# Editorial

This issue of the IJEE is divided into two sections. The first section is a special issue on STEM education. It has seven papers expanded selected papers from the 2012 International STEM in Education Conference, Beijing, P. R. China. I would like to thank Dr. Feng-Kuang Chiang for guest editing this issue.

The second section has 17 contributions related to a variety of engineering education topics, including: Creativity, Problem-Based Learning, Motivation, Retention, Student Stress, Professional Skills, Oral Presentations, Ethical Reasoning, Assessment, Computing Engineering, Virtual Laboratories, Software Tutorials, Robot Simulation, Architectural Design, Physics & Engineering, and Outreach. The authors discussing these issues are from Denmark, USA, Spain, UAE, Pakistan, Malaysia, Belgium, Saudi Arabia, Kazakhstan, Australia, Israel, Serbia, and Egypt.

The first two papers address issues related to creativity. Zhou and Kolmos investigate how students perceive the interplay between individual and group creativity. They present the results of qualitative interviews of numerous students in varied engineering disciplines at Aalborg University. Tolbert and Daly examine how the first-year students view the role of creativity in engineering, the opportunities they see for creativity in their design projects, and the impact of various factors on the choices to pursue creative opportunities.

Problem-based learning is investigated by Mateo-Sanz et al. who introduce two new Moodle modules aimed to enhance a problem-based learning approach. One of the modules enables the creation of questions containing random numeric variables with answers computed automatically. The second module deconstucts a problem into a set of questions displayed consecutively through the browser. The impact of the two modules on the performance of students is analyzed.

Issues related to motivation, retention, and stress are discussed in the three papers to follow. Dadach examines the effect of an active learning strategy on the motivation of students in a process control course. A measure of the effects of the strategy on students motivation is introduced. Geisinger and Raman present a study that identifies the factors that lead students to discontinue their studies. The work is based on an extensive review of the literature related to student retention and attrition. Rizwan et al. analyze factors that affect the stress level of engineering students who come from remote areas. The analysis is based on surveying a large number of students in Pakistan. The most critical stress-causing factors are presented.

The next group of papers discuss various aspects of soft skills including presentation skills and ethical decision making. Bakar et al. present a program of study that aims at creating enthusiasm among high school students to study engineering and to develop the soft skills needed to become a good engineer. They include communication, teamwork and life-long learning. The program is a one-year, project-based learning experience with a focus on microcontroller applications with engineering undergraduates serving as mentors. It was was assessed through questionnaires and interviews.

De Grez and Valcke describe the implementation and evaluation of an instruction format aimed to help engineering students learn oral presentation skills. It is based on the integrated use of a Student Response System for peer assessment. Several aspects related to this approach are investigated including: whether students are good assessors, the impact of practicing, whether good presenters are good assessors, the impact of self efficacy, and perception of the learning process.

Rudnicka et al. use two models to study the engineering team-based ethical decision making and the process of ethical decision making by engineers. They also assess factors that could affect the quality of the resolution and the decision process.

Sharaf et al. discuss the results of a study carried out in Saudi Arabia to rank generic competencies required from engineering graduates. The study is based on data collected through questionnaires completed by engineers working in industry and academics. The questionnaire included fifty competencies grouped into four categories: knowledge and understanding, personal and professional skills, interpersonal skills, and practicing skills.

An approach to assessment is presented by Adair and Jaeger who discuss a scheme based on probability theory for multiple-choice testing; it takes into consideration partial knowledge and omissions of responses. They compare the scheme with other methods which also take partial knowledge into account and with a conventional dichotomous method of scoring.

The papers following focus on computer applications, software, and simulations.

Martin et al. present both quantitative and qualitative analysis of the use of collaborative learning, as opposed to project-based learning in a database course. Blostotsky et al. suggest an active training method for studying the behavior of bridges with base isolation systems under earthquakes. The method includes creating

and testing of bridges' numerical models in the classroom, and further analysis of results by the students, aimed at drawing practical conclusions under the teacher's supervision. Implementation of the method in teaching an undergraduate course is presented and explained. Novakovic et al. compare and contrast the effectiveness and efficiency of two software tutorial forms: one that uses static illustrations and the other that employs animations. The comparisons are based on assessing various aspects participants' performances and choices.

Taha et al. assess the learning environment of a game-based robotics simulator in as compared with a conventional robotics simulator. The assessment is based on students' perceptions using two questionnaires involving undergraduate and graduate students.

El-Fiki reports on a process-based approach to efficiently teach a first course on architectural design. The approach described has two phases. The first phase comprises six steps that are planned as a medium for gradual and cumulative learning of principles of architectural design. The second phase consists of four steps; it introduces students to a systematic design process that they can pursue in their future academic and practical endeavors. The outcomes of the approach are also presented.

In the final paper Gero introduces an interdisciplinary program implemented at a high school that is affiliated with the Israeli Air Force. The program integrated physics and engineering and dealt with the structure and principle of operation of weapon systems used in aviation. Also presented is an assessment of students' attitudes towards the program and the impact on their attitudes towards physics and engineering.

I wish to thank all the authors for their valuable contributions. I hope, as usual, that the readers find this issue of the IJEE interesting, useful and thought provoking.

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