

## **Sustainable development needs to be a part of every engineer's competence**

Technology plays a key role in responding to the challenges associated with sustainable development. For example, mitigating climate change and sustainable use of natural resources require new and innovative technology that has energy and material efficiency as its starting point. Engineers act as decision makers and experts and play a decisive role in advancing sustainable development. Thus, sustainable development should be among the key learning objectives in all degree programmes of engineering.

The mission of the Finnish engineering education is to benefit people and the environment through providing knowledge and skills, research and innovations for the society and business life. As part of the *National Strategy Project for the Engineering Education (www.tek.fi/engineeringstrategy)* it was seen necessary to find out what kind of learning objectives do the challenges associated with sustainable development impose on the Finnish engineering education and how have the units providing engineering education responded to these challenges. Therefore, a research was conducted at the Finnish Association of Graduate Engineers TEK by Ms Annina Takala.

The research consisted of an extensive literature survey and interviews of 66 experts of all key stakeholders of engineering education. The leading Finnish experts on technology and sustainable development were represented among the interviewees. Based on the results of the research and participatory working methods in the Cooperation Group an action plan was prepared.

Sustainable development in education is not just about adding new content and knowledge, but values, attitudes and teaching methods play a central role. Critical thinking and creativeness should be advanced and a shift of focus from single solution problems into defining problems is needed. Engineering education should better support the development of personal values and independent thinking and encourage more discussion and participation.

The main challenge in engineering education is to achieve a holistic view on sustainable development that simultaneously takes into account the environmental, social and economic aspects, in addition to the temporal and spatial dimensions. Engineering education needs to prepare students better, than it currently does, for systemic and life cycle thinking. Cooperation between different professions and disciplines is needed. This calls for improved communication skills and deeper understanding of the role of engineering in society. Engineers need to understand the possibilities, but also the limitations of their knowledge and skills, and adopt a more active role in society.

The findings of the research indicated that the Finnish engineering education already enhances sustainable development. However, sustainability is not an approach consciously chosen. The way in which sustainability is carried out is, for example, in the form of isolated courses and projects. Knowledge and skills related to sustainable development need to be included among the key learning objectives in all degree programmes of engineering. And moreover, the higher education institutions need to become best practice examples for enhancing sustainable development in their own activities, for instance, through material and energy efficiency of the campus and enhancing the well-being of staff and students.

Results of the research are presented at the SEFI Annual Conference in Rotterdam. The whole publication is available in Finnish with English abstract at [http://www.tek.fi/ci/tekstra/kestava\\_kehitys.pdf](http://www.tek.fi/ci/tekstra/kestava_kehitys.pdf) More information [annina.takala@tek.fi](mailto:annina.takala@tek.fi)