

Editorial

The papers in this issue address a wide range of engineering education topics, which include: simulations and simulators, web-based instruction and evaluation, cooperative learning, assessment, curriculum design and integration, sustainability, creativity, STEM learning, as well as international experiences spanning Ireland, Lebanon, Germany, Nigeria, and Norway.

The first three papers relate to simulation and simulators. Hewlett and Wilamowski propose an approach to simulate dynamic systems using the free software SPICE. The tool used is simple and allows students to focus on the problem rather than the tool. The authors provide technical details and discuss the impact on teaching and learning. Mateo Sanguino and Andújar Márquez introduce an educational simulation tool, 3D-RAS, for kinematics analysis of robotic arms. The authors provide detailed technical information and a pedagogical assessment of the tool. The third, a paper by Sánchez et al. introduces the simulator SiMR; it integrates an assembler program and a simulation tool of the Rudimentary Machine. Assessment data of the simulator is also presented and discussed.

Issues related to web-based learning and testing are addressed by the next five papers. Shen and Yang introduce an artificial intelligence-based system to assist students in understanding the theory and applications of artificial intelligence. The authors present a detailed evaluation of the system. The impact that the implementation of online interactive exercises has on the success of the students' projects is discussed by Molcer and Delic. They present data and analysis to show that interactive exercises enhanced the outcome of project-based learning and improved the students' motivation. Paya and et al. report on a new interactive tool that enables students to monitor and control the evolution of a group of mobile robots using the Internet. The authors also report on a detailed analysis of the impact that the tool has on teaching and learning. An autonomous online safety module to enhance the curriculum is presented by Keren et al.; an analysis of the effectiveness of the approach is presented as well. Finally, an approach for blended-learning is investigated by Forcada et al. They conclude that effective integration of face-to-face sessions and ICTs is the basis for a successful design group-based blended learning course.

Seven papers address curriculum design, teaching approaches and related issues. A series of experimental investigations was conducted by Hsiung; the author concludes that the benefit of cooperative learning may depend on the academic ability of the individual members within the team. Cinar and Bilgin present an analysis of peer assessment of teamwork projects. They conclude that it is a viable tool for evaluating individual contributions as long as human bias is adequately reduced. Ssemakula et al. introduce a methodology to determine the core learning outcomes of manufacturing curricula. This work shows how curricula that differ in their detailed implementation can be developed based on a common set of core learning outcomes. Balasubramanian et al. describe a collaborative project to design a nanotechnology option based on the spiral theory. The authors present a detailed analysis and assessment of the approach. Ortiz et al. describe a methodology for curriculum integration in a first year course of a chemical engineering program. The approach is based on coherent identification of issues belonging to the subsequent learning cycles of the program. The authors present a detailed assessment of the approach. Depcik et al. present a flexible program for capstone design projects. It aims to create a curriculum-wide methodology that relates theory and practice and leads to improved designs. Creativity in design projects is addressed by Takai. Initial results show that creativity methods taught in an experimental course may improve creativity but not necessarily the performance of design projects.

Issues related to STEM learning are addressed by the next two papers. The first, by Lyn English and co-authors investigates the perceived gender differences in middle school. They conclude that despite equal opportunities for both boys and girls, boys perceive themselves as more successful than girls in science. The authors put forward suggestions that may help to overcome this problem. The investigation of the effectiveness of an online STEM project-based learning approach for female high school students is presented by Lou et al. Analysis of the project and its impact are presented as well.

The next five papers in this issue address international teaching experiences. Lynch and Walsh examine the continued decline in popularity of engineering among second level students in Ireland. Baytiyeh and Naja investigate the factors influencing Lebanese students to pursue a doctorate degree in engineering. Chiang et al. report on the attitudes of German students towards the use of information technology tools in instruction; it seems that the views of the students depend upon gender and age. Jian discusses teaching experiences in

Norway and compares it with experiences in Taiwan. Experiences from Nigeria are reported by Abdul and co-authors. They report on the use of a novel pedagogy incorporating a Desktop Learning Module for effective Hands-on Active Learning. The authors present an assessment of the impact of the approach on the academic performance of the students.

I would like to thank all the authors for their important contributions and I hope the readers find this issue of the IJEE interesting and informative.

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