Editorial

I would like to welcome readers to the first issue of 2013. This issue, as with many before it, addresses a variety of topics dealing with engineering education, including: PBL, Innovation, Team work, Creativity, Entrepreneurship, Service Learning, Leadership, Engineering Thinking, Motivation, Academic Performance, Laboratory Development, STEM, Outreach, Professional Skills, International Engineers, Technological Tools, Mechanical Engineering, Computer Engineering, Process Automation, Control Systems, and Manufacturing. Contributing authors for this issue are based in various countries including (alphabetically): Australia, Austria, Botswana, Brazil, Canada, Chile, Cyprus, Denmark, Ecuador, Israel, Italy, Mexico, Slovakia, Taiwan, and the USA.

Contributions to PBL, innovation, and creativity are included in several papers. Zhang et al. presents an investigation in problem- and project-based learning curriculum to shed light on how educators and students conceptualize innovation and compare and contrast their views. The findings are situated within relevant literature which is critically and comprehensively reviewed. Nepal compares two teaching and learning approaches (problem-based learning and traditional lecture–tutorial teaching) through an analysis based on data from students' performance, course evaluation and expectation in two large undergraduate engineering courses. Reasons that may deter educators from switching to PBL are reported. Jaeger et al. introduce the Learning and Innovation Factory for Integrative Production Education (LF) at the Vienna University of Technology through a case study. The Factory provides an immersive learning environment resulting in, as the authors describe it, an integrated hands-on and 'heads-on' educational laboratory. Johri et al. present a framework for examining the role of computers in supporting creative collaborative engineering design. They illustrate the usefulness of this framework by presenting their findings from a case study of a collaborative engineering design project. Zappe et al. examine the practices and beliefs of educators in the entrepreneurship programs that target engineering students. They address issues such as how educators define the entrepreneurial mindset, whether they believe that the entrepreneurial mindset can be developed, the way they teach entrepreneurship, and whether there is a relationship between their teaching practices and their beliefs. Lou et al. present an instructional model for blended TRIZ (Theory of Inventive Problem Solving) creative learning; along with presenting a verification approach. Suggestions for revising the model are also presented. Bowen presents an analysis of historical technical innovation and engineering knowledge trends based on US patent data which is readily available. This leads to a perspective on the practice of parsing technological knowledge to define new engineering disciplines. Further findings and suggestions are presented.

Leadership is addressed by two papers. Shelby et al. investigate how an engineering service learning module with a focus on leadership can affect engineering students' confidence level for technical and professional traits. The module was offered as part of a first-year course that aims to expose freshmen to general engineering principles. They address the impact of the module on the confidence levels of women and men and on their confidence in and perceptions of leadership. Yueh reports a case study on the implementation of the portfolio practice in an engineering leadership block curriculum and assessment of students' perceptions of this practice. It also provides implications for advancing engineering education with this approach.

Engineering thinking is addressed by Trotskovsky et al. They investigate engineering-thinking misunderstandings and misconceptions of students studying electronics, mechanical and software engineering. The investigation is based on the analysis of interviews with experienced lecturers. Three levels of engineering-thinking misunderstandings are identified. The match between the misunderstandings and the system of categories is also investigated.

Motivation is addressed by Brown et al. They investigate motivational factors behind students' participation in an in-class peer tutoring program. Tutors were interviewed using a semi-structured format with an open-ended interview protocol using both general questions about their experience with the program.

The next two papers relate to academic performance. Palmer presents an academic analytics investigation into the modelling of academic performance of engineering students. The model uses student data the institute maintains, in order to predict the academic performance of students. Predictor variables are identified to be used to develop specific interventions to improve student success and retention. Jouaneh et al. discuss the impact on teaching and learning of take-home experiments. The approach was used in four undergraduate mechanical engineering courses. Students were provided with a compact, low-cost kit to enable them carry out experiments at home using their own computer. The evaluation was based on input from students and post- and pre-course quizzes.

Two more papers address the topics of outreach and STEM. Zeid et al. present a study with the purpose of

training high school teachers in using a new educational methodology that promotes engineering-based teaching and learning . Their experiences with the implementation in their classrooms are evaluated. The study is intended to contribute to the understanding of how high school students deal with subjects related to STEM.

Fang et al. describe a case study of K-12 engineering education in which an engineering example is integrated into a computer simulation learning module. The objective is to improve the knowledge of some physics concepts amongst students. The approach was assessed through students' input from a survey and pre- and post-module tests.

Skills for industry are investigated by Walczak et al. They present an analysis of a Chilean industry survey of to investigate the relation between the desired and actual graduate professional and technical skills. They put forward suggestions, based on the finding, for teaching professional skills.

Integrating intentional engineers into a new country is addressed by Ingram et al. They discuss an exploratory study aimed to examine the role of a cooperative education term in the integration of immigrant engineers into the Canadian engineering profession. The participants were enrolled in a university-based qualifications recognition program, of which a co-operative education term is one critical component. Focus group interviews were used to collect data which were analysed through a theoretical framework of cultural categories and social and cultural capital. The enabling and disabling aspects of a cooperative education experience on the career development of an immigrant engineer are identified.

Technology tools, laboratory and course development are addressed by the final set of contributions. Do Carmo et al. study the potential of Web 2.0 tools in engineering education. They address the issue of how engineering educators could use Web 2.0 tools to improve teaching strategies. Mulia et al. introduce a System on a Chip design tool: the Progressive Learning Platform (PLP).The hardware components are written in HDL and available as open source. The package include an assembler, cycle accurate emulator, and board interface software which is written in Java and also available freely. Perdukova and Fedor present the design and development of a web-based virtual laboratory architecture that supports the study of process automation. The architecture is independent of hardware and software configurations. Ibrahim and Hasna introduce a low-cost home-made microcontroller-based temperature control system. The objective of the system is to support teaching of an undergraduate automatic control course. Various digital controller algorithms and PID tuning methods can be programmed and tested using the kit. Secundo et al. presents a description and the results of a case study of a two year postgraduate program that aims at developing graduates who are able to meet the requirements of intelligent and sustainable manufacturing. Hincapié et al. present the development and results of a case study involving a didactic teleoperated cell and the cooperation between universities in Mexico and Ecuador through the Internet2 network. The software that integrates all the control systems was developed by students of both universities Students were surveyed and assessed to evaluate the impact of experience.

I wish to thank all the authors for their valuable contributions. I hope, as usual, that the readers will find this issue of the IJEE interesting, useful and thought provoking. As well, I would like to wish all a productive and prosperous new year.

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