

The Significance of Introducing Humanities and Social Sciences into Engineering Curriculum

G. V. Praveen, Pankojini Mulia, Ajit Kumar Behura and Sarita Kar

Abstract— During the past few years engineering profession has been found with professional and social, ethical and behavioral disorders. Humanities and Social Sciences has become an important subject in the engineering curriculum as the professionals become progressively more complex and engineers should have at least the idea of the context they are working in. The need to integrate the subject into an engineering curriculum is well documented as education can only sufficiently prepare engineers for ethical conflicts, social responsibilities they experience. Engineers are the group of people that works in different changing circumstances of society; therefore it is mandatory to include humanities and social sciences into engineering curriculum. In order to bring a better future there is an essence of the amalgamation of the both the subjects. Humanities and social sciences help the techno-centric engineers to be 'value-centric' persons in their every decision they make. While emphasizing on the need of the study, the discussion is a short analysis of introducing the subject humanities and social sciences (HSS) into engineering education and the discussion is limited to philosophy, psychology and sociology. It also analyzes the need for addressing questions of character, imagination and behavior of engineers in the societal periphery.

Index Terms— Social Value and Humanity, Social and Ethical Responsibility, Conflict-of- Interest, Personality Building.

1) INTRODUCTION

As the nature of engineering profession is a 'hard hat' that is restricted only to particular consequence based actions therefore there is a need of proper understanding and knowledge to deal with the realities of the world. The Humanities and Social Sciences had not paid enough attention into engineering curriculum; however, the importance of the subjects cannot be ignored and can be explained in part by the impact that the technology has on our society. Recent research indicates that Professional engineers are expected to make intellectual judgments that encompasses human, societal and technological values as engineering professions are restricted to social affairs like, economic, environmental, political and developmental

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G. V. Praveen, Department of Civil Engineering, S.R. Engineering College, Warangal.

Pankojini Mulia, Assistant Professor, S R International Institute of Technology, Hyderabad and Research Scholar, Department of Humanities and Social Sciences, Indian Institute of Technology (ISM) Dhanbad.

Ajit Kumar Behura and Sarita Kar, Faculty, Department of Humanities and Social Sciences, Indian Institute of Technology (ISM) Dhanbad.

decisions. The subjects like sociology, ethics and psychology has become an increasingly important topic within engineering as the profession has become progressively more complex. Engineers must make significant decisions which are often based on what appears to be best for their employers or themselves or for the environment and what they believe to be morally proper. However, only engineering education is not sufficient to prepare them for these rational decisions. Because professional accreditation agencies are demanding more than technical competence of baccalaureate graduates, engineering educators have been grappling with the challenge of preparing professionals who are both technically competent and socially responsible. However, the difficulty lies in how to meet the challenge presented by this need.

Discussions of Humanities and Social Sciences in engineering practice typically have the following common features. Viz., understandably, they tend to focus on specific events, typically events that are newsworthy because of their unfortunate, if not tragic, consequences and they usually focus on questions about alleged wrongdoing, its avoidance, or its prevention. Important as such discussions are, this paper will focus on a different, though related, aspect of engineering ethics—namely, responsible engineering practice. Given the importance of responsible professional practice, it is perhaps surprising how little attention has been directed to this more positive side of HSS in the literature.

2) SIGNIFICANCE OF HUMANITIES AND SOCIAL SCIENCE

Openness, modesty and responsibility, which are basic qualities of any serious education, cannot be taught directly. Openness, modesty and responsibility are attitudes. Attitudes can only be transferred indirectly. Therefore, they can be induced everywhere. Every teacher of any given subject can and should contribute to this. The contribution of the subject is critical thinking, therefore should not be consider as a subject of relaxation. So there should not be any kind of differentiation between the technical education and not-technical education but only tension that exists between the two. HSS appear to be essentially different from technical disciplines. The significance of the subject HSS (Humanities and Social Science) into engineering curriculum seems fairly obvious. Because the engineers work (developing, designing, and implementing technologies) always left tremendous effect on the world. It affects our everyday life as well as our larger social, economic and political domains. As the actions of engineers are for the betterment of the society and for the betterment of the humanity, so it is needed engineers and other scientists must be aware of the social implications of their activities and must be able to take some responsibilities for themselves as well as for others. The humanities and social sciences will help the engineers to set

the standards that will lead to safe and techno-effective technologies that produce less or no negative effect.

It is not at-all difficult to make understand or convince an engineering faculty about the significance of the subject rather different set of principles have been introduced by the education policies. In fact, the Accreditation Board for Engineering and Technology (ABET) and Association for Computing Machinery (ACM) have been pressuring departments to address ethics in their study curriculum. So the importance of the study cannot be simply ignored. It is widely accepted that science and technology are shaping the world in increasingly profound ways, raising complex questions and often creating new and united social and ethical challenges. Human beings need to work together as the member of one organized whole in order to avoid the misapplication of technology in future. It is very essential for young people- the future decision makers and managers of technology to be trained and educated in way they can resolves the moral, social and psychological dilemmas.

3) DISCUSSION

Many professionals consider it is the responsibility of academe to teach the basic humanities and cultural-social values to students. However, the importance of the subjects in science and engineering cannot simply 'tech' effectively, creatively in only classrooms; it can better 'learn' outside from our daily affairs. When an engineering student takes the basic course of HSS, like philosophy, there is often the feeling that the subject matter is unrelated to his world of technology. This is not to say that the philosophical, social or psychological issues cannot be brought into engineering courses. One example can make it simpler like: the consequences of Infrared Radiations from mobile phones, the consequences of collapsing a multistoried building in Liquefaction, the impact of technological or chemicals waste products on the natural habitats, creation of robots creates unemployment etc.

Some scholars argued we should avoid bringing the metaphysics into the field of science and technology. Like Schuon (1984) says that, all down ages to philosophize was to think; it has been reserved to twentieth century not to think and to make a philosophy of it. For example, Civil Engineering does not understand in order to construct a building, it is destroying the forest nearby areas, not only that many hills or mountains have to be rearranged, primary materials and minerals have to be mined and manufactured. These aspects are generally not studied in mechanical or civil engineering. Rather methods like efficient ways of mining, transporting, using of raw materials and manufacturing the final product and taught well and studied effectively. In simpler language it can be stated that our education system is not secular, the sacredness is still missing. E F Schumacher (1977) has rightly remarked: "Anything that we can destroy but are unable to make is, in a sense, sacred, and all our 'explanations' of it do not really explain anything". So in a way the same constructing developmental work by engineers can be called as destructive work by others. Whitehead (1927) regarding the professionalization and specialization of learning and the consequent imbalance in the education of the young said that, the noble place of progress requires a greater

force of directing if disasters are to be avoided. The point is that the discoveries of the nineteenth century were in the direction of professionalism, so that we are left with no expansions of wisdom and with greater need of it. And the wisdom is the fruit of a balanced development. It is this balanced growth of individuality which should be the aim of education to secure. The most useful discoveries for the immediate future would concern the furtherance of this aim without detriment to the necessary intellectual professionalisms.

The education system's responsibilities are to educate the young mass in order to maintain the balance and secure the future. By HSS studies we do not mean anything religious or spiritual or bounded by any particular sect, caste and culture, rather we mean application of a universal understanding of humanity and their relations with other humans, nature and future generations. Then the special contribution of the HSS thus ends. What must be the position and status of the humanities in the academic world in order achieves the highest social ethical life. The contribution of humanities and social science is undoubtedly great in order to draw a proper balance in all education system.

4) CONCLUSION

Integrating ethics in today's crowded engineering curriculum is an extremely difficult challenge. The profession is concerned with the importance of ethics in engineering and the lack of training in this area. Part of the problem may lie in the need to educate engineering educators in the area of ethics. Another part of the problem may be the engineering faculty's lack of knowledge of a pedagogy based on a psychological model. This issue can be addressed by providing faculty training in the areas of Kohlberg's theory and Reimer's model as well as the utilization of existing material (e.g., case studies) in multiple courses. By incorporating this pedagogy in multiple existing content area courses throughout the degree program, engineering faculty will better prepare students for the professional as well as ethical responsibilities facing them upon graduation.

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