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A Taxonomy of Professional Engineering Attributes for Tackling Global Humanitarian Challenges

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Abstract : There is a growing interest in enhancing the creativity and problem-solving ability of engineering students by expanding their engagement to complex, interdisciplinary problems such as environmental issues, resilience to man-made and natural disasters, global health matters, water needs, increased energy demands, and other global humanitarian challenges. Tackling societal challenges requires knowledgeable and erudite engineers who can handle, combine, transform and create innovative, affordable and sustainable solutions. This view simultaneously complements and challenges current conceptions of an emerging educational movement that, almost without exception, are underpinned by calls for competitive economic growth and technological development. This article reveals a taxonomy of humanitarian attributes to be enabled to professional engineers, through reformed curricula and innovative pedagogies, which once implemented and integrated efficiently in higher engineering education, they will provide students and educators with opportunities to explore interdependencies and connections between resources, sustainable design, societal needs, and the natural environment and to critically engage with implicit and explicit facets of disciplinary identity. The research involves carrying out a study on (a) current practices, best practices and barriers in knowledge organisation, content, and hierarchy in graduate engineering programmes, (b) best practices associated with teaching and research in engineering education around the world, (c) opportunities inherent in general reforms of graduate engineering education and inherent in integrating the humanitarian context throughout engineering education programmes, and, (d) an overarching taxonomy of professional attributes for tackling humanitarian challenges. Research methods involve state-of-the-art literature review on engineering education and pedagogy to resource thematic findings on current status in engineering education worldwide, and qualitative research through three practice dialogue workshops, run in Asia (Vietnam, Indonesia and Bangladesh) involving a variety of national, international and local stakeholders (industries; NGOs, governmental organisations). Findings from this study provide evidence on: (a) what are the professional engineering attributes (skills, experience, knowledge) needed for tackling humanitarian challenges; (b) how we can integrate other disciplines and professions to engineering while defining the professional attributes of engineers who are capable of tackling humanitarian challenges. The attributes will be linked to those discipline(s) and profession(s) that are more likely to enforce the attributes (removing the assumption that engineering education as it stands at the moment can provide all attributes), and; (c) how these attributes shall be supplied; what kind of pedagogies or training shall take place beyond current practices. Acknowledgment: The study is currently in progress and is being undertaken in the framework of the project ENHANCE - ENabling Humanitarian Attributes for Nurturing Community-based Engineering (project No: 598502-EEP-1-2018-1-UK-EPPKA2-CBHE-JP (2018-2582/001-001), funded by the Erasmus + KA2 Cooperation for innovation and the exchange of good practices – Capacity building in the field of Higher Education.

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