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Two MSU engineering professors' teaching methods featured in journal

June 5, 2014 -- Tanya Reinhardt, MSU News Service

BOZEMAN—Two MSU electrical engineering professors have researched new teaching methodologies for engineering and published their findings in the May issue of an engineering education journal.

Brock LaMeris and Jim Becker, professors in MSU's Electrical and Computer Engineering Department, were published in the international engineering magazine "IEEE Transactions on Education."

IEEE stands for the Institute of Electrical and Electronics Engineers, and "IEEE Transactions on Education" is a quarterly peer-reviewed academic journal that features articles related to engineering education.

"There are only six articles featured in the journal and to have two of them from Montana State University is quite impressive," said Robert Maher, electrical engineering professor and department head. "It really shows an institutional commitment to bettering our processes. We are all about student success, and because of that we are always seeking the most effective ways to help them learn."

In the article "Project Circuits in a Basic Electric Circuits Course," Becker compares student learning in a sophomore-level electrical circuits course using conventional lectures and lab work, versus a new approach using hands-on experimentation and problem-based group work to solve circuits.

"I wanted to find a way to add a more practical component to the circuits course," Becker said. "The idea is to have the students focused on an actual and relevant circuit project where they work together to figure out the principles and procedures instead of being told the facts and answers."

According to Becker, the students were pleased with the active engagement and learning, and some have requested similar projects in other courses he teaches.

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From left to right, MSU electrical engineering professors Jim Becker and Brock LaMeris were featured in the premier publication for engineers "IEEE Transactions on Education" in May. MSU photo by Kelly Gorham. [High-Res Available](#)

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Students worked on circuits ranging from those with medical applications to circuits used in audio applications and in determining strain in metal beams.

“By introducing project circuits the students were more engaged and they benefited from a deeper level of learning,” Becker said. “An additional benefit was the interpersonal communication skills the students developed while working on the project. Building communities enhances engineering programs and increases the likelihood of student success.”

Becker earned his doctorate from the University of Michigan, Ann Arbor and joined MSU in 2001. Becker received the National Science Foundation CAREER award partly for his research into active learning methodologies and distance learning in 2004. His most recent work in educational research has been funded through two NSF curriculum innovation grants.

Becker and LaMeres have both assumed active roles in developing new teaching methods for engineering students and have received recognition and numerous grants from IEEE, NASA and the National Science Foundation.

LaMeres’ research paper compared the differences in how well students learned the material in a digital systems curriculum using an online delivery as opposed to face-to-face lectures. LaMeres also created technology to administer the laboratory component of a digital course remotely so that the students could take the entire engineering course online.

“I measured student learning outcomes and student satisfaction,” LaMeres said. “As educators one of our big concerns in the online era is maintaining quality when moving course work online, and what type of material is suitable for online presentation and learning.”

LaMeres believes online courses can offer three benefits: accessibility of courses for students transferring into MSU, scheduling flexibility for current students and more options for non-traditional students who could take an online course in the evenings.

“Online education really depends on the content and type of class,” LaMeres said. “It is important to look at the material presented in different courses. The results were positive for the digital circuits curriculum, but online delivery might not be as effective for other types of courses.”

LaMeres has published more than 60 manuscripts and a textbook in the area of high-speed digital systems and is a Senior Member of IEEE, a registered professional engineer in Montana and Colorado and serves as the faculty advisor for the MSU student branch of IEEE

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