

# Lending Human Touch: The Role of Humanities in Engineering Education

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## Abstract

There is a growing awareness that professional engineers need a substantial acquaintance with a variety of subjects traditionally taught within the humanities. This argument reflects the claim put forth on many fronts that modern, scientific technology poses many challenges that can only be addressed by the insight of the humanities. This radical change of direction forced various engineering educators to respond more adequately to the 'technoscience' challenges and to introduce subjects in engineering such as ethics, literature, philosophy, culture, history of technology and aesthetics which can be called 'engineering humanities'. The purpose of this paper is to explore the indispensable need of inclusion of humanities in engineering education for regaining the human factor in technological questions. This paper argues that due to the perception that engineering profession is 'hard hat' technical in nature, it requires application of broad knowledge of human affairs in engineering practice.

**Introduction:** Engineering is a very diverse profession that requires different skills. An engineer has to perform various tasks, namely, technical supervision, personal management, project development, diagnostics etc. Moreover, in today's global world an engineer is to be capable of intercultural communication in order to work with international partners and to run joint projects. Therefore engineering education aims at training a specialist who has all these skills, however, providing technical knowledge in the field of profession obtained is not sufficient. Only humanities education can help in developing special traits necessary for performing all engineering functions, and it is through humanities that character development and ethics can be incorporated in engineering.

**What is humanities:** The term humanities includes, but not limited to, the study of: languages, modern and classical; linguistics; literature; history; philosophy, ethics; those aspects of social sciences which have humanistic content and employ humanities methods; and to study and application of the humanities to the human environment with particular attention to reflecting our diverse heritage, traditions and history and to the relevance of the humanities to the current conditions of national life.

**Relationship between humanities and engineering:** The relationship between engineering and humanities is one that traditionally has not been close. The acquisition through education of humanities and social sciences can not be regarded just as an extension of knowledge capital. It provides professional engineers with means of new way of critical thinking and inquiry. Hudson in a study of humanities and engineering graduates found that humanities students had highly developed divergent thinking skills whereas engineering graduates were more convergent thinkers.[1] Divergent thinkers were more effective in conceptualizing an issue into a problem which itself could be further conceptualized. Convergent thinkers, on the other hand, were less conceptual but more effective in setting the parameters of the problem and, in a mechanistic way, solving it. In fact combination of convergent and divergent thinking is a good representation of techno science and what Schon would see as a basis for a reflective practitioner. [2]

## Why humanities in engineering:

- The humanities prepare you to fulfill your civic and cultural responsibilities.
- Studying the humanities allows you to become familiar with and to use the creative ideas from great minds outside of science.
- The state-of-the-art scientific knowledge and techniques you learn in college have a limited self life; mastering humanities provides tools for expanding it.
- Humanities study strengthens your ability to communicate and work with others.
- You will gain knowledge of foreign languages and cultures.
- The wall that exists among disciplines has been lowered and students can move across disciplines more easily.

**New challenges of technology: Need for humanization** Technology now a days is no longer just an instrument at man's disposal which from time to time presents problems that he can resolve on the basis of extra technological criteria. It has turned into a *Weltanschauung*, a pseudo world that imposes on man its laws and

categories, altering his manner of thinking and feeling, of evaluating and planning. At the same time technology turns into a new master as we become more dependent on it, eventually lacking the skill, knowledge, and disposition to manage our own lives autonomously. More and more engineering projects are extremely scientific and require deep knowledge of a variety of disciplines. The engineering education faces incipient crisis on two fronts: the pressure created by rapidly changing technology to include latest topics and the growing requirements for engineers to be able to make responsible cultural, political and social decisions that shape the future of the world.

In this context, the engineering students should learn not particularly academic humanities but genuine humanities nonetheless. Likewise, the humanists should be educated in engineering, though clearly not to the level of practicing engineer. Such courses may exemplify the best model for teaching humanities to engineering and by extension, suggest the most appropriate model for the best relationship between humanities and engineering faculties.

In short, we can say humanities are indispensable for regaining the human factor in technological questions and for more profound reflection about specifically humanistic matters. Humanities can radically transform the otherwise exclusive horizon dominated by the techno scientific paradigm where issues concerning the person and human nature- as well as related notions like man's corporeal nature, health, sickness, freedom and work- are exposed to incessant redefinitions until they are made objects of adequate philosophical reflections.

**How incorporate the humanities in engineering curriculum:** The role of humanities in engineering curriculum needs to be observed through two main perspectives which are:

- The nature of humanities and social science subjects in engineering curriculum; and
- Proportional allocation of engineering curriculum to the humanities and social sciences.

The nature of humanities and social sciences, which are to be incorporated into engineering courses, must be relevant to workplace discourses in which the engineering profession is embedded.

The US National Academy of Engineering (NAE), in its 2000 annual meeting, reflecting on the challenges to engineering education in the third millennium identifies engineering ethics as an emerging area that needs to be taken into account in professional preparation because of the "enormous impact of engineers on individuals and society." [3]

Ashby recommended that subjects concerned with ethics, languages, social and industrial history and history of technology were relevant to engineering education. [4] A survey jointly conducted by the faculties of art and engineering at Monash University Australia revealed that knowledge of languages as a desirable attribute of engineering graduates was placed highly by the respondents. [5] Likewise a report on engineering education in Sweden recommended the inclusion of history in core engineering curriculum. As a subject history expands cultural references and enhances the understanding of human condition in the context of development of ideas. History can also be highly contextual to the technical and scientific part of engineering curricula. History of ideas and technology ensure that engineering graduates will not go through a process of "reinventing the wheel". Philosophy must also be an essential contextual subject in core engineering curriculum. The study of value system is essential in the examination of ethics and ethical frameworks so essential to professional engineering judgments.

Grinter suggested that 30% of engineering curricula in the United States be allocated to core humanities and social sciences disciplines.[6] Heitmann in his overview of European engineering education felt that 20% of allocation to humanities and social sciences was adequate.[7] The Accreditation Board of Engineering and Technology(ABET), a body responsible for accrediting professional curriculum in the United States, set aside a minimum of 12.5% of engineering curriculum that had to be allocated in humanities and social sciences if these courses were to be accredited [8]

In short, there is a general international acknowledgement concerning the value of humanities and social sciences in engineering education to enhance workplace discourses and raise the social standing of the profession.

**Conclusion:** Since all the crucial issues facing humanity are global the movement to establish meaningful discourse between engineering and humanities must likewise be international and global. The problems and challenges facing the world do not know political boundaries. As discipline and practice engineering has a better opportunity to achieve world wide acceptance than many others. As engineering makes it overtures to the humanities it must do so with global consciousness, mindful of the need to establish standards respectful of human interests and simply responsive to economic opportunities.

#### References:

- 1 Hudson, L. (1975), *Human Beings*, London, Cape.
- 2 Schon, D. (1991), *The Reflective Practitioner: How Professionals Think in Action*, New York, Basic Books.

- 3 Herkert, J. (2002) "Continuing and Emerging Issues in Engineering Ethics Education", *The Bridge*, No3, Vol.32 pp.15-19. See also Herkert, J. (2000) Engineering Ethics Education in the USA: Content, Pedagogy, and Curriculum", *European Journal of Engineering Education*, No25, pp. 303-313
- 4 Ashby, E. (1966), *Technology and the Academics- An Essay on Universities and Scientific Revolution*, London, Macmillan.
- 5 Monash University Faculties of Arts and Engineering(1991), Survey of Demand for Engineers with Foreign Language Skills: Summary of Responses and Initial Analysis, Melbourne, Monash University Publication.
- 6 Grinter, S. (1995), "Final Report of the Committee on Evaluation of Engineering Education", *Journal of Engineering Education*, 46, pp. 25-60
- 7 Heitmann, G., John, V.(1995), Educating the Whole Engineer. The Role of Non Technical Subjects in Engineering Curricula, Cracow University of Technology, SEFI Curriculum Development Group, pp 135-140
- 8 ABET Engineering Criteria, (2000), [Online] Available, <http://www.abet.org>