POLICY BRIEF
October 2015

GDEE GLOBAL DIMENSION IN ENGINEERING EDUCATION

Global Engineers: key professionals for Sustainable Human Development

KEY FINDINGS

Engineers with a broader capacity are needed to contribute to the realization of the **Sustainable Development Goals**

Current debates at EU and international level **have not yet explored** in detail the **role that Higher Education** should play within Global Citizenship Education

The **GDEE project** has developed a specific curriculum and tools to **widen the training of Engineers** in Europe, and to **include global development** aspects into their **professional competences**

SUSTAINABLE HUMAN DEVELOPMENT NEEDS PROFESSIONALS

This September 2015, a new formulation of international action, based on Sustainable Development Goals (SDGs) has been unanimously adopted by the United Nations, to supersede the Millennium Development Goals set in 2000 [1]. The SDGs seek to complete the unfinished business of the MDGs and respond to new challenges. They are action oriented, global in nature and universally applicable; and constitute a holistic, indivisible set of global priorities for sustainable development. These goals will integrate economic, social and environmental aspects and recognize their interlinkages in achieving sustainable development in all its dimensions.

Technical and technological innovative solutions are expected to play a key role in addressing the vast majority of the SDGs. Engineering does and can play a major role in promoting human development and well-being. The "global" engineer needs to take a wider perspective and understand the potential for improving lives of the poor worldwide, through the appropriate design and use of technology [2].

Goal 1	End poverty in all its form everywhere
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure healthy lives and promote well-being for all at all ages
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment & decent work for all
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10	Reduce inequality within and among countries
Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12	Ensure sustainable consumption and production patterns
Goal 13	Take urgent action to combat climate change and its impacts
Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Such considerations must therefore be an integral part of the two essential stages in the engineering profession, namely:

a) *Training* – Sustainable human development aspects need to be increasingly included within higher education (engineering) curricula

b) *Practising* – The standards that regulate engineers' professional competences shall specifically recognise practising in a context of development.

UNESCO and other international stakeholders advocate for the recognition of the **Global Citizenship Education** (GCE) vision [3]: *"It is a concern with the relevance of knowledge, skills and values for the participation of citizens in, and their contribution to, dimensions of societal development which are linked at local and global levels. Global learning can make a positive contribution to a globalised world by helping students learn about the challenges our world faces and think critically about how to deal with issues such as poverty, inequality and sustainability."*

Higher Education can and must be also part of the GCE vision; however, current debates at EU and international level have **not yet explored in detail the role that Higher Education should play** within GCE.

CURRICULAR CHALLENGES IN PREPARING GLOBAL ENGINEERS

Higher education needs to prepare engineers with conceptual and practical instruments to recognise and deal with the challenges posed by an increasingly complex and inter-dependent world. The European Union recognizes the important role higher education plays for development. Official DEVCO regional support focuses on the development and modernisation of higher education in those countries that participate in the external cooperation programmes of the EU [4]. The two main components of DEVCO's support are i) the capacity building of higher education institutions and ii) mobility of students, academics and staff. However, such important support is not formally encompassing the role of the engineers being trained within the EU. Higher education in Europe is largely defined and administered at state level, and the only area where a coordinated EU action can be found is student mobility (ERASMUS + programme).

Since 2013, **the GDEE project** (http://gdee.eu), an initiative led by top EU universities and NGOs delivering training services and infrastructure projects, has **explored the challenges** in widening the traditional training of engineers, and **developed tools and materials** accordingly. The key conclusions of the GDEE analysis are:

A. Engineering practice **needs to incorporate global skills and competences**, further than greener ones [5], such as being able to work in a range of complex social and cultural environments, being culturally sensitive and being able to recognize broader social needs and agendas [5].

B. Universities, teachers and quality assurance agencies do not have a common understanding and proper guidelines to **implement, evaluate or provide accreditation of these global competences** into the engineering degrees. International experiences have shown that the first step should be the promotion of global competences explicitly included in the curricula, and the second step should be to include evidence in the monitoring and evaluation of the degrees. **Global civil society organizations should be involved** in the quality assurance (QA) of global competences, in line with previous analyses of QA within the European Higher Education Area [6].

C. Global Learning is an **area of increasing interest** in higher education, helps to **raise the profile and prestige** of the university.

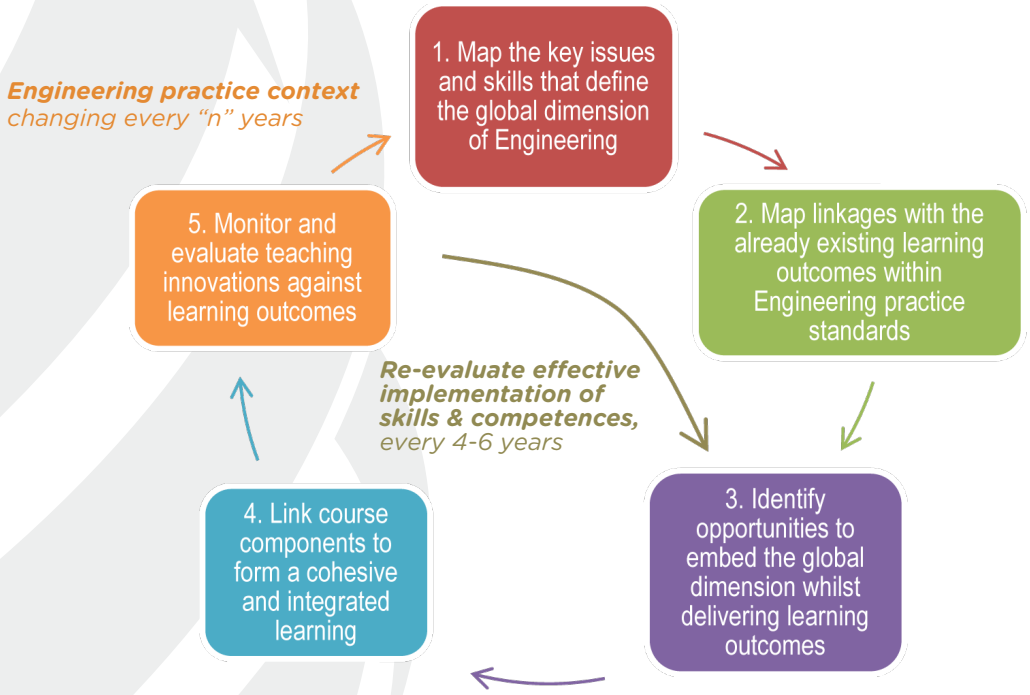
D. Engineering students are **aware of the importance of including global competencies** in their curriculum, and have a strong motivation for it.

E. Global learning in engineering education is directly related to the **Research for Development practice**, especially in MSc and PhD programs. Work on research and education for development is published in relevant scientific journals, and in sector-related conferences. However, the **research for development impact is hindered** by the inertia of the mainstream international quality assessment of Science. Novel subjects as Development Studies in top scientific databases could help engineering sciences researchers, as well as social scientists, to highlight their current contributions in these fields. Further work with research database providers (such as Elsevier or Thomson Reuters) is needed to effectively increase the recognition of Development as a reputed discipline of Science and Research.

GLOBAL DIMENSION IN PROFESSIONAL ENGINEERING COMPETENCES

In 2008, 'The Global Engineer' report [7] laid out a conceptual methodology to incorporate the competences of a 'Global Engineer' into the professional accreditation standards (in the UK), comprising 5 sequential stages. Based on recent policy discussion in Spain, Italy and the UK, the GDEE initiative proposes an evolution of this concept to factor in the need for a cyclical approach:

- a general, longer cycle should map the global engineer skills and competences every 'n' years (about 15 years, e.g. the Global Development cycle, MDG-SDG), for a continuous adaptation to the practice context; and
- a specific, shorter cycle (every 4-6 years) should monitor and re-evaluate the effective implementation of global skills within curricula and lectures, primarily through direct contact with post-graduates and professional engineers.



The post-2015 agenda and SDG momentum are pushing the mapping of global engineer skills and competences to the top of the agenda. It is the time to advocate for a Global Dimension approach in Engineering degrees, schools, professional associations and accreditation bodies.

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[1] **Experience in the UK**: The British Engineering Council is the UK regulatory body for the engineering profession; it sets and maintains the standards (UK SPEC) for the engineering profession and sets the overall requirements for accreditation. The Engineering Council licenses over 20 professional engineering institutions (such as the Inst. of Civil Engineers, Inst. of Mechanical Engineers, Inst. of Engineering and Technology, etc.) to undertake accreditation within these requirements, interpreting them as appropriate for their own sector of the profession and maintains the database of accredited degree programmes. Also, the Engineering Council sets and maintains the internationally recognised standards of professional competence and ethics that govern the award and retention of these titles.

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The GDEE Project

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