Progress report on the UNESCO Engineering Initiative (UEI)

Background

A proposal to strengthen education, capacity-building, and research in the field of engineering was submitted to the 186th session of the Executive Board (186 EX/Decision 15) for consideration as the UNESCO Engineering Initiative (UEI). The decision followed the creation of a cross-cutting thematic unit within the Natural Sciences Sector (SC), which leverages engineering expertise across SC as well as the other sectors in order to build on existing engineering capacities using a cost-effective approach. With renewed focus on engineering education and capacity-building, the UEI has sought to establish partnerships with professional societies, academia, and the private sector worldwide to collaboratively develop projects that use engineering applications to reduce poverty or contribute to sustainable development.

Achievements

The UEI has established several fruitful partnerships in its mission to develop projects that increase engineering enrolment by young people, particularly young women, promote the importance of engineering as a key driver of sustainable development, and to include more interdisciplinary and sustainability topics in engineering curricula worldwide. UEI has partnered with the African Network of Science and Technological Institutions (ANSTI), the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the World Federation of Engineering Organizations (WFEO), Airbus, and the Intel Foundation, to develop projects in three major themes: engineering education; women in engineering; and interdisciplinary and sustainable engineering.

Engineering education

To stimulate interest in engineering among youth, UEI has partnered with Airbus on the Fly Your Ideas (FYI) competition and with the Intel Foundation on the Intel International Science and Engineering Fair (ISEF). UEI participation in the ISEF high school student competition and the FYI university student competition will increase the number of applicants by disseminating information through the UNESCO networks as well as Permanent Delegations and National Commissions of Member States. Greater competition visibility will result in a greater impact on youth interest in engineering.

In addition to encouragement of young people to study engineering, UEI has also launched several projects to improve the quality of engineering education and accreditation standards and/or bodies. Following the February 2012 signing of an MoU between UNESCO and IEEE (the world's largest professional association dedicated to advancing technological innovation), both organizations have pledged to work on accreditation standards and/or bodies for the improvement of university-level education. At a May brainstorming session which included IEEE members from Nigeria and South Africa, preliminary actions were identified to facilitate institutional capacitybuilding, defined as accreditation, faculty development, curricula development, and quality control and assurance, in pilot African countries. Moreover, short-term partnership activities include hosting a Science and Engineering Day for African students at the University of Nigeria, Nsukka and establishing an UNESCO-IEEE Chair in Innovation at an African university. UEI and IEEE also organized a successful side event at the Forum on Science, Technology, and Innovation for Sustainable Development (STI Forum) in Rio de Janeiro, Brazil, in June 2012, which focused on engineering as a key factor in sustainable development and highlighted the importance of engineering education using case studies from western Africa and Brazil.

UEI was invited by South Africa to the Southern African Development Community (SADC) Engineering Needs and Numbers brainstorming session in July 2012. Each of the 15 SADC countries submitted a questionnaire to establish what the engineering needs and numbers required for sustainable development in the SADC region would be. Interactive discussions transpired about addressing the shortage of engineers in Southern Africa as well as increasing engineering enrolment, retention and career advancement of young people in engineering. UEI will partner with South Africa and SADC to determine the scope of the pilot study and implement it.

At a United Nations Conference on Sustainable Development (UNCSD) side event, UNESCO and ASME signed an MoU launching a partnership that pledges to improve the quality of engineering education, increase public awareness of the value of the engineering profession, and promote science, technology, engineering and mathematics (STEM) training and careers. In addition, ADG/SC provided the podium for Vice Chancellors, Deans, Heads of Department, the private sector and development partners in Africa and the Diaspora for the Conference of Vice Chancellors and Deans of Science and Technology (COVIDSET 2011) to build and

strengthen engineering education in African universities through cooperation and partnership, including the exchange of ideas, experience, good practices, and new and emerging trends to enhance Africa's global competitiveness and the impact of high-level training and research on African development. On a global scale, UEI is also working with WFEO on a Compendium of Capacity-Building Guidelines to strengthen institutions worldwide that contribute to the education, training, and professional development of engineers.

Women and youth in engineering

UEI efforts for women in engineering seek to encourage young women to pursue engineering and to retain women engineers in the profession. On International Women's Day 2012, UNESCO and WFEO co-hosted a meeting where women engineers from Côte d'Ivoire, Kuwait, Malaysia, Saudi Arabia and Spain shared their experience, reiterated the need for women role models in engineering, and suggested that retention policies, mentoring and networking programs for women, and flexible work hours and childcare provision would increase the number of women working in engineering professions. Anousheh Ansari, an engineer and the co-founder and chairman of Prodea Systems, the founder of the Ansari X Prize, and the first self-funded woman to fly to the International Space Station, emphasized that giving children confidence in their abilities and promoting awareness about engineering fields as a career option can have a significant impact on the future generation of engineers. In addition, UEI will also partner with the Education Sector on a project in Kenya and Lesotho to increase girls' and women's success and advancement in STEM, thus making them eligible to pursue careers in engineering.

In July 2012, UEI was invited to the SADC Women in Science, Engineering and Technology (WISET) meeting. The SADC secretariat adopted a charter which was drawn up to establish a regional platform for women in science. This charter will be presented to the 15 ministers in SADC for adoption. UEI will work with the WISET secretariat to implement projects in STEM through our networks.

The WISET programme in the Republic of Korea is intending to propose a category 2 centre for women in science and engineering. Uruguay is in the process of developing a proposal for a UNESCO Chair on Women in Science and Engineering which will focus on increasing the number of women in science and engineering careers. These initiatives will help UEI to increase and improve the number of women in engineering in these countries.

The WFEO Youth committee, together with UNESCO, is organizing a conference for young engineers in Kuwait in January 2013. This conference will help stimulate the interest of youth in engineering and will also showcase interesting careers in engineering.

Engineering for sustainable development

UEI efforts for interdisciplinary and sustainability in engineering have two objectives: to incorporate sustainability into professional training and development; and to develop engineering curricula that includes interdisciplinary and sustainability components. UEI demonstrated its commitment to including sustainability in training and development through its participation in two UNCSD side events as part of the STI Forum. UNESCO and IEEE co-hosted an event on Engineering for Sustainable Development and UNESCO and WFEO co-hosted an event on Sustainable Communities. Both events emphasized the important role of engineering in future sustainable communities and development. UEI will also work with IEEE and ASME on Engineering for Change (E4C) to encourage youth and civil society to share knowledge on a global platform, discover how communities are being transformed using appropriate technology to solve real problems and learn as well as solve worldwide development challenges.

Germany has proposed a strategy to work with the UEI on quality engineering for sustainability. This strategy will be implemented in a coordinated manner by an open group of German companies and German technical universities, in close cooperation with the Association of German Engineers and the German National Commission for UNESCO, with support from Government of Germany. The draft strategy intends developing a well-structured pool of trainee positions and internships for students from targeted universities in partner countries, transferring best practice in establishing engineering courses and faculties through international cooperation, designing a cross-cultural postgraduate course on "Quality Engineering for Sustainability" and developing a communication concept informing youth about the career prospects associated with engineering, and in international cooperation.

The Chinese Academy of Engineering has proposed a category 2 centre entitled the International Knowledge Centre of Engineering Sciences and Technology. Its purpose would be to collect and combine related digital resources in the field of engineering science and technology in China and the international community, including data sources like digital libraries, publishers, Internet, digital media, archives and exhibition centres.

Lastly, UNESCO has received a proposal for a category 2 centre at Aalborg University in Denmark on Problem Based Learning and Sustainability in Engineering and Science Education. Through partnership with Aalborg University, UEI plans to leverage expertise in teaching methods and curricula development with a focus on interdisciplinary problem-solving and sustainable perspective.