Editorial

I would like to welcome readers to the first issue of 2012. The issue, as with many before it, addresses a variety of topics dealing with engineering education.

The first four papers delve into aspects of Problem and Project-Based Learning. Zhou et al. report that formal and informal group discussions, regular supervisor meetings, common goals, support of peers and openness stimulate motivation in a PBL environment. They also discuss how students think time scheduling is a barrier to group creativity. Codur et al. discuss a rather unusual application of Project-Based Learning in software engineering; where the projects are based upon using historical software development methods. The objective is to provide students with the experience of software development planning. In the third paper, Fang presents a project-based active and collaborative learning approach that is applied to an upper-level undergraduate course. Students indicated that the approach enhanced their teamwork and communication skills, business knowledge, and entrepreneurship skills. Lou et al. developed a learning environment to resolve the restrictions of time and space on student learning as a means to help students develop a positive attitude toward active/interactive cooperative learning and foster creativity.

The impact of internship and apprenticeship programs are discussed in papers by Galeano et al. and Blandin. Galeano et al. present the Internship in Research and Innovation Program; which includes research and innovation as part of the curriculum. The program has been operating for eight years and has led to international publications, technical developments, innovations and patents, industrial research projects, and improved training of researchers. The results of four years of researching the impact an apprenticeship program had on the competence that students develop is presented by Blandin. The work aims to answer the questions: How does one know that the learning outcomes achieved are those described in terms of competencies in one's competency framework? How does one assess that this is true?

Aspects of final year projects, FYP, are discussed in two papers. Filella et al. present a methodology based on the use of an electronic portfolio for supervising the final year projects. Its purpose is to maintain the motivation of students throughout their project process; decreasing stress level and increasing the interaction between students and teachers. Enhancing the well-being of students leads to improved academic performance and increased the rate of project completion. Ortiz-Marcos et al. investigated the impact of the final year project on the competences of students; the competence model considered is that used by the Accreditation Board for Engineering and Technology (ABET). The investigation involved two Spanish technical universities; one public and one private. Despite the differences between the FYP concepts at the two universities, competences are reinforced in a similar manner.

Self-efficacy and related traits are discussed in thee papers. Lawanto and Johnson investigated the relationship between cognitive self-appraisal (CSA) and cognitive self-management (CSM), and the level of difficulty for electrical-computer engineering, mechanical engineering, and computer science students working on their senior design projects. Meyers et al. investigate the relationship between engineering identity for students and professionals. The study involved 700 students and 500 alumni within 10 years of receiving their undergraduate engineering degree. Brown and Burnham examined the changes in mathematics self-efficacy of students over the course of a freshman engineering mathematics.

Martínez-Mediano and Lord describe a multidisciplinary and international collaboration between an education professor from Spain and an engineering professor from the USA. An innovative program for Life-Long Learning Competencies for Engineers was developed and presented in a workshop to students. Jesiek et al. address the questions about what global competency means, and how it might be developed and assessed. They discussed the idea that cross-cultural competence is a key facet of global competency for engineers. Then, they present a study of US engineering students to determine their openness to and appreciation of cultural diversity. Ball et al. present a study aimed at the validation of a comprehensive set of global competencies for engineering students. A set of 23 global competencies was identified and arranged within five broad categories. They were validated by two professional groups who rated each of the competencies based on their importance. Mohtar and Dare present a global service learning experience; the Global Design Team (GDT). The paper presents the GDT model and assessment of the results of two experiences in Kenya and Palestine. The impact of these experiences on the global competence of engineering students is addressed.

Variawa and McCahan suggest that the language used in engineering course materials may be a barrier to accurate assessment because students perceive the meanings of words differently. They investigated whether students can accurately self assess their understanding of vocabulary.

Lindsay and Wankat pose the question: Can remote laboratories fungibly replace the in-person experience? I have to say that the word "fungible" is not a commonly used word. The authors suggest that it does not simply mean *replaceable.* It means *replaceable in such a way that it doesn't matter where the replacement comes from; it's just as good as the original*. I hope the readers find this word intriguing rather than being a barrier.

Jerez et al. suggest that some engineering degree students feel unmotivated and thus under perform in their programming course because they feel that the topic is irrelevant to their discipline. The paper presents work done over a ten year period to resolve this difficulty. A novel pedagogical methodology was introduced to design the practical exercises for the Laboratory Course for Programming. Concept maps were used as a source of topics around which class exercises were designed. The design was based on a questionnaire that was given to lecturers of the core subjects not directly related to programming.

Hollander and Givoli argue that engineering approximations are at the heart of engineering education and practice, yet students are rarely equipped with quantitative estimates of the errors associated with such approximations. They suggest that there is need for in-class discussion on quantitative error estimates, as part of the engineering curriculum. The torsion of elastic rods with thin walled cross sections is presented as an example.

Shafipour and Fetanat present educational software to design wire winding of electrical machines. It is intended to help both the students and lecturers to design wire winding diagrams easily. The software could be included in MATLAB Power System Toolbox and could be used though the web.

Gonzalo explains how to set up a practical experiment to teach the mechanics of flight by means of a modular aeroplane that can be designed and assembled by the student for specific mission requirements. A catalogue of hardware modules allows the real-time construction of many types of aircraft ready to perform flight practices. Given its modularity, the approach is affordable. A companion tool has been implemented to provide a preliminary estimate of the aerodynamics of the model, the flight stability and control. A number of examples have been provided.

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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