



## 142 Students Make High School Research Symposium a Big Success

On April 16<sup>th</sup>, 2010, 142 high school students gathered at Illinois State University to participate in the 9<sup>th</sup> Annual High School Research Symposium.

The event, sponsored by the Center for Mathematics, Science, and Technology, involved local schools as well as Chicago-area schools.

Niles North High School took home the coveted trophy for "Highest Performing School in STEM Research," an award given to the school with the highest average score overall.

Students presented posters on their individual or group research projects. Topics included biology, chemistry, environmental science, physics, and interdisciplinary science. The projects were divided into two categories: experimental and exploratory/job shadowing.

Experimental projects involved student-designed experiments where a formalized hypothesis was either supported or not supported. Exploratory/Job Shadowing projects allowed students to do specific research on a particular topic of interest to them or job shadow a professional scientist, mathematician, or engineer.

Posters were reviewed by volunteer judges from the Illinois State University community, including both faculty and students alike, and scoring was based on content as well as presentation.

The top three winners in each category received plaques and a scholarship to the Illinois Summer Research Academy in July.

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## CeMaST forms the Southern Illinois Partnership for Achievement in Mathematics and Science (SIPAMS)

CeMaST is working with Southern Illinois University – Carbondale in a partnership with ten high-needs school districts in southern Illinois over the next three years to develop and implement a teacher professional development program aimed at increasing mathematics and science teachers' content knowledge and pedagogical skills and student achievement in mathematics and science subject areas.

In the first year, the program will serve 25 mathematics and science teachers in grades 4-8, who teach 1,250 students. One goal of the SIPAMS program is to develop an intensive professional development program to address science

content and pedagogical knowledge as well as National and State Learning Standards. Courses will help teachers infuse inquiry-based approaches in integrated mathematics and science activities for their students. Course design will focus on helping teachers address the learning challenges of and provide learning opportunities for students with special needs.

CeMaST's primary role in this project will be to evaluate the effectiveness of the SIPAMS approaches to helping teachers and students learn mathematics and science in an integrated fashion.



*Teacher Bob Weinrich from Washington Gifted School in Peoria discusses a poster with one of the students at the 9<sup>th</sup> Annual High School Research Symposium on April 16, 2010.*

### Upcoming Events:

- May 5** — ACS Chemistry Exam at ISU
- May 6** — ISU STEM Teacher Alumni Dinner in Chicago.
- June 25-26** — American Solar Challenge at ISU
- July 12-16** — Illinois Summer Research Academy at ISU.

*More information, including details about Registration, can be found at our website:*

**CeMaST.IllinoisState.edu**

### Recent Events

- CeMaST sponsored Guest Speaker, Ed Begley, during CAST week.
- ISU STEM education alumni event for the Chicago-land area was held on April 7.

## Teach.Chem Continues to Grow Internationally

Google “high school chemistry” and you get almost 18 million hits, but Number One is Jeff Christopherson’s Unit 5 website.

In 2001, Jeff, a local chemistry teacher at Normal Community High School, participated in the Illinois State University Teach.chem series of chemistry pedagogy workshops. As part of Teach.chem, Jeff built an astoundingly complex set of teaching and learning materials for high school chemistry teachers.

Since then, he has worked with graduate students, student teachers, and faculty from Illinois State, as well as his high school colleague, John Bergmann, to continually update and improve his materials.

Almost all of his materials, which include 5,000 animated PowerPoint presentations,

lesson plans, and 300 student and teacher worksheets, are available via the website. Teacher-protected information and answer keys are available upon request in CD format. These materials are free, and for several years, Jeff sent his Teach.chem CD to teachers around the globe at his own expense.

Recently, however, CeMaST has been able to support Jeff by easing some of the administrative burden and by providing materials and postage.

We now send out CDs to teachers all over the world – the Philippines, Sri Lanka, Australia, India and across the USA—nearly 500 this past year! We won’t tell you the website, Google it and find it for yourself... High School Chemistry.

## High School Research Symposium from page 1

Winners in the experimental category were as follows: First place—Binita Shah, Niles North High School. Second place—Emmanuelle Asrow, Niles North High School. Third place—Daniel Scott Hillenburg, Washington High School.

Winners in the exploratory/job shadowing category were as follows: First place—Kyle Ressurreccion, Niles West High School. Second place—Breanne Bumbrick, Washington High School. Third place—Suhail Ansari, Niles West High School.

In addition to the trophy and plaques distributed, certificate awards were given for the following:

Outstanding Biology Project –Ayana Jamal, Niles North High School.

Outstanding Chemistry Project—Rishy Chacko, Niles West High School.

Outstanding Environmental Science Project—Nicole Torosin, Niles North High School.

Outstanding Physics Project—Jason Kaatz, Niles West High School.

Outstanding Interdisciplinary Project—Erica Miller and Tyler Emmerson, Normal Community West High School.

The Student Choice Award, voted on by the student attendees, was given to Alex Lorsbach, Normal Community West High School.

Finally, Amy Sands, Niles West High School, won the Edison Award, given for best “failed” project, that is, the project where the experimental design was great but the results did not turn out as planned.



CeMaST director Willy Hunter, congratulates Niles North High School teacher Jackie Naughton as she accepts the trophy for “Highest Performing School in STEM Research” at the 9th Annual High School Research Symposium on April 16, 2010.

## Ways to Get Involved

Volunteer your time by participating in one of the following events:

- ★ Attend Urban STEM Alumni Events—May 6th and September 11th in Chicago
- ★ Participate in the festivities surrounding the American Solar Challenge on June 25th
- ★ Serve as a research mentor for students in the High School Research Symposium

In addition, we are looking for people with expertise or interest in working on:

- ★ Global Climate Change Education Initiatives
- ★ TUES—Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (formerly CCLI) due January 2011

**Contact Us: [CeMaST.IllinoisState.edu](http://CeMaST.IllinoisState.edu)**

## The Impact of Completing Research Projects

Studies show that completing student-centered research projects is likely to encourage students to not only complete their undergraduate science education but to go on to graduate school and become practicing scientists (Lopatto, 2007; Kinkel and Henke, 2006). Rigorous science programs that include student-centered inquiry research excite students to go into scientific fields and improve their overall grade point averages because they've applied skills like interpreting data and finding answers in a sea of text (Kindel, & Henke, 2006).

For eight years, Illinois State University has held a high school research symposium for students who have completed STEM research projects as part of coursework. Teachers from across the state are invited to bring their students to share their research results with other high school students and teachers, college students and professors.

Informal feedback from students, shared by high school teachers, indicated that although they were often stressed with the idea that they would have to present their research to individuals who would know a lot about their topics, they considered the experience worthwhile. This study was designed to take a more comprehensive look at how students viewed the research process, the impact it had on them at the time, and how they viewed the experience looking back.

Fifty-eight former high school researchers responded to a 29-question survey. Eighty-six percent (50/58) completed biology research projects, 7% (4/58) chemistry, and 3% (2/58) earth science. Seventy-two percent indicated they were currently undergraduate students and 25% had already graduated college.

When asked to compare how they enjoyed the activities at the time with how beneficial they view them now, several notable changes emerged in the students' view of the research process. The first discrepancy was the *Research process*, which 50% (n = 27) of students said they disliked back in high school, but looking back 59% (n = 32) felt it was one of the top three benefits of completing a research project in high school.

While 69% (n = 37) remember enjoying *Conducting the experiment*, only 26% (n = 14) felt it was one of the most important long-term benefits. *Writing the scientific paper* was the one aspect of the research process that most students (76%, n = 41) enjoyed the least, however, 50% (n = 27) felt that it was one of the most beneficial. And while a large number (57%, n = 31) enjoyed designing the poster for the research symposium, only one (2%) felt it was one of the most important long-term benefits.

Several educational implications can be taken from this study. First, instructors must understand that the student's attitude toward the scientific method does not correlate to its long-term benefits because the aspects students dislike at the time are the same ones they later identify as most beneficial. Secondly, the most useful skill students took from completing research were skills in which most STEM instructors have never had any formal pedagogical training, including the ability to critically discriminate to find credible sources and writing well. Therefore, STEM teachers might feel more comfortable implementing research projects if they had more training in these areas.

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## American Solar Challenge to make Pit Stop at ISU

On Friday, June 25<sup>th</sup>, 2010, solar car teams from around the world will pull into Normal, Illinois for their final pit stop at Illinois State University in the 2010 American Solar Challenge.

CeMaST, the Town of Normal, and the Children's Discovery Museum are planning a day of fun and sun to welcome these solar car teams to Illinois State University!

The 2010 American Solar Challenge is a competition to design, build, and drive solar-powered cars in a cross-country rally event. Approximately 20 teams, including Team Mercury from Illinois State University, will compete in the 1100 mile drive from Tulsa, OK to Chicago, IL.

The route combines pieces of old routes used in previous events, giv-

ing some historical significance to the past 20 years of organized solar challenge events in North America.

Solar Cars will begin to arrive late Friday morning and continue throughout the day. On Saturday morning, the solar cars will depart from the Children's Discovery Museum on the final leg of their journey as they make their way towards Naperville, IL and then complete their ceremonial run into Chicago.

Participants in the event include solar car teams from as far away as Taiwan and Germany. The Illinois State University Solar Car Team, ranked 5<sup>th</sup>, will be racing their Mercury III solar car for this event.

Developed as a way to offer a unique learning experience for

students interested in the STEM disciplines, Team Mercury promotes a greener future by competing in events in North America and the world.



<http://www.solarcar.ilstu.edu/>