.

Dr. Anant Kukreti

Lead PI,
Professor & Head,
College of Engineering,
Department of Civil &
Environmental Engineering



Dr. Dan Oerther

Associate Professor and
Chair of the Institutional
Bio-safety Committee,
College of Engineering,
Department of Civil &
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Dr. Karen Davis

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puter Engineering & Computer
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Dr. Richard Miller

Professor,
College of Engineering,
Department of Civil & Environ-
mental Engineering



Dr. Suzanne Soled

Associate Professor,
College of Education,
Division of Educational Studies



Dr. Thaddeus Fowler

Professor Emeritus ,
College of Education,
Division of Teacher Education



Apart from the PIs mentioned above the other participants of Project STEP are

Kelly Obarski

Grant Coordinator for
Project STEP, Doctoral
Student in C & I Education,
College of Education,
Criminal Justice, and Human Services.



Patty McNerny

Evaluation Graduate Fellow,
Doctoral Student in C & I
Education/Technology.
College of Education,
Criminal Justice, and Human Services.



Janet Rajan

Graphics/Web Developer,
Masters Student ,
Department of Electrical
& Computer Engineering
& Computer Science



Research Experience for Teachers (RET), Summer 2005

RET was developed for 7th to 12th grade math and science teachers in order to provide them with an opportunity to experience research in Civil Infrastructure Renewal and Rehabilitation. This was a pilot effort in which four teachers were immersed in research through discovery in actual construction and experimental testing, field data collection, observing and recording, computer simulations, synthesizing within civil engineering.

Four project topics were chosen to provide an overall perspective about the research related to performance evaluation of diesel fuel, health monitoring of retrofitted bridges, water reuse, and intelligent transportation systems.

Each teacher worked on a project for six weeks during the summer under the mentorship of a faculty member and a graduate student. Teachers were sent reading materials in advance to familiarize themselves with the research in which they were immersed. Lectures, seminars, demonstrations, and four field

trips were conducted to provide the teachers with background training in civil engineering.

The RET projects provided the teachers with an opportunity to develop a lesson module for their students related to their research experience. This included professional development related to engaging the interests and abilities of their students by allowing them to see how STEM concepts are used to solve and inform them of society's pressing needs.

This RET Site provides the teachers with total experience of learning through re-



Field Trip to ARTIMIS

search, by using state-of-the-art testing, data recording equipment, simulation tools, a report writing, and presentation.

Teacher Quotes:

"This was the one experience that I hoped to gain this summer and I definitely have a better understanding and ability to link what my students are doing in the classroom to real world science and mathematics problem solving."

"The most rewarding experience was meeting all the Fellows, grad students, professors and engineering professionals. I think the contacts made are invaluable. I also think the field trips we took were very helpful because now we have contacts and places thought about that we can take our students to. I think the information that I gained from all the engineers just about what different types of engineers do was invaluable too."

Stay tuned for next summers recruitment in December of 2005.