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## 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 four high schools in the Cincinnati Public School District, Hughes Center, Shroder Paideia Academy, Western Hills University High School, and Western Hills Design Technology High School.

STEP involves eight graduate Fellows, nine secondary

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

Project STEP began in July of 2002. A wide variety of lessons are available on our website.



Program funded by National Science Foundation Grant #0139312 & matching funds by University of Cincinnati.



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

## Open House 2006

Project STEP hosted an **Open House** on **March 30th, 2006** at which STEP lessons were showcased.

Dr. Kukreti and Dr. Soled presented details about STEP, RET and Track II to the attendees, which was followed by informative discussions about school, teacher and fellow participation in the project.

All in all there was a valuable exchange of ideas and information.



## NSF Annual GK-12 Conference

The National Science Foundation Annual GK-12 Conference was held in Washington D.C. at the Ronald Reagan Building International Trade Center on March 24-26, 2006.

Dr. Arden Bement, Director of NSF, opened the conference highlighting NSF policy and agendas for the upcoming year. The GK-12 Congressional budget line item began in 1998 and has since funded 167 GK-12 projects and over 5,000 Fellows at 114 institutions. Through innovative programs over 250,000 students have increased their interest and knowledge in STEM skills (science, technology, engineering, and math).

The conference topics included building partnerships,

evaluating GK-12 projects, institutionalization/changing the culture, international opportunities, research and urban issues.

Anant Kukreti, Patty McNerney & Kelly Obarski presented Project STEP at a poster session on Saturday evening in order to share successes and improvements that we have made in the four years since we began. In all over 80 universities presented their projects.

The 2006 GK-12 conference was a great success, for further information on the same please visit the following website: <http://ehrweb.aas.org/gk12/index.htm>

# Evacuation Planning

Fall 2005

## Lesson Information

### Grade Level

11

### Subject Areas

Mathematics

### Duration

3—50 minute classes

### Setting

Classroom w/ large tables

### Materials

1. Overhead Projector
2. Rulers
3. Colored pencils or markers (optional)
4. Evacuation Planning hand-outs.

### Key Concepts

Engineering Design

Natural and Human-caused disasters

Single variable algebraic equations.

### Background Knowledge

A basic understanding of algebraic equations containing single unknown variables.

**Developed by Fellow:**

Jim Allen

## Summary

In this activity, students were introduced to the effects and impacts of natural disasters on engineering design. They were presented with a scenario of a fictional tornado heading toward a popular landmark in Cincinnati. They used algebra to calculate time until impact and to determine safe escape alternatives from the impact zone.

Students enjoyed working with the maps of their city and the energetic discussion of natural and human caused disasters in Cincinnati.



Students working on the activity.

## Objectives

- Students will know to determine map related data including scales and compass.
- Students will know how to calculate time and distance estimates for different escape routes.

## Ohio Academic Standards

### MATHEMATICS

#### Standard: Number, Number Sense and Operations

Grade 11—Benchmark D— Indicator 4 —Apply algebraic methods to represent and generalize problem situations involving vectors and matrices.

#### Standard: Measurement

Grade 11 — Benchmark C — Indicator 4 — Estimate and compute areas and volume in increasingly complex problem situations

#### Standard: Data Analysis and Probability Standard

Grade 11 — Benchmark A — Indicators 10—Understand and use the concept of random variable, and compute and interpret the expected value for a random variable in simple cases.

## Teacher Profile

**Kelly Poulin** is an 11<sup>th</sup> grade mathematics teacher at Shroder Paideia Academy. This is her 5<sup>th</sup> year at Shroder. Kelly graduated with a Secondary Math Ed degree from Miami University at Oxford.

This is Kelly's fourth year with Project STEP. She says that it is very rewarding to see students in her math classes pursue engineering degrees because of Project STEP involvement. She also believes that seeing students make connections with math and "the



**Mrs. Poulin**

real world" is a valuable teaching aid.

She says: "Seeing the students actively engaged and enthusiastic about math activities is a great thing that STEP brings to her classrooms."

In her spare time, she enjoys spending time with her family, scrap-booking, camping, and boating.

## PI Profile



**Patty McNerney** is a doctoral candidate in the College of Education, Criminal Justice and Human Services.

Patty is currently focusing her research in the Ed.D in Curriculum and Instruction program for a Specialization in Education and Knowledge Technologies at the University of Cincinnati. This is her first year as an Evaluation Fellow with Project STEP.

Patty has a degree in elementary education and has spent the past fifteen years specializing in the integration of technology across the curriculum. She has taught math, science, and technology in the classroom, and has spent time in the areas of technology coordination, implementation, training and integration as a Technology Coordinator/Director.

## Student Profile (s)

The **Students** participating in Jim's recent STEP lessons had the following comments.

**"It seemed real!"**



**"What I liked most was that I learned something and got to see Cincinnati."**

**"I liked planning the escape route."**



**"We got to figure out things in more than one way! And we used math and learned a little about engineering."**

## Fellow Profile



**Jim Allen** is a 3<sup>rd</sup> year PhD student at the University of Cincinnati. He received his B.S. degree in 1994 from the University of Missouri-Rolla and his

M.S. degree in 1997 from the University of Oklahoma both in Civil Engineering.

Jim's current research is in the areas of improvement of computer-based structural analysis solution algorithms.

This is Jim's first year with Project STEP and is currently assigned to Algebra II and Consumer Mathematics classrooms at Shroder Paideia Academy where he works with Kelly Poulin.

## School Profile

**Shroder Paideia Academy** has offered its first American Sign Language class! One of the goals of this program is to provide training for students interested in becoming interpreters for the Deaf. Students from the class and have participated in several community events. For more information, contact Ms. Julie Hallabrin or Ms. Gabriela Staufeneger.

**The New Shroder Paideia**



**Under Construction**



# Hurricane Tracker

Western Hills Design Technology High School

Fall 2005

## Lesson Information

### Grade Level

11

### Subject Areas

Algebra II

### Duration

1—70 minute class

### Setting

Standard classroom

### Materials

Handouts

Intro PowerPoint

### Key Concepts

Plotting coordinates

Hurricane formation and movement

### Background Knowledge

None

### Additional Resources

<http://www.nhc.noaa.gov/><http://hurricane.terrapin.com/>

Science and Mathematics Lab Manual, Glencoe Mathematics, Glencoe McGraw-Hill, New York, NY

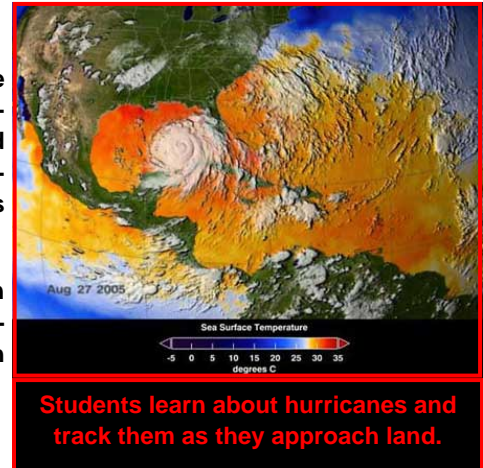
### Developed by Fellow:

Michael J. Rust

## Summary

In this activity, students will learn about the mechanics of hurricane formation and movement. Using coordinate locations and wind speed data, students track a hurricane forming off the coast of Florida until it reaches land.

This lesson was developed as a part of an interdisciplinary activity to tie together concepts in math, science, history, and English with the common theme of hurricanes.



Students learn about hurricanes and track them as they approach land.

## Objectives

- Students will be able to:
  1. Identify the steps in formation of a hurricane
  2. Determine the naming convention for hurricanes and tropical storms

## Ohio Academic Standards

### SCIENCE

Standard: Earth and Space Sciences

Grade 11—Benchmark B—Indicator 10—Interpret weather maps and their symbols to predict changing weather conditions worldwide (e.g. monsoons, hurricanes and cyclones).

### MATHEMATICS

Standard: Data Analysis and Probability

Grade 11—Indicator 10—Analyze and interpret univariate and bivariate data to identify patterns, note trends, draw conclusions, and make predictions.