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From the Editor

With this our third issue, AEE has arrived! We are delighted to be able to publish six papers that illustrate the diversity of the advances occurring in engineering education. These papers span a number of topics of relevance to engineering education—active learning, mechanics of materials, convergent-divergent design, cooling of electronic components, green engineering, using concept maps for assessment, blending teaching and computer programming skills, and retention of freshmen engineering students. Further, not only are we beginning to have a backlog of quality papers to present to the engineering education community, but we should now be able to maintain a regular schedule and hopefully will soon be meeting our goal of four issues a year.

We present a paper by colleagues from four universities that addresses an innovative approach to active learning. Julie Linsey, Austin Talley, Christina White, Dan Jensen and Kristin Wood have focused on mechanics of materials and have written a paper that provides a number of creative ways to appeal to various learning styles. In total, they have created and successfully tested a series of 28 active learning products (APLs). Their paper includes an overview of the applicable educational theories and how they apply to the develop of APLs. An evaluation is presented that demonstrates the effectiveness of the ALPs as a learning tool.

Kevin Dahm, William Riddell, Eric Constans, Jennifer Courtney, Roberta Harvey and Paris von Lockette have successfully combined design and technical writing in a sophomore level course at Rowan University. In doing this, they have adapted Dym's model of Convergent-Divergent Design. They propose that an effective design process requires both divergent and convergent thinking. Consequently, a workable cognitive model would be an alternating series of divergent and convergent steps. Using this model, they have re-tooled the Rowan sophomore design clinic, replacing a semester long design project with a much more effective series of smaller project that better instill the convergent-divergent design model. The net effect, described in the paper, was a documented improvement in the students' technical performance.

Nicole Okamoto, Tai-Ran Hsu and Cullen E. Bash have created a thermal management of electronics course and laboratory at San Jose State University. In doing this, they address an important, but too frequently overlooked design problem—the cooling of electronic components and equipment. Their course includes lectures, a term project, a computer modeling project, and six associated experiments, most of which is available via the course website. Using pre- and post- tests, they have documented a significant increase in student understanding of fundamental thermal management problems.

Maura Borrego, Chad B. Newswander, Lisa D. McNair, Sean McGinnis and Marie C. Paretti have focused on assessing interdisciplinary knowledge integration. In their particular case, the focus is green engineering and their primary assessment tool involves the use of concept maps. Their year-long study of a green engineering design course at Virginia Tech documents the viability of using concept maps for assessment, and the learning potential of the course. However, in using an interdisciplinary group of faculty to score the concept maps they discovered differences in evaluation criteria, expertise, and investment. They offer our readers suggestions as to how to best use and score concept maps when addressing interdisciplinary knowledge integration.

Almost every engineering program must deal with the challenge of teaching first year engineering students some form of computer programming, usually in large classes. Abbas El-Zein, Tim Langrish and Nigel Balaam, three colleagues at the University of Sydney (Australia) present a flexible learning approach for effectively addressing this challenge. Their paper describes the design and development of a WebCT-based self-practice online tool (SPOT) that supports the learning of computer programming skills. Their tool consists of three components- programming syntax, understanding the way programs work and writing programs. The paper discusses the integration of the tool into the course and its role in student assessment. Qualitative and quantitative data on student reactions to the tool and its usefulness in achieving learning outcomes cost-effectively are presented.

Freshman engineering retention remains a problem of concern, even after two decades of study. Cindy P. Veenstra, Eric L. Dey and Gary D. Herrin propose a working model for freshman retention based on Tinto's interactionalist theory. Their model uses pre-college student characteristics as predictors of first year academic success and retention. A comprehensive literature search is used to identify significant pre-college characteristics that best predict freshman engineering success and retention, which were then used with empirical data to develop a series of models. They then apply their model to data from the University of Michigan. The results show that High School Academic Achievement, Quantitative Skills, Commitment to Career and Education Goals and Confidence in Quantitative Skills predicted student success as measured by the first year grade point average (GPA). Engineering programs concerned about first year retention may want to carefully examine this model's framework as a starting point

Sincerely,

Larry Shuman
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