

Editorial

The special section on agricultural, biosystems and biological engineering education opens this issue. After noticing the fascinating interdisciplinarity of the materials engineering issue (22-5) I am again intrigued by what has become of the 'old' agricultural engineering departments and the materials they cover in their courses. Again, a remarkable interdisciplinarity has emerged- there are touches of biology, information technology, mechanical engineering, control engineering, education, management and business administration all involved in the window of papers from the subject-just in this one second special issue of 3 planned issues.

Much (though not all) the papers I would classify as engineering education research papers.

Why? In order to allocate the papers to engineering education research we will look at a definition of this research (The definition is based on Diamond, R. "The Mission-Driven Faculty Reward System", in R.M. Diamond (ed.), *Field Guide to Academic Leadership*, Jossey-Bass, San Francisco, CA, 2002).

Engineering Education Research is Research on the structure, content, delivery, personnel, and clientele of engineering education that:

1. Requires a high level of discipline-related expertise.
2. Is conducted in a scholarly manner with clear goals, adequate preparation, and appropriate methodology.
3. Is appropriately and effectively documented and includes a reflective critique that addresses the significance of the work, the process used, and what was learned.
4. Has significance beyond the individual context.
5. Breaks new ground or is innovative.
6. Can be replicated or elaborated upon.
7. Is judged to be meritorious and significant by a rigorous peer review process.

These criteria are upheld in the paper by Badal, Kim and Beck, who present a database approach to represent instructional content to gain flexibility provided by rich definitions, object reusability and object sharing. Here is an innovative interdisciplinary approach requiring academic expertise in bioprocess engineering and computer science. Also, in the paper by Rodriguez *et al.* the emphasis is on control engineering as applied to agricultural engineering with the institution of a virtual course. These papers require creativity, innovation and in particular the cooperation of academics from different areas of expertise. This is what is new about engineering education research. Traditionally, much research has been single domain oriented with a limited amount of major expertise incorporated in a single investigation or development. Engineering education research is a new—'interdisciplinary discipline'. That makes it so exciting. Engineering education research is still in its infancy—and I hope to be able to say more about this in the future.

The special section of this issue was painstakingly put together by Linus Opara and Joel Cuello, in different parts of the globe-Oman and Arizona. I am deeply indebted to their patience and expertise in bringing this series of issues to fruition.

The remaining 10 papers in this issue cover a wide spectrum. Learning research is of increasing importance for the optimization of the engineering student's experience. This is covered by 3 papers. There is an ethics and social responsibility paper, and papers on test structure, control engineering and a unique multimedia sensors course. A varied fare, with hopefully something of interest for everyone.

Michael Wald