Guest Editorial

Engineering educators of today face many challenges: the increased sophistication of engineering disciplines requires specialisation and more study time to reach the deep science and technology knowledge needed for research, and for developing today's complex products and systems. Simultaneously, industry and society require that graduated engineers are skilled in project management and communications, and that they can appreciate the effects of technology development and use on humans and society. To a large degree, the issues are international and, hence, educators across the world face similar problems.

The CDIO Initiative constitutes one approach towards addressing the situation, involving an international group of more than 20 universities, which have formed a coalition that aims to reform engineering education. The mutual starting point is the statement that the product, process or system lifecycle (*Conceive – Design – Implement - Operate*) should form the common context – but not the content – for engineering education. From this starting point, the universities in the CDIO Initiative have collaborated in the development of the CDIO framework. To read more about CDIO, and to access the CDIO resources, the reader should consult the CDIO Initiative Web site: www.cdio.org. This Special Edition of the *World Transactions on Engineering and Technology Education* (WTE&TE) consists of selected papers from the first two international CDIO conferences held in Kingston, Canada (2005) and Linköping, Sweden (2006). This publication contains papers ranging from understanding stakeholders' needs, to evaluating the effects of the introduction of CDIO.

In the first paper in this Edition, Wyss et al present the results from an investigation of the stakeholders of the Department of Mechanical and Materials Engineering at Queen's University, Canada, and their views on the needed competences of its graduates. This is followed by a number of papers addressing curriculum design, including new tools for curriculum design (Malmqvist), an international benchmarking of engineering curricula (Armstrong et al), as well as applications to programmes in civil engineering (Gu) and product development (Albers).

Design-build-test learning experiences are a central element of a CDIO-based education and various papers present new developments in this area, including applications to bioengineering (Salerud, Wetterö), civil engineering (Lin) and aeronautical engineering (Fortin et al, Karlsson et al, Perfect et al). Armstrong et al present a project course, where business development and entrepreneurship are included as part one of the design-build-test tasks, while Tedford presents data on the educational effects of these team-based projects. Papers by Tansley, D'heer and Pee discuss sequences of the design-build-test experiences, and Strong and Cunningham elaborate on aspects of the different student workspaces needed to support the design-build-test learning experiences.

Another aspect, heavily emphasised in a CDIO-based education, is that of integrated learning, characterised by the mutual collaboration between disciplinary subjects, and by the integration of the learning of professional skills such as communication and ethics in disciplinary courses and projects. Enelund presents an approach to integrating mathematics and applied mechanics subjects in a more computation-oriented mathematics curriculum, while Van Deynse et al discuss how to integrate the training of communication skills in a laboratory physics course. The papers by McCarthy, Niewoehner and Oosthuizen present novel approaches to teaching open-ended problem solving, critical thinking and ethics, respectively. Finally, Goodhew problematises the increasingly challenging issue of posing culturally-neutral assessment questions to today's international student groups.

The final section of the Special Edition presents the results from the CDIO programme-level evaluations. Jungert and Edwardsson Stiwne track the implementation of CDIO in Linköping and report about its effects on students' attitudes towards their studies and future professional careers, as well as their experiences in their study environments. In the last paper, Malmqvist accounts for the application of the CDIO Standards and self-evaluation methodology in the 2005 Swedish national evaluation of *Civilingenjör* engineering degree programmes.

As the Guest Editor, I would like to acknowledge the outstanding efforts of Dr Perry Armstrong and Dr Göran Gustafsson, who have worked with me to prepare this Edition. Further, I wish to thank the authors of the articles included in this Edition for their outstanding contributions to this educational development, as well as express my sincere gratitude to the referees for their excellent work in refereeing these articles.

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