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## Technological Engineering Education and Ethics of Conduct

*Abstract: The presence of ethical conduct within university institutions promote positive attitude among employees these institutions also provide them with a reference to which they revert to determine what is the proper conduct. The commitment to compliance with the ethics of engineering education is a definite indication of the degree of pertinence to the profession. That ethical conduct in universities is one of the superiority standards as well as in the guidelines of granting reliability for university institutions. In this research we discussed how to educate engineering students about work ethics by deliberating the importance of considering work ethics subject with the engineering courses in several ways. This research as well presents the role of university professor and the significance of being a role model in work ethics to be the main source for students to teach them the anticipated ethics through him/her. Particularly with the rapid changes in various fields of life which led to the emergence new challenges that the community has never faced previously. The present research implicated field study through a questionnaire that a group of university engineering professors participated in which included a questionnaire form with questions about key objectives, principles and foundations that should be incorporated into the ethical program of engineering students.*

*Keywords: Technological Engineering, Education, Ethics, Conduct*

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**1. Introduction**

Engineering is the most significant profession for civilization historical and present-day because it has a direct and vital influence on the life, prosperity and health of any society. The significance of the engineering professions is constantly growing due to successive scientific and technological developments, which increases the probability of being a danger to society and culture as well as to the environment. Therefore, engineering profession should devote all the disposable efforts to safeguard society and the environment and to preserve the necessities of sustainable development. In order to maintain the relationship with the community and to gain confidence in the implications of engineering work, the need for engineering services to be bounded by standards that define the mandatory behavior through ethical principles governing the relationship among all employees, which is done by issuing ethic codes for engineering work to be clearly understood [1]. Unconditional fundamentals that do not substitute by place or time are values and principles of ethics, while manners and what they express are not so.

Manners can change between a region and another depending on the changing norms of each society and may change with time and the development of the necessities and ambitions of professions and specially engineering professions. Some professional institutions and unions resorted to issuing special regulations defining the requirements for profession practicing, however, adherence to these affairs or requirements took secondary attention from college's graduates. This is exactly the contradiction of the anticipated goal. On the other hand, this association is evident in some professions such as medical professions because of their direct connection to human life, while in the technical and engineering professions the gap between ethics of the profession and ethics are growing due to the superficial view as being invented by human motive [2].

There are two main causes to address:

- Incorporate specialized courses designed for this goal in syllabus.
- The university professor is committed to high level of ethics, which makes him an example for his students. [3]

This paper offers an analysis of the profession ethics subject, especially engineering ethics, by addressing the syllabus and incorporating the ethics of the profession, and the importance of the university professor's ethics.

Engineering education profession ethics Objectives:

The ethical guidelines of teaching profession contribute to:

- 1) Elimination of negative phenomena prevalent in our society especially university community.
- 2) Determine the principles and rules for the teaching profession of engineering and technology.
- 3) Clarify the rights and duties of professors in educational institutions.
- 4) The transformation of teaching profession from being a job to the level of delivering a message.
- 5) Provide a system include ethics for the teaching profession that reflected on the professors and students.

## 2. Moral Concepts and Ethics of the Profession

Ethics is defined as the principles and standards that govern the behavior of individuals, groups, and ethics are innate qualities that do not change by place or time, and manners are defined by the words and actions of man himself. Manners differ from the concept of ethics relative to the fact that they may change by changing place or time. The ethics of the profession are the words and deeds of man in the practicing of a profession; the meaning of the term "profession ethics" reflects the standards and principles of the practitioner who undertakes to comply with good behavior. The need of ethical guidelines has increased in modern society in which the focus of most professions shifted toward increasing profits without Compliance with the ethics of the profession which led to spread of Work because of the prevalence of behaviors and ideas harmful to society, such as without attention to ethical considerations, which led to the spread of administrative corruption at all levels. So ethics of the profession is a safeguard for the society [4]. Because teaching is a profession that requires professionalism, this profession requires standards and conditions to practice. The professional person specially engineering university professor is a person who has learned engineering sciences and technical skills in the field of his specialty, and then teaches it to his student. The most important rules in the ethics of the profession to teach engineering universities students are:

The purpose does not justify the means: Avoid what can be bad and exceed the commitment to achieve what is good.

The source Figure 1.

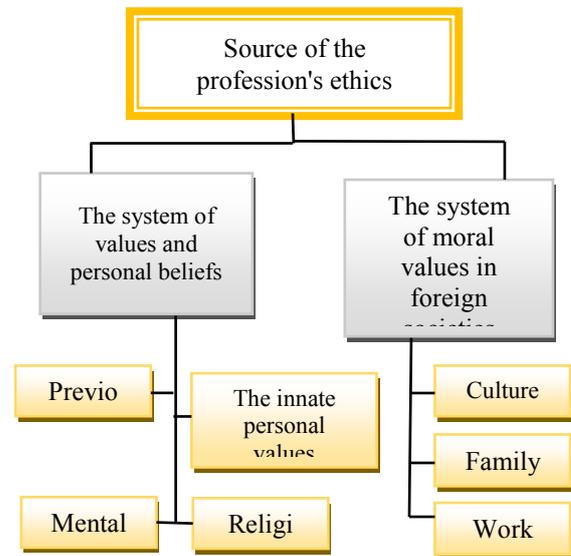


Figure 1: explained the source of the profession's ethics

## 3. Ethical Charter in the engineering institutions

The Code of Ethics is a set of principles, standards and rules that the University leaders undertake, which are committed by university leaders and faculty members to act by voluntarily to achieve the objectives of the educational institution.

The existence of a moral charter within universities boosts the ethics of the profession in education. The commitment to the ethics of the profession is a strong indicator of the professor belonging his/her position as an educator [5].

Engineering ethics can be expressed as the study of engineering and technical issues and ethical decisions done by organizations and individuals in terms of technical and engineering development as well as infrastructure policy. [6]

Engineers must have the ability to modify and develop the techniques that will be used to build society, which results in moral responsibilities towards his community. so faculty members in the engineering universities need to Prepare an engineer with a professional conscience and an internal guard and must be prepared to be able to develop himself and be in harmony with himself and other and finally with his profession. The teaching staff of the engineering colleges should ensure that their curricula includes subjects about principles and ethics that help engineers to be capable of improving his job and being loyal to his work with taking into consideration the public

interest and the safety of the society, so some of the engineering bodies to prepare code of ethics for their engineers includes a set of rules to Committed for example, Association of Professional Engineers of Ontario (APEO), Institute of Electrical and Electronics Engineers (IEEE) and National Society of Professional Engineers (NSPE). [7]

#### 4. Ethics Education in the Engineering Profession

There is a growing interest in introducing ethics into engineering and technical subjects

This is evident in the increase of specialized publications in this regard such as:

A moral charter for education in Tunisia [8]

Ethics of the Education Profession for the Arab Gulf States [9]

Engineering problems, especially those arising from technological developments, have also contributed significantly to the study, which called on researchers in this field to submit a paper containing fifty-one dilemmas of ethical which can be taught in engineering ethics courses [10].

The use of information technology and modern means of communication can help increase education opportunities and improve quality as well as the improvement of the educational departments themselves, despite the limited use in our university.

Engineering ethics courses are taught using several methods

Integrating the study of engineering ethics with the curriculum.

Developing the methods that professors teach ethics in engineering through courses which is called “ethic challenge” the student is divided into several teams and raises an ethical dilemma with many options prepared with all possible solutions which will stimulates thinking of the issues and the winning team is the one with most correct answers.

The use of modern teaching techniques and techniques in the teaching of engineering ethics where they are considered

Modern technology is an important factor in attracting students to education, and from these means the Internet to connect with sites related to ethics issues, and to view videos with cases related to the subject and the students will be able to discuss about it through forums. The use of these methods in the appropriate way with the traditional teaching method will give a deeper understanding and greater benefits will to the students.

#### The Professor Ethics

Teaching profession ethics will not be helpful if the professor does not have high professional ethics. The effect of the professor behavior on the student's behavior is certain, so the university's teaching is great responsibility on the moral level of students, which is even more critical than its responsibility for student's development and growth [11] therefore, the objective criteria for an ethical evaluation that must be correspond to work ethics, so professors need to pass high standards examinations in ethics and Work ethics before being qualify to teach. [12] There are other criteria professors need to possess before being qualify to teach such as:

- Keen to self-development and maintain up to date knowledge about the field of specialty.
- Directing students to the best ways to get knowledge about their course.
- Commitment to transparency and justice in evaluating students.
- Participate in the provision of scientific advice to solve the problems experienced by individuals and institutions.

#### Field Study

The field study was carried out in this research by setting the goal for this paper to be published and adhered by all employees and supervisors of the university teaching staff, especially engineering education and this has been done by a questionnaire in this area table (2), arbitration was conducted for the questionnaire. A group of professors with high experience filled up the questionnaire and at the end of the field study a statistical analysis was done by calculating percentages and calculating the relative weight of the questionnaire. Incomplete forms were discarded.

The questionnaire was prepared according to form 2 to explore their views on whether or not it is necessary to have ethics subject the syllabus

The statistical scale was carried out using the five-point Likert method, Table No. 1

Table 1: scale of Likert

Weight	Answer
5	Excellence
4	Very good
3	Good
2	Average
1	Below average

The arithmetic average Y is calculated by the following formula: [13]

$$Y = \frac{mx1 * 5 + mx2 * 4 + mx3 * 3 + mx2 * 2 + mx5 * 1}{M}$$

Where:

mx: repetition

M: Total number of recurrences

The standard deviation ( $\delta$ ) It is calculated according to the following equation: [13]

$$\delta = \left( \sum_1^m \frac{mx(x - y)^2}{m - 1} \right)^{0.5}$$

X: weight

**Table 2: Questionnaire submitted to the experts (professors of engineering universities).**

No.	Paragraphs	Excellent	Very good	Good	Average	Below
1	The teaching profession is a moral message that establishes ethics in society.					
2	Employing syllabus about ethics in engineering Colleges help The Society eliminate some negative phenomena (Selfishness, unwillingness to be part of a team).					
3	Ethics supports innovation, development and progress.					
4	Including ethics within the syllabus clarifies the rights and duties of professionals in engineering fields					
5	Ethics provides an ethical system for Teaching, professors and students.					
6	Studying ethics in engineering Universities Require high competencies to deliver the ideas to the target group.					
7	The study of ethics requires legislation and rules to be successful					

8 University engineering professors support the concepts of pluralism, diversity, freedom and citizenship.

**The analysis and outcomes of the field study**

The results of the questionnaire for this research from the expert's point of view on the importance of ethics for students of engineering colleges, which was done by a questionnaire 10 experts (professors at Iraqi engineering universities) through eight paragraphs dealing with specific aspects of the subject.

Table 3 shows the results of the arithmetic average as well as the standard deviation of the responses of the Questionnaire submitted to the experts.

**Table 3: arithmetic average and standard deviation from the point of view of the expert.**

No.	Paragraphs	$\delta$	Y
1	The teaching profession is a moral message that establishes ethics in society.	0.71	4.35
2	Employing syllabus about ethics in engineering Colleges help The Society eliminate some negative phenomena (Selfishness, unwillingness to be part of a team).	0.52	4.21
3	Ethics supports innovation, development and progress.	0.4	4.25
4	Including ethics within the syllabus clarifies the rights and duties of professionals in engineering fields	0.35	4.4
5	Ethics provides an ethical system for Teaching, professors and students.	0.62	4.51
6	Studying ethics in engineering Universities Require high competencies to deliver the ideas to the target group.	0.75	4.6
7	The study of ethics requires legislation and rules to be successful	0.5	4.125

8	University engineering professors support the concepts of pluralism, diversity, freedom and citizenship.	0.6	4.42
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The results presented in the questionnaire were based on an arithmetic average of (4.358), which is a high degree of confirmation of the questionnaire contents. The standard deviation of the questionnaire was (0.556). This means that there is a performance convergence of the questionnaire paragraphs.

The values of the standard deviation and the arithmetic average of the questionnaire paragraphs indicate that the content of this study is related to the needed objectives, and contributes to guide the students and professors towards achieving the desired goals and meeting level of work to serve the community

### Conclusions

The research proves a set of principles about the ethics of teaching profession which are:

The need to commit to the teaching profession as a message.

The university education profession, especially the engineering field, must have confidence and mutual respect between the professors and students vice versa.

The need to respect and believe in diversity and pluralism without preference to his or her religion, identity, nationality or others.

Belief in building partnership and team work among workers in the same profession, especially in engineering.

Belief in citizenship and the importance of promoting confidence in the engineering profession in terms of honesty, knowledge and not to exploit others to achieve personal ambitions.

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