CeMaST Summer Recap

The CeMaST team has been busy this summer with a number of projects in STEM education and professional development, including teacher workshops and STEM activities with students.

The Illinois Mathematics and Science Partnerships (IMSP) program, which is administered by the Illinois State Board of Education funded by the U.S. Department of Education, was created to improve STEM teacher quality and thus improve student achievement in mathematics and science. IMSPs are partnerships led by a regional office of education (ROE), and one of those partners includes an institution of higher education. Members of the CeMaST team are involved with two IMSPs: the Kid Tech Workshop at the Regional Office of Education for Champaign and Ford Counties (ROE #9) and the Illinois Math and Science Partnership: Regional Office of Education #17 (ROE #17), serving DeWitt, Livingston, Logan, and McLean Counties. This summer, the CeMaST team, led by Dr. Brad Christensen, visited Rantoul and Danville for the ROE #9 Kid Tech Workshop to conduct professional development workshops in which teachers participated in project activities designed to teach valuable knowledge and skills in STEM (e.g., designing and racing Muscle Karts) and created lessons using a variety of toys and games to effectively address a given standard. Dr. Christensen also presented a workshop on the importance of STEM projects to pre-K–8 teachers from DeWitt, Livingston, Logan, and McLean Counties for ROE #17.

In addition to the IMSP workshops, CeMaST also holds other professional development workshops for teachers and brings programs such as the Smart Grid for Schools program, Muscle Karts, and the Monster Chopper Challenge to schools. For instance, this May, Dr. Christensen joined students at LeRoy High School for the second day of Workshop Week to lead them in the Engineering Challenge. CeMaST partnered with the Children's Discovery Museum on the First Annual Pushcart Derby on May 20th. Despite some rain, 56 children ages 8–13 joined us in uptown Normal to participate. Each of the eight race teams designed and built the bodies for their cars and then raced them. The CeMaST team also led the STEAM Camp at the Children's Discovery Museum in Normal, which ran from July 31–August 4. This event was a week-long, day camp for children entering Grades 2–6. Dr. Christensen and the CeMaST team led campers in a variety of STEAM activities and projects throughout the week, including building and decorating Monster Choppers.

CeMaST Director Dr. Willy Hunter has also been traveling for teacher professional development and evaluation. As a part of the Fulbright Specialist program, Dr. Hunter has been assisting with STEM education curriculum development and training at Erdiston Teacher Training College in Barbados. Dr. Hunter will also be working as an evaluator for the University of Calgary’s Werklund School of Education on the new STEM course that is required for teacher candidates. The CeMaST team also enjoyed serving as mentors for students from Downers Grove North High School, ITW David Speers Academy, Washington High School, and Williamsfield High School in the STEM Challenge program, which challenges high school students to find innovative solutions to real-world problems. These students had 6 months to “develop a prototype product, plan, process, or system that suggests an innovation and ‘smart’ way to manage everyday energy and/or water use.” The CeMaST team looks forward to our continued work with teachers and students on current and future projects in STEM education and professional development.

For more information, please visit: cemast.illinoisstate.edu
CeMaST Programs on the Road

This has also been a busy summer for CeMaST programs, including Smart Grid for Schools, the Monster Chopper Challenge, and Muscle Karts.

Smart Grid for Schools
The Smart Grid for Schools program, which started in 2014, offers schools the opportunity to learn about the new Smart Grid technology currently being rolled out by the utilities companies in their area. The program engages students from Kindergarten through Grade 12 with hands-on activities and experiments to explore electric utility strategy and planning.

The Smart Grid Interactive Display was on the road early this summer, appearing at a number of events and visiting schools, including El Paso High School and the Goode STEM Academy in Chicago. This display includes three life-size rooms in which students select electrical appliances and plug them in to outlets to discover energy use and how the Smart Meter can help them make better energy use decisions as well as three interactive tables which allow students to connect power lines from the power plants to several different customers. The Smart Grid Interactive Display will be on the road again next year.

Smart Grid Construction Sets have been shipping out to schools all over the state. The Smart Grid Construction Set consists of two components: Smart Homes and Smart Grid. Smart Homes consist of actual Smart Home components, including Smart outlets, thermostats, lights, sensors, Smart Meters. Students plug in and test the energy outputs of real appliances from home or the classroom. The Smart Grid system allows students to experience the development of the power grid through a historical perspective, starting with the discovery of electrical generation by Michael Faraday in the early 1800s and progressing through the decades by adding capacity and complexity to their grid until they make their grid “smart” by adding special meters and switching devices. The Smart Grid team has also been hard at work all summer finishing the new version of the Smart Grid Construction Sets that are shipping out to schools this fall. Smart Grid teacher training sessions are currently scheduled for September and October with additional training sessions later this fall.

For more information, please visit: smartgridforschools.org

Monster Chopper Challenge
Monster Chopper Challenge kits have been on the road throughout the state as well, traveling to Latino Youth High School and the Faragut Career Center in Chicago, the Pekin Academy of Fine Arts, and Metamora Grade School. The Monster Chopper Challenge was also one of the activities at the State Farm Park Summer Camp in July. The Monster Chopper is a kit that allows students from Grades K–12 and adults to build a full-size motorcycle that can then be customized. Although it does not roll, the Monster Chopper Challenge is an exciting and engaging vehicle to teach communication, teamwork, and problem-solving skills as well as specific STEM content.

For more information, please visit: cemast.illinoisstate.edu/educators/monster-chopper/

Muscle Karts
Muscle Karts have also been on the road around Illinois this summer. The STEM Racing Series seeks to revive the sport of push car racing by introducing “Muscle Kart” racing as a means to teach valuable knowledge and skills in STEM that also requires a physical component. Race teams consist of one driver and six runners, all within specific age groups. This activity is appropriate for ages 5–12; however, participant groups have ranged from pre-K to adults. Each racing team starts with a preassembled chassis, which includes steering, brakes, seat, and safety considerations (groups may choose to start with a disassembled kit). The racing teams research, design, and build a body for their cars from cardboard and other inexpensive materials and then race their cars. Participants from all over the state have included students...
in Panther Care in LeRoy, Bureau Valley South in Buda, Peoria Public School District 150, Tilton Elementary School in Rochelle, LeRoy Elementary School, and J.W. Eater Junior High School in Rantoul. As mentioned previously, CeMaST partnered with the Children’s Discovery Museum on the First Annual Pushcart Derby in uptown Normal. CeMaST was also pleased to host and race Muscle Karts with a group from Commerce Bank and visiting international students from Friends Forever International.

For more information, please visit: cemast.illinoisstate.edu/educators/muscle-kart/

16th Annual High School Research Symposium

This year, the 16th Annual High School Research Symposium brought 194 students, along with their teachers and some family members, to the Illinois State campus to share their original work in science, technology, engineering, or mathematics (STEM). The symposium was held in the Brown Ballroom of the Bone Student Center on Friday, April 28, 2017. Students from throughout the state and beyond represented 13 schools and two organizations: Bloomington High School, The Community Builders (Chicago), Fisher Jr/Sr High School, LaMoille High School, Lane Tech High School, Libertyville High School, McHenry Community High School-West Campus, McLean High School (VA), Olympia High School, Oswego East High School, Prairie Central High School, Romeoville High School, Teen Learning Lab of Greater Chicago, University High School, and Washington Community High School.

In addition to presenting their own research and learning about the research of their peers, students also had the opportunity to explore the Illinois Geographic Alliance’s Giant Traveling Map of Illinois and to visit the Smart Grid for Schools Interactive Display and learn more about smart grid technology. The Illinois State faculty presentation this year was “So What Is Organic Anyway?” by Dr. Andrew Mitchell, Associate Professor of Organic Chemistry.

At the symposium this year, students presented 103 research projects to the judges and their peers. Projects included “From Leaf Blower to Hovercraft,” “Developing a Cost Effective and Environmentally Friendly Prosthetic Arm for Use in Developing Countries,” and “Breast Cancer Diagnosis Using Minkowski Distance Method Based Mutual Information and Genetic Algorithm (MIGA),” just to name a few. All of the students should be very proud of their accomplishments, and we look forward to next year’s projects.

We would also like to thank the 34 judges and volunteers for the symposium. Without your support, this event would not be possible.

Please join us next year for the 17th Annual High School Research Symposium on Friday, April 27, 2018.

For more information, please visit: cemast.illinoisstate.edu/students/high-school/research/

Announcements

- The Midwest Regional Robert Noyce Conference, “Connecting STEM Learning to the Community,” will be held in St. Louis, October 14–15, 2017. Current and past Noyce project participants are invited to attend. More information is available at cemast.illinoisstate.edu/faculty/noyce-conference.shtml.
- Three of the K–12 STEM Curriculum titles—Real Science: Pathways to Next Generation Science Standards (middle school and high school) and Real Numbers: Pathways to Common Core Mathematics—are now available for free to Illinois teachers. More information is available at cemast.illinoisstate.edu/educators/stem/downloads/.
This summer, 79 high school students attended the Illinois Summer Research Academy (ISRA) on the Illinois State campus the week of June 25–30. The ISRA, which started in 2010, brings high school students from across the state and beyond to work with their peers and ISU professors on various hands-on research projects. Students are introduced to current research projects that ISU professors are working on and learn about the tools and techniques that are being used to accomplish this research. Students make contributions to these research projects and/or work on their own research projects with their peers. This year’s research opportunities were in biochemistry, computing and information technology, molecular neuroscience, and organic chemistry.

Eighteen students worked with Dr. Marjorie A. Jones, Professor of Biochemistry, in her lab to help grow Leishmania tarentolae and perform assays to measure how additions of various compounds affect the cells and use spectroscopy and microscopy (human Leishmania diseases infect more than 20–25 million people worldwide).

Dr. Glen Sagers, Associate Professor of Information Systems, and other faculty and staff members from the School of Information Technology led 30 students in the “Opportunities in Computing: A Hands-on Overview of Information Technology” program, a series of research activities to learn more about information technology.

Thirteen students joined Dr. Andrés Vidal-Gadea, Assistant Professor of Molecular Neuroethology, and his graduate students in the lab to study the tiny nematode worm C. elegans to investigate the neuronal deficits associated with Duchenne muscular dystrophy (DMD), a disease which affects 1 in 3,500 boys (check out the Pantagraph article at http://www.pantagraph.com/news/local/education/science-boot-camp-challenges-students/article_170de996-4bad-55c6-b9d0-631fe1af779e.html).

With the help of Dr. Andrew Mitchell, Associate Professor of Organic Chemistry, 18 students researched the development of new reactions that are either inspired by or directed toward natural products, using creative thinking, problem solving, teamwork, synthesis, and spectroscopy to observe and understand why a reaction failed to afford the desired product.

We would like to thank all of the faculty members and their students, and we would also like to thank the eight undergraduate and graduate students who served as chaperones for the academy. Planning is already underway for the 2018 ISRA. Please visit the ISRA website in early 2018 for more information.