The role of education for Engineers in the implementation of the UNSDGs

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Why am I here?

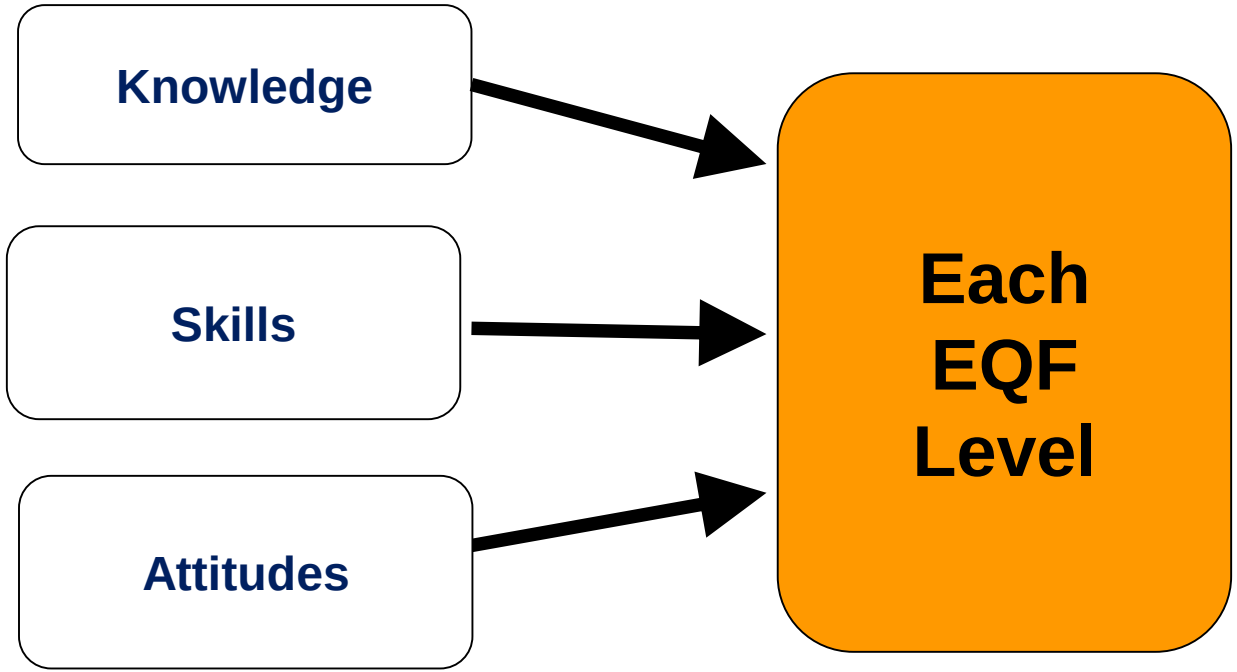
- Civil Engineer – 1st job was on water and wastewater tretament
- Coordinated and worked on engineering qualification frameworks – EUSAFE, CALOHEE, EUR-ACE, FEANI
- Organizer of Porto Declaration of IACEE
- Author of articles about sustainability and training
- Research on assessment and verification of competences

EQF = European Qualification Framework

Qualification = Title, eligible for a duty, position, function

Framework = Structure for supporting something

The Eight EQF Levels



EUR-ACE European Accredited Engineer

- Accreditation of Engineering Programmes
- Widely used in Europe
- Rest of world uses International Engineering Alliance (Washington Accord) attributes
- FEANI considers as reference set of competences for engineers
- CALOHEE and TA-SE projects have developed a qualification framework for Civil Engineers

Twenty-first Century Challenges

Millions of students finish university education every year. They enter the labour market with sets of competences based on their personal experiences and their studies.

- *Are they really prepared for the jobs they go after?*
- *What are the demands of employers?*
- *Are they equipped to fully engage with their civic responsibilities?*
- *Are universities up to speed?*
- *Do existing quality assurance instruments offer sufficient evidence to answer those questions?*
- *Can institutional performances be compared to identify best practices?*

Subject area/ Dimension	*Civil engineering*	*Teacher Education*	*History*	*Nursing*	*Physics*
1.	Knowledge and understanding	Knowledge management and creation	Human beings: Cultures and Societies	Professional values and the role of the nurse associated competences	Knowledge and understanding
2.	Analysis and problem solving	Design and management of processes of learning, teaching and assessment	Texts and Contexts	Nurse practice and clinical decision making competences	Mathematical methods
3.	Design	Learner empowerment, potential and creativity	Theories and Concepts	Knowledge and cognitive competences	Experimental design and scientific investigation
4.	Investigation	Communication	Interdisciplinarity	Communication and interpersonal competences	Problem solving
5.	Practice	Values and social leadership	Communication	Leadership, management and team working	Scientific (physics) culture
6.	Decision making	Development as professionals and life-long learners	Initiative and Creativity		Ethical awareness
7.	Team-working		Professional development		Communication
8.	Communication				Management and teamwork
9.	Lifelong Learning				

Dimension 6: Decision making

	Knowledge	Skills	Attitudes (Responsibility and Autonomy)
Level descriptor	Demonstrate awareness of the key aspects of professional, ethical and social responsibilities linked to management of civil engineering activities, decision making and judgment formulation.	Manage work contexts in civil engineering subject area, take decisions and formulate judgments.	Identify appropriate and relevant approaches to manage work contexts in civil engineering subject area and reflect on professional, ethical and social responsibilities in taking decisions and formulating judgments.

Global sustainability: challenge or opportunity for engineering?

Global sustainability: challenge or opportunity for engineering?

- Engineers are the great problem solvers of the world
- Understanding the problem
- Climate, environment, resources, …
- United Nations 17 Sustainable Development Goals
- God created the World and engineers change it!

Porto Declaration 2016

"In keeping with its dedication to leading life long learning, the IACEE will develop global initiatives to address 21st century challenges threating the survival of human kind, through collaboration, education, design, creative thinking and engineering"

Global Initiative SERINA

Sustainability Competences of Engineers

- Inclusion on all engineering program competences/learning outcomes
- Training for active engineers (mandatory?)
- Continuing Professional Development/Lifelong learning
- Required by professional organizations to keep status
- Medium and long term impact - Graduates
- Short term impact - professionals

UNESCO II Engineering Report (4Mar21)

- Engineering for Sustainable Development
- 4.ENGINEERING EDUCATION AND CAPACITY-BUILDING FOR SUSTAINABLE DEVELOPMENT
- 4.1 Engineering education for the future;
- 4.2 Lifelong learning in engineering: an imperative to achieve the Sustainable Development Goals;
- 4.3 Engineers' continuing professional development

UNESCO II Engineering Report (4Mar21)

- Session 28Oct21 – European Commission - European Sustainability Competence Framework
  - Breakout sessions: the framework in your context
  - Group 1: Supporting lifelong learning for sustainability
  - Group 2: Building educator capacity
  - Group 3: Teaching and learning and whole school approaches
- New Bauhaus , IFEES and AECEF/EUCEET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Research possibilities

- Research program outcomes of Civil Engineers in terms of learning outcomes/competences; include contents, teaching modes and assessment techniques.
- Same for other engineering areas.
- How to upskill and reskill active engineers and professionals to acquire sustainability competences.
- Adapt European Commission sustainability competence framework to existing engineering competence frameworks.
- Reseacrh about UNSGDs implementation in engineering LLL and CPD.

Obrigado!
Thank you!

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