

# Guest Editorial

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Learning is an activity: it is something you do, not something that is done to you. Teaching is successful if it results in student learning. Today, more and more engineering schools around the world recognize the importance of Active Learning. Active means everything but passive; the whole idea is to be active in your learning all the time. Engineering students need to develop skills, not just knowledge, to fulfil contemporary work requirements.

Active Learning is promoted by an international network: Active Learning in Engineering (ALE). ALE was established in 2000, when the first international ALE workshop was hosted by the Simon Bolivar University in Caracas, Venezuela. Since then, ALE has organized international workshops annually, shifting from continent to continent. After holding the event in Europe twice in a row (Nantes, 2004 and Delft and Amsterdam, 2005), ALE moved back to the Americas, to Tecnologico de Monterrey in Mexico in 2006. This special issue, offering examples of research done in this area, includes some of the papers from the ALE 2006 Workshop.

The paper, "Systematic creativity, challenge-based instruction and active learning: a study of its impact on freshman engineering students", reports an experiment using systematic creativity tools, challenge-based instruction, and active learning methods with freshman mechanical engineering students during the course, Introduction to Engineering, at Tecnologico de Monterrey, Monterrey Campus. The aim was for students in the experimental group to enhance their creative and critical thinking skills during their academic efforts in the course.

The paper, "An Educational Framework based on Collaborative Reverse Engineering and Active Learning", suggests re-structuring learning through reverse engineering. This study examines practical aspects of the methodology developed, such as the efficiency of educational strategies in materializing advanced learning concepts. It concludes that the proposed strategies have a direct, positive impact on a student's ability to generate and synthesize knowledge.

A contribution to the enhancement of teamwork skills and independent-learning skills is described in the paper, "Development of transferable skills within an engineering science context using problem-based learning". The authors find that students who were taught using PBL rated their progress in teamwork skills significantly higher than their peers taught in the traditional way.

In a case study, "Learning how to learn medical signal processing in the university", the author recognizes the growing popularity of modern teaching and learning environments such as Active Collaborative Learning (ACL) and Project Based Learning (PBL), and points out a lack of preparation among students for the new learning environment. This paper reports experiences in designing a course in biomedical signal processing based on the concepts of active learning in an ACL/PBL framework. The study stresses the importance of formally educating students with contemporary best practices in university education.

Two papers in this theme issue focus on teamwork skills and collaborative learning. Integrating active learning and assessment is the contribution of a paper on the use of Interactive Capstone Portfolios that concludes that these activities develop communication skills for working within an industrial environment. The paper gives examples of ongoing capstone portfolio content and considers its impact on student creativity, learning and self evaluation.

The paper, "Active learning and assessment within the NASA robotics alliance cadets program", investigates the NASA Cadets' use of Active Learning within an educational experiment co-developed with Cornell University to meet the nationally recognized need for a formal assessment standard. Their analysis of student questionnaires concludes the theme issue on Active Learning and shows that engineering students have positive attitudes toward cooperative learning and towards the use of computers in engineering problem solving.

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