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A-STEP 2030 – New Research Project Presents a Picture of the Skills Needed for Engineers to Solve the Sustainable Development Goals (SDGs).

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A-STEP 2030 – New research project presents a picture of the skills needed for Engineers to solve the Sustainable Development Goals (SDGs).

Communication and Technical Skills will still be the most important attributes required of engineers in the future, according to a new study by the A-STEP 2030 Erasmus+ funded project. The project which is led by ENSTA Bretagne, France and has academic partners in TU Dublin, Metropolia University of Applied Sciences in Finland and Aalborg University in Denmark aims to develop innovative teaching approaches for engineering students which will attract a more diverse student body to the engineering profession.

The first activity in the project, led by TU Dublin, involved 12 focus groups across the four countries involved and compared the views of Engineering Students, Engineering Academics and Engineering Employers. Participants were asked about the awareness of Sustainable Development, of the SDGs and how current engineering programmes incorporate teaching around Sustainable Development in general and the SDGs in particular.

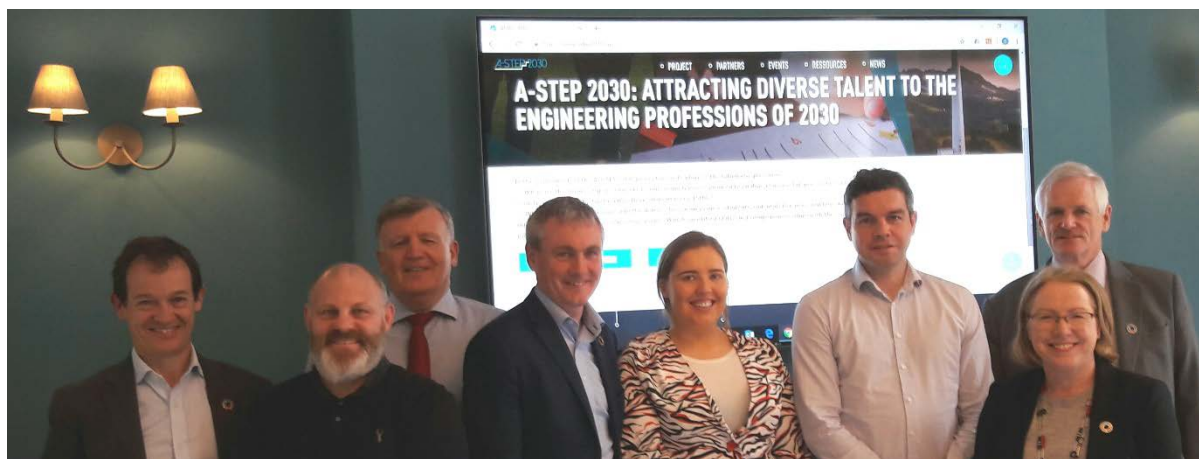


Figure 1: Employer Focus Group hosted by Engineers Ireland

What emerges is a varied picture of awareness of the SDGs with SDG 13 (Climate Action) topping the list, as shown in Figure 2. Irish focus group participants showed the highest awareness of the SDGs, but this is differentiated significantly with a low awareness from students (compared to all countries) but the highest awareness from academics and employers.

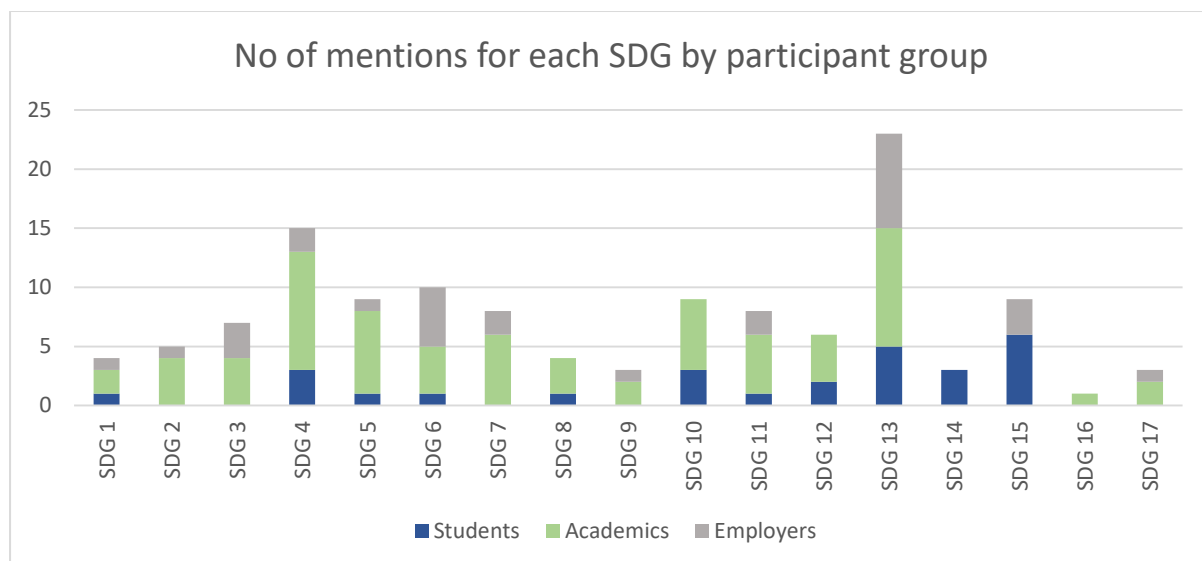


Figure 2: No of mentions for each SDG for all countries by participant group.

Participants were also asked to identify and discuss the skills that engineers would need to solve the SDGs in the future. Figure 3 presents the key skills which were viewed as being of key value to engineers in the future, with Communication, Technical Skills and Critical thinking and Ethical behaviour being those which emerged as most important.



Figure 3: Overall word cloud indicating skills requirements for Engineers to achieve the SDGs [All groups, All countries]

The data collected from the focus groups with regard to skills requirements was further analysed and the findings are presented as a new Model of Engineering Skills and Attributes required of Engineers to meet the SDGs. (All reports available on www.astep2030.eu)

Looking forward

The role of the Engineer will move from serving industry to serving society and this requires engineers to be mindful of the impact of their decisions on both society and the environment. Engineers will need new ways of carrying out engineering projects and will need to have greater influence at higher levels of political power. They can no longer focus only on the technical aspects of projects, they are called to look up, face the future and become changemakers in society. By looking upward and outward, they need to have a sustainable worldview, one that acknowledges international and intercultural issues, the diversity of society, and understands how to turn these seeming liabilities into opportunities. Engineers of the future will be presented with complicated, complex problems and will need to consider multi-perspective views, whilst being conscious of long-term effects, risk and the impacts of decisions on society. These engineers will most certainly need fundamental technical skills, but as the rate of change in technology increases, engineers must also become highly flexible lifelong learners, capable of adapting their practices to new technologies and

developments. With all of these new challenges comes the awareness that Engineers of the future will need to know how to work with diverse others and with difference in general, will need to understand how to make the most of teams comprising non-engineers, composed of people speaking languages and of different nationalities. These attributes are those which must form the character and the practice of the engineer of the future.

The model that we are presenting offers a broad picture of a person with an expansive worldview, a sound character and a firm ethical orientation derived from a commitment to and belief in the idea that engineering can be used to further sustainable development. Building on these characteristics, the student engineers of the future will need to master technical tools such as mathematics, as well as a broad pallet of application skills that will allow them to find ways of applying fundamental tools to the practice of achieving sustainable engineering projects. Throughout their education—and indeed throughout their life-long learning—tomorrow’s engineers will also acquire non-technical skills of two primary types: what we have described as inward facing and outward facing. The first of these involves capacities like creativity and critical thinking, both of which will be necessary for the kind of responsible research and innovation that will be characteristic of the practice of tomorrow’s engineers. The latter, outward facing skills, will involve people skills of all types, with a particular emphasis on those relating to dealing with diversity, inclusion, and difference.

Overall, tomorrow’s engineer will be both better grounded in the urgency of using engineering to bring about sustainable development and better prepared, both in technical and in human terms, for making sustainable development a reality.

In order to prepare engineers to meet this new reality, we need to better inform students and lecturers about their (perhaps varying) perceptions and views of the future. Without sharing this information among us there is little chance anything will change and thus the next step in the project, is to do just that.

For more information on this project, please contact una.beagon@TUDublin.ie

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All reports are available on www.astep2030.eu

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