Guest Editorial

The impact of E-learning on engineering education has grown rapidly in recent decades. E-learning research in engineering education is interdisciplinary. While some studies focus on the effects of information and communication technologies (ICT) on teaching and learning, others examine the socio-cultural implications in varied training and learning contexts. Building upon the two previous IJEE special issues on E-learning (emerging technologies and social networks), this special issue is intended to answer the following research questions, with a specific focus on the pedagogical and learning issues in engineering education:

- What are the effective pedagogical methods with regard to the use of E-learning technologies in engineering education?
- In what ways can E-learning technologies be used to facilitate students' learning process?
- How are students' learning outcomes assessed in an E-learning context? Can those outcomes be validated? Are they reliable?
- What pedagogical theories and models are used by curriculum development and instructional design teams?
- How do curriculum development and instructional design teams address the diversity of learning styles among students?
- How are different assistive technologies used to support E-learning platforms?
- What are students' perceptions and experiences of different E-learning platforms?
- What types of collaborative activities can be implemented in an E-learning setting, and how may those activities assist students' learning processes?
- What communication mechanisms are used to support E-learning courses?
- What types and levels of interaction do students have with their peers and tutors?

Specific proposed topics for the special issue include:

- Integration of E-learning technologies into engineering curriculum
- Courseware development
- Computer Mediated Communication (CMC)
- Computer Supported Cooperative Work (CSCW)
- Learning Management Systems (LMS) implementation examples and issues
- Blended (Hybrid) E-learning models
- Ubiquitous computing applications and issues
- E-learning evaluation and assessment
- E-learning 2.0 (Web 2.0 tools and services: blogs, Facebook, serious games, virtual worlds, wikis, etc.)
- Social and affective issues in E-learning contexts
- Virtual E-learning universities, classrooms, and laboratories
- E-learning accessibility

After the review of more than 50 manuscripts, 13 outstanding papers are included in this special issue. They cover a range of important topics on E-learning in engineering education: (1) blended E-learning, (2) implementation and evaluation of E-learning systems, (3) assessment of E-learning methodologies, (4) Web 2.0 in E-learning (a.k.a. E-learning 2.0), and (5) E-learning in engineering disciplines. In addition, this E-learning special issue is global in that it covers scholarly work and data across 10 different countries, including China, Denmark, Germany, Israel, Japan, Norway, South Korea, Spain, Taiwan, and United States. These papers are briefly described as follows.

Blended E-Learning

Chiang and Wang from National Cheng Kung University, Taiwan, present a dynamic learning community called "in-flipped classroom" that integrates the concepts of flipped learning, collaborative learning, and problem-based learning into a blended E-learning environment. A college and university classroom environment inventory was used to investigate student learning performance in the in-flipped classroom.

Nicholls and Restauri from Southeast Missouri State University and The University of Alabama in Huntsville, USA, examine the development and assessment of micro-lectures in a blended undergraduate engineering economic analysis class. Data from student usage of the micro-lectures, students' prior academic performance, exam performance, and their demographic variables were collected and analyzed through a quantitative methodology.

Park from Dankook University, South Korea, presents an instructional design model with guidelines for blended learning in industrial engineering education. Task analysis methods, activity theory, and PARI (Precursor-Action-Results-Interpretation) were used to identify troubleshooting problems in an engineering energy audit course.

Implementation and Evaluation of E-Learning Systems

Gnaur and Clausen from Aalborg University, Denmark, examine the effect of podcasts on student learning in a graduate course in structural engineering. Student perceived benefits of the course podcasts were investigated. A mixed method (both qualitative and quantitative) was used to report their findings.

Huang et al. from National Tsing Hua University and the National Center for High-Performance Computing, Taiwan, investigate the accessibility issue of E-learning for visually-impaired learners. The implementation of Digital Accessible Information System (DAISY) was examined by using an experimental design.

Kvadsheim et al. from Oslo and Akershus University College of Applied Sciences, Norway, report a quantitative study of clicker use in an undergraduate compute science course. They used a controlled and randomized experiment to measure student learning outcomes at different levels of cognitive capability.

Uğurlu from the University of Tokyo, Japan, proposes an intelligent E-learning system that incorporates user voice activity information to build a collaborative learning environment. Based on the pitch frequency, power amplitude, and duration of a voice activity signal, he integrated the technique of voice activity detection to implement the E-learning system.

Assessment of E-Learning Methodologies

Hettiarachchi et al. from Universitat Oberta de Catalunya, Spain, implements an E-assessment system by using a formative assessment model. The effectiveness of the system was evaluated by using student data in a Logic course at an online university.

Pamplona et al. from Universidad a Distancia de Madrid and Universidad Politécnica de Madrid at Madrid, Spain, present a design model for formative assessment and investigate its effect on student learning in an online operating systems course. They used a qualitative case study methodology to collect and analyze data from nine student participants.

Web 2.0 in E-Learning

Liu et al. from University of Southern California and University of California Santa Barbara, USA, report a case study in implementing E-leaning 2.0 tools and services in a global engineering class that is jointly offered by five worldwide engineering schools. A qualitative methodology was used to report data collected from 108 students in five different countries (China, Germany, Israel, South Korea, and US).

Wu et al. from Kaohsiung Medical University and the National Kaohsiung University of Applied Sciences, Taiwan, examine the effect of varied types of social media in student learning. They used a mixed method (both quantitative and qualitative) to report data collected from 81 undergraduate students.

E-Learning in Engineering Disciplines

Merayo et al. from University of Valladolid, Spain, report an implementation study of mobile learning in an optical communication class by using online virtual labs/simulations and Android apps.

Tsuei and Lai from National Taipei University of Education and Taipei Municipal Zhong-Lun High School, Taiwan, implement an online engineering drawing system for an engineering graphics course and report its effects on K-12 student learning. One hundred and ninety students participated in their experimental study.

On behalf of all the authors and reviewers contributing to this special issue, I would like to particularly thank Editor-in-Chief Ahmad Ibrahim for his continued support to our scholarly efforts. I hope you will find these papers informative and useful.

Wei-Fan Chen
The Pennsylvania State University, USA
Guest Editor
weifan@psu.edu