CeMaST Helping to Lead Implementation of Next Generation Science Standards in Illinois

For the past two summers, teachers from across Illinois have participated in a variety of summer professional development programs organized by CeMaST and funded by the Illinois State Board of Education and the U.S. Department of Education. Over 150 teachers participated in these workshops as authors, curriculum designers, and leaders.

In the Real Science and the Next Generation Science Standards workshop, Dr. Brad Christensen (CeMaST/TCH), Dr. Rebekka Darner (BIO), and Dr. Ryan Brown (CeMaST/TCH) led 22 teachers from Rockford, Belvidere, Woodstock, Harlem, and across Winnebago County in the creation of a series of online learning modules over the course of the two-week workshop. These modules were created to teach science content, as defined by the Next Generation Science Standards in the context of career clusters (as defined by the Illinois Pathways). Teachers visited industrial, business, and non-profit locations (such as Burpee Museum, Rockford International Airport, Green Circuit Solar Farm, the Rockford Ice Hogs, Thermo Fisher Scientific, and UTC Aerospace) looking for science and engineering activities that could be translated into online modules for high school students. The 22 Real Science teachers then led professional development for a further 60 teachers on the content of the Real Science lessons. Finishing its third year, the Real Science project parallels the Real Numbers in Real Situations project, which was begun in 2012 to help teachers develop lessons to teach the new Common Core State Standards for Mathematics.

Closer to the ISU campus, Dr. Darci Harland (CeMaST) led 13 teachers in Introducing Students to Research and Development for the High School Classroom. This project was designed for teachers who want to implement student research components into their curriculum. Teacher participants from Clinton, Elmhurst, Olympia, El Paso-Gridley, Naperville, Prairie Central, Washington, and East St. Louis conducted their own micro experiments and then designed a STEM research project for their own students. Introducing Students to Research and Development provided a framework on which participants developed and practiced inquiry-based, content-rich activities that support student understanding of the research process. Dr. Harland was joined by experts in student research including Allison Hennings (nurse turned teacher at Oak Park River Forest, IL who has implemented a research course), Dr. Jorge Valdez and Ms. Tanaga Boozer from the United States Patent and Trademark Office, and Ms. Mindy Stoller (former teacher at Washington Community High School).

Upcoming Deadlines:

- September 6 – Teachers in the Lead: NGSS in Illinois
- September 27 – World Wide Day of Play
- October 2 – Robert Noyce Connections Conference
- October 7 – SmartGrid Professional Development

More information can be found at our website: CeMaST.IllinoisState.edu
We were very sorry to hear about the early return of Team Mercury, Illinois State’s solar car team, from the annual national solar car race. They had been in the midst of the three-day Formula Sun Grand Prix qualifier when a fire destroyed the Mercury 5 solar car overnight.

Solar car teams from across the world arrived at Circuit of the Americas race track in Austin, Texas this July to compete in the annual solar car race, the American Solar Challenge. The kickoff of the annual solar car event began on July 14th with Scrutineering before the start of the Formula Sun Grand Prix qualifier on July 17th. Scrutineering is three days of inspection and testing by race officials, which all cars and drivers must pass in order to move on to the Formula Sun Grand Prix qualifying race.

After passing scrutineering, Team Mercury moved on to the qualifier. Despite difficulties on day one, day two had the team hopeful that they were on their way to qualifying for the road race. Team Mercury even won the award for the Fastest Dynamics Slalom Test with an 8.5 second slalom. However, the car caught fire in the garage overnight and was destroyed. Team Mercury stayed on to see the other teams off on the road race that started in Austin, Texas and ended in Minneapolis, Minnesota.

Team Mercury returned home to Normal disappointed but already thinking about ideas for the Mercury 6: “While we would have liked for our homecoming news releases to be of a different nature, the reality is: not everything works out as intended. We will be to arriving back in Normal this evening and after a good night's sleep in our own beds, we will begin planning for what our next steps are. We've already begun brainstorming, and we have many options as to where we go from here. The team would like to thank everyone for their condolences and words of encouragement. We will be back!”

Please visit the Team Mercury website at www.solarcar.ilstu.edu or visit them on Facebook or Twitter. The team could use your support.
This July, CeMaST played host to 71 high school students on the Illinois State campus for a weeklong summer research experience, the Illinois Summer Research Academy (ISRA) held July 13th-18th. This marked the 5th year for the academy in which high school students spend a week with ISU professors and other high school students from across Illinois working on various hands-on research projects. Students are introduced to current research projects of ISU faculty and exposed to the tools and techniques that are being used to accomplish this research. Students then make contributions to these research projects or work on their own research projects with their peers. This year’s research opportunities included the following:

**Ecology of Prairie Plants**
Three students worked with Dr. Vickie Borowicz on research projects concerning seed predation of wild indigo or competition between an exotic legume and a native parasitic plant.

*Participants:* Lauren Eckert, Marcus Tecarro, and Molly Widing.

**Biochemistry**
Nine students worked with Dr. Marjorie A. Jones growing *Leishmania tarentolae* (a one-celled organism) performing assays to measure how additions of various compounds affect the cells, and using spectroscopy and microscopy.

*Participants:* Dominick Biggs, Sabrina Bruczas, Nicole Hefner, Sai Krishna Komaragiri, Ian McCormic, Cecily Negri, Abhishek Pandravada, Zachary Sample, and Nihal Voruganti.

**Chemistry**
Five students worked with Dr. Andrew Mitchell focusing their research on the development of new reactions that are either inspired by or directed toward natural products, carbon-based molecules discovered in a variety of environments.


**Computer Mapping and GPS**
Nine students worked with Mrs. Crystal K. Williams applying various Geographic Information System (GIS) technologies to real world problems through hands-on computer and GPS research.


**Opportunities in Computing: A Hands-on Overview of Information Technology**
Thirty-two students worked with Dr. Bryan Hosack and other staff and faculty members from the School of Information Technology on research activities including: using sensors embedded in computers to control temperature, lighting, and other systems; encrypting information; learning how to tear down, troubleshoot, and rebuilding a home computer; robotics; and many others.


**Exploratory Mathematics Research**
Thirteen students worked with Dr. Saad El-Zanati and Dr. David Barker on conjectures, proofs, and counter examples using Latin squares and other topics.

*Participants:* Mariah Bryant, Danyell Cole, Amanda Cortez, O’Rion Craig, Stephanie Flores, Mariah Fulton, Mayra Moreno Jorge Nunez, Luis Rico, Armando Rodriguez, Karina Solano, Elizabeth Soto, and Ashlei Williams.

This year’s Illinois Summer Research Academy was larger than ever, in part due to generous scholarships funded by the National Science Foundation, the Illinois State University School of Information Technology, Department of Mathematics, Office of Research, CeMaST, and the Illinois Geographic Alliance. CeMaST would also like to thank all of the faculty members, staff members, and undergraduate and graduate student chaperones who helped to make this event a success. Be sure to check out the Bloomington Pantograph article, *Robots Build Interest in Computer Technology*, which featured students in the Opportunities in Computing experience.

For more information, please visit the ISRA website: cemast.illinoisstate.edu/students/high-school/summer-academy/
Teachers in the Lead: New Illinois Learning Standards for Science

The Teachers in the Lead: New Illinois Learning Standards for Science conference took place on September 6th at Illinois State University. This conference served as a culminating experience for the teachers involved in the NGSS professional development workshops organized by CeMaST and funded by the Illinois State Board of Education and the U.S. Department of Education. Over 150 teachers participated in these workshops—Real Science and the Next Generation Science Standards, Introducing Students to Research and Development for the High School Classroom, Teaching Next Generation Energy Concepts with Next Generation Science Standards, and Cornbelt STEM Alliance—as authors, curriculum designers, and leaders. These teachers, along with colleagues from across Illinois, participated in and led this conference.

The keynote speakers for the conference were Dr. Lee Shumow from Northern Illinois University, who is a Presidential Teaching Professor in Educational Psychology, and Dr. Brian Reiser from Northwestern University, who is a Professor in Learning Sciences. In addition to the keynote presentations, there were three breakout sessions. Breakout Session I included the following sessions: Kernels of Knowledge; Fail Early, Fail Often: Engineering Student Learning Through Research; A Comparison of Traditional Scientific Modeling and Modeling Through the Lens of NGSS; and Meeting NGSS Standards Through Engineering Putt-Putt Boats. Breakout Session II included: Minecraft Edu: Using Video Games to Teach in NGSS and STEM Classrooms; NGSS: A School District's Journey; Where Does Our Water Come From?; and WIPS Project Director Meeting and Program Update. Finally, Breakout Session III included: Solar Reflection and Energy; Cool Your School and Beat the Heat; Better Presentations; and Smart Grid.

For more information, please visit: cemast.illinoisstate.edu/educators/development/ngss-conference.shtml

Dr. Lee Shumow, Northern Illinois University (left), and Dr. Brian Reiser, Northwestern University (right).