



Challenges in Engineering Profession and Education: Ethics, Practices and Evaluation

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Abstract:

Engineering education is facing many challenges and so are engineering professionals. Growing demand for competency is many times become so called barriers in rational and ethical thinking of an engineer. Engineering education is also finding it challenging to meet the need of industries. It is very important to follow ethical values and practices to save the profession and engineering education system. The current paper is an attempt to summarize few publications on the topic and suggest few guidelines for imparting ethical values through engineering education.

Keywords:

Ethics, quality, engineering, quality, education.

Introduction

Technical and engineering professionals always come across a situation where it is important to choose between profits and ethics. It is very important to impart ethical values in teaching system so that when these students become engineers they can take the decision from the human welfare point of view. The ethical standards are also important from safety and environmental considerations. Teaching needs to be more value based and practical oriented in technical institutes. The present paper reviews few studies on engineering practices while suggesting few measures to improve engineering education.

Studies on Ethical Practices in Engineering Profession and Education

According to Kreiner et.al. engineers must be properly prepared to face the moral, legal and ethical ramifications of their actions [1]. They discussed ethical issues faced by engineering professional and the engineering profession. According to them the ethics can be taught and imparted into engineering professionals. Ethical practices in engineering are important as they are directly related to human safety and environment. He emphasized the need of teaching engineering history in order to understand the effects of various wrong and right engineering practices and their effects in the past engineering projects and designs. They concluded that engineering ethics was essence of the engineering profession. Also according to them, engineering teachers must be encouraged to teach confrontation with the ethical problems, examining the standards of conduct with critical thinking and the competence and ability that are illustrated and taught in engineering classes. Finelli discussed factors that influence the faculty motivation of effective teaching practices in engineering [2]. He studied the local factors that influence adoption of effective teaching practices by conducting a series of 90-minute faculty focus groups. He probed expectancy (i.e., ability self concept and perception of

task difficulty) and value. He discussed Factors that influence faculty adoption of effective teaching practices like infrastructure and culture, knowledge, skills and student experience, personal disposition and infrastructure. According to him, faculty professional development initiative and the administrative change plan are both critical parts of overall institutional change plan. Sellers et.al. discussed case studies in inclusive teaching in science, technology, engineering and mathematics [3]. According to them, case study method allows for multiple points of view, to create discussion and foster greater understanding. Oboler et.al. discussed reasons behind the apparent large-scale non-adoption of software engineering in academic research [4]. They found that a clear and constant aim was lacking in the academic software development. The study also revealed that many techniques are considered inappropriate or too costly for research work. Juwah et.al. discussed the aspect of enhancing student learning through effective formative feedback [5]. Their study included a conceptual model of the formative assessment/feedback cycle, Seven principles of good feedback practice which were drawn from the model and a review of the research literature, Some examples of good practice strategies related to each principle. In their study they assumed students to construct actively their own understanding of feedback messages from tutors. According to them it was important to facilitate the development of self assessment (reflection) in learning. The aspects such as dialog between teaching and learning parties, expected standards of learning and teaching, opportunities to close the gap between current and desired performance, delivery of high quality information and encouraging positive motivational beliefs and self-esteem are important principles in effective teaching. Nicol, in his key note paper addressed the issue of effective feed back and assessment

[6].He presented principles for good assessments and feed back and rationale for these principles and their selection criteria. They emphasized on additional principles such as developing of learning communities, helping teachers adapt teaching to student needs and involving students in assessment policy and practice. Lynch and Kline discussed the importance of Understanding the importance of precedents, incremental change, and fallible engineering judgment in engineering design[7].They suggested modifications of both detailed case studies on engineering disasters and hypothetical, ethical dilemmas employed in engineering ethics classes. Sohoni emphasized the need for the engineering professional to address social problems and solve them [8].Also there is need to broaden the engineering spectrum. Engineering professional and industrials need to work in public domain. Pons identified the key characteristics for successful engineering management by graduates [9].He highlighted the difference between engineering scientist and professional engineer. According to him engineering management was essential attribute of a professional engineer.

Problems in Engineering Education

- 1.Increase in quantity, decrease in quality of feed.
- 2.High expectations of parents from the ward notwithstanding his or her interest.
- 3.Engineering teacher faces tough task of creating interest in the student.
- 4.Not all, but many parents are not aware of student's progress.
- 5.Teacher has to make sure that the prescribed syllabus is complete in stipulated time period.
- 6.Evaluation of teacher and students itself is done through a flawed system where mugging the formulae and definition is important.

7.Many times the score in exam does not reflect actual knowledge of student and result in exam doesn't reflect the teaching ability of teacher.

8.Feed back system is flawed many times and reflects only behavior of teacher and his or her relation with student and lenient practices than teaching ability and knowledge.

9.Decreasing moral values and standards is major problem faced by technical and engineering education.

Suggested Guidelines

1.Ethical guidelines for teachers and students.

2.Uniformity in home work and assignment in terms of quantity and quality.

3.Uniformity in level of expectations from students in terms of answering and response.

4.Addition of value education in engineering syllabus.

5.Teachers should be encouraged to think differently and practically.

6.The evaluation system for students should be based on practical knowledge than theoretical.

7.Mugging of formulae and text book definitions is not required in the current engineering practices. Important is to know the meaning of the term. These practices should be avoided.

8.Engineering and technology faculty should be deputed for industrial training program.

9.Teacher must be given freedom about teaching methods and resources of knowledge.

Conclusion

The engineering and technical education faces many challenges and need to address many problems. It is important not to forget basic teaching practices and ethical, moral values in the era of rapidly diminishing trend of these factors.

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