



*In the Department of Technology and Engineering Education, Associate Professor Michele Dischino (left) and Professor and Department Chair James DeLaura, work with students Elizabeth Chatis (lower center) and Djenne Mobley (top right) to introduce problem-based learning.*

## Michele Dischino

### Sparking Student Interest in Science, Technology, Engineering, and Math

Growing up Associate Professor of Technology and Engineering Education Michele Dischino was mystified by her Etch-A-Sketch™. How did the drawing contraption work? What made that gray powder stick to the screen and then allow it to be shaken free of the drawing surface so that a new picture could be created? She needed to see inside.

Today, with her sense of scientific curiosity firmly intact, Dischino's latest research aims at identifying the most effective ways to capture and keep students' interest in science, technology, engineering, and math (STEM).

"My degrees in engineering (BS, mechanical engineering, Manhattan College, and PhD, bioengineering, University of Pennsylvania) are crucial to my teaching and research," says Dischino, who joined the School of Engineering and Technology six years ago. "But I think it's important for every member of society to have insights into engineering. Can you imagine a world without technology?" She laughs, "Or students without cell phones? I don't want students to think STEM subjects are boring,

useless, and difficult. I want students to be captivated by an understanding of these areas and to feel they can be creative in finding solutions to society's challenges."

Dischino talks about her role as co-principal investigator for an Advanced Technological Education project funded by the National Science Foundation. Titled "Problem-Based Learning for Sustainable Technologies: Increasing the STEM Pipeline," the three-year project began in 2009 and will continue until fall 2012.

She explains that problem-based learning (PBL) is an instructional approach whereby students learn content by actively and collaboratively solving authentic, real-world problems. "Used extensively in medical education since the 1970s, PBL has emerged as an exciting and effective alternative to traditional lecture-based instruction in STEM education. Research shows that PBL improves student learning and retention, critical thinking and problem-solving skills, teamwork, and the ability to apply knowledge in new situations — skills deemed critical for success in the 21st-century workplace."

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The principles of PBL are being used to develop innovative, standards-based curricula with the aim of increasing students' interest and preparedness in pursuing STEM-related careers. "The project principal investigators (myself included) worked with industry collaborators who are breaking new ground in 'green' technologies to create a comprehensive series of online multimedia PBL resources focused on sustainability," she says. Referred to as "STEM PBL Challenges," these instructional materials are designed to engage high school and college students in real-world problem solving.

"These materials build on our previous NSF-funded project, 'PHOTON PBL,' in which we developed similar materials, specifically for educators, on the field of photonics," explains Dischino. The results were very positive; students who used the PBL materials showed increases in their problem-solving abilities, as well as their motivation and self-efficacy. "We're optimistic that the STEM PBL Challenges will prove to be equally, if not more, effective," she says.

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Another goal of the current NSF-funded research, notes Dischino, is to introduce pre-service teacher candidates to PBL methods and to conduct research to determine their attitudes regarding adaptation of these methods into their future classrooms.

Here CCSU plays a critical role due to the strength of its teacher education programs. In spring 2011, 15 CCSU technology education students were enrolled in a required methods course, Teaching Technology and Engineering Education, that was modified to include PBL.

Throughout the semester, students were presented with fundamental concepts related to PBL methodology and introduced to the STEM PBL curricular materials. They were led through the development of these materials and instructed in effective implementation, considering both student and teacher perspectives. Data from the pilot semester of the modified course, including pre- and post-surveys and focus group findings, are currently being analyzed and will be presented at a conference in March 2012.

Dischino's work has gained recognition. One particular point of pride came recently when she learned she was one of 59 women in Connecticut selected as finalists for the 2010 Women of Innovation Awards to honor innovators, role models, and leaders in the technology, science, and engineering fields.

### **Future Scholarly Projects?**

Dischino and her associates are in the process of writing an application for another NSF grant. "We're planning to expand the reach of our two successful PBL projects into the field of advanced manufacturing by creating a new series of multimedia challenges, and we aim to also increase the number of STEM teachers capable of developing and delivering PBL instruction. Our hope is that our efforts will continue to inspire students to pursue careers in STEM."

Dischino notes, "I am particularly excited to be introducing these problem-based learning concepts and materials into our pre-service teacher education courses where they will benefit both our CCSU students and the many young individuals they will go on to teach. As one of only a handful of institutions with an undergraduate degree program in engineering education, CCSU is ideally situated to become a leader in this emerging field."

— Geri Radacsi

## **16th Annual New England Conference on Multicultural Education at CCSU**

In September CCSU hosted the 16th annual **New England Conference on Multicultural Education**. Speakers included James A. Banks, the Kerry and Linda Killinger Endowed Chair in Diversity Studies and founding director of the Center for Multicultural Education at the University of Washington, Seattle; Lee Mun Wah, documentary filmmaker and director of the new film *If These Halls Could Talk*; and Kris D. Gutiérrez, professor of literacy and learning sciences and holder of the Inaugural Provost's Chair at the University of Colorado, Boulder. Sponsors included CCSU's School of Education and Professional Studies' Center for Multicultural Research and Education, the New England Equity Assistance Center at Brown University, and the Connecticut State Department of Education.