Aplinkos tyrimai, inžinerija ir vadyba, 2013. Nr. 1(63), P. 3-4 *ISSN 1392-1649 (print)*
Environmental Research, Engineering and Management, 2013. No. 1(63), P. 3-4 *ISSN 2029-2139 (online)*
http://erem.ktu.lt

Editorial

Engineering Education for Sustainable Industries

Prof. dr. habil. Jurgis K. Staniškis
Editor-in-Chief
Kaunas University of Technology, Institute of Environmental Engineering

crossref http://dx.doi.org/10.5755/j01.erem.63.1.3787

In traditional engineering education much is said about response to needs or demands – those of employers, industry and the marketplace. These needs or demands, when focused on the acquisition of specific Scientific and technological knowledge, practical skills and competencies may result in a concise description of a limited set of learning objectives for assessment. Today there is a growing concern about responsibility for decisions that may have a negative impact on society, the environment and resources.

Education for sustainable development (ESD) is an increasingly important feature of higher education which poses new challenges for teaching and learning. There are two options: ESD might focus entirely or mainly on developing new education if this type of education is completely absent or ESD has to be to change the existing education. On the one hand, sustainable development itself is a field of study that is complex by its very nature, while on the other hand the systems of education are also highly complex. Thus, it is no surprise that education for sustainable development appears to cause many barriers and resistance.

One of the main barriers to ESD is the university organization with its sharp division between faculties and departments where the various courses are "owned" by the separate units. To avoid the risk of internal conflict and extra costs of changes, which could happen during the integration of sustainable development principles into a course, departments are generally very reluctant to change the curricula. Secondly, university lecturers are supposed to be active scientists, working on the scientific frontline, and this implies that disciplinary approach is perceived as essential. Interdisciplinary work is only perceived as important for applied projects, not for scientific progress as it does not contribute to the conceptual core of the discipline. This creates a strong barrier for the introduction of sustainable development in the education. Scientists and lecturers often interpret sustainable development too narrow, often too specifically concentrating on only one of three dimensions of sustainable development, mostly on the environmental aspect in the case of technical disciplines.

In many countries around the world ESD is understood as the integration of sustainable development in the education, research and operations as a starting point in the strategic policy of the university. In other words, university has four roles in society. First, university acts as an educational institution and its impact on society is to guide and assist students with their learning processes and thus deliver sustainably educated professionals. Secondly, the university is a research institution and from this perspective it delivers the results of fundamental or applied scientific research to society. Thirdly, a university is an organization which as all organizations has all kinds of operational interactions with the outside world, like procurement, the employment of staff members, use of materials, energy and water, the transport of people and goods, the production of waste, air pollution and other

ways of environmental impacts. Fourth role is its direct interaction with society, for instance, participation with the local community in the implementation of joint local Agenda 21 projects, cultural events etc.

Kaunas University of Technology has undertaken some successful actions at the levels in all four roles: education, research, infrastructure and management, and society. The university was selected as a pilot institution for the QUESTE-SI project funded by the European Commission under Lifelong Learning programme ERASMUS (2010-2012). QUESTE-SI stands for "Quality system of European Scientific and Technical Education for Sustainable Industry". The project was coordinated by EFMD, the Management Education Network, and ENQHEEI, the European Network for Quality of Higher Engineering Education for Industry. The project has developed along three axes:

- Share best practice between Business and Scientific and Technical education using the examples of EQUIS (the European Quality Improvement System for business school), exchanges with ENQA (the European Association for Quality Assurance in Higher Education) and ABET (the Accreditation Board for Engineering and Technology, USA);
- Set up referents in Scientific and Technical higher education for sustainable industry;
- Develop, implement and evaluate a quality improvement system.

The QUESTE-SI evaluation focuses on the institutional unit (department) that is responsible for one or more programmes. All submitted programmes should at least be at a formal or implementation stage. A key point is to assure that each graduate should have learned the sustainability aspects related to the concerned education domain. A fair evaluation of social responsibility and sustainability education is not limited to teaching and learning methods or curricular content – it depends upon parallel efforts in other dimensions:

- Education and Curriculum, as well as
- Institution, Department, or Faculty
- Student involvement
- Research & Innovation in Cooperation with industry.

The project has surveyed various networks of academic institutions, rankings, quality assurance systems, models to enhance the development of the triangle of knowledge to identify the awareness of and commitment to sustainability like strategic approach to sustainability, including sustainability in the study programmes , involvement KICs of the European institute of Innovation and Technology, membership in certain networks etc.

More than ten European Science and Technical universities have been accredited according the QUESTE-SI requirements, for instance, Brno University of Technology, KTH Royal Institute of Technology, Vienna University of Technology, Telecom Bretagne, Instituto Superior Tecnico etc. Kaunas University of Technology was presented by the Institute of Environmental Engineering with the MSc programme "Environmental Management and Cleaner Production" and PhD programme "Environmental Engineering and Landscape Management". The Institute of Environmental Engineering was awarded by the highest ranking and has become a fertile basis for a larger pilot project. Programmes and staff experience facilitated the development of the university itself as a model for sustainable operations, research and study.