HINDRANCES TO ENGINEERING ETHICS APPRAISAL

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Key words: Engineering ethics, engineering education, professional ethics.

1 INTRODUCTION

Engineering and ethics are, in some aspects, very close together. In fact, more than it is usually recognized. Both of them, the engineer and the individual in society are continually faced to situations that must be dealt with a limited set of resources, a particular code and some accumulated experience. The engineer confronts technical problems while the individual finds herself immersed in moral problems[1]. Moreover, these technical problems often have ethical implications whereas moral dilemmas may allow some technical analysis. Nevertheless, ethical implications of engineering activities are not always fully accepted and understood by professionals. In fact, as many teachers have confirmed in classroom activities, this misunderstanding is still more serious among engineering students. Certainly, both of them, engineers and engineering students are not amoral people; at least, no more than other professionals or undergraduates. So, the goal of this paper is double. First, to analyse some of the main causes acting in this withdrawal, in particular among engineering undergraduates. The case of computer engineering students is considered with more detail because their subject and environment poses many obstacles to them whenever moral involvement is required. Second, to recall some ideas and to introduce some suggestions which are worth considering when the education of these students —our future engineers— is revised.

2 UNDERSTANDING PROFESSIONAL ETHICS

Before entering into the main subject here an important point has to be raised about the character of Professional Ethics. This is related to what will be called *moral schizophrenia*. This suggested disorder might appear when a person establishes a full division between her ethics in public life and her ethics in private life. When this happens, several different moral identities appear pulling from opposite sides. And then, should I decide this moral dilemma solely as an engineer? Should my personal values and beliefs be taken into consideration in the analysis? Should I consider here my personal relation with my fellows or the interest of my family? Undoubtedly, it is sometimes possible to recognize some responsibilities and

commitments which are specific to our private life, and some others which are specific to our professional life. Of course, there are many instances of lives where these two worlds can be kept apart enough. But, in practice, things are not so clear and squared. To begin with, public life and private life are not always independent from each other; it is usually quite the reverse: they both exist in a relation. For instance, two closest friends may work in the same office or department. Also, the welfare of a family could depend on the success in some professional project or business enterprise. Moreover, all decisions taken in the different environments where someone interacts —family, work, friends or whatever it may be— are always decided by a person as a whole, not just by one of the social roles of this person.

Thus, the subject Professional Ethics is misunderstood whenever it is read just as ethics affecting some people from, say, 9 am to 5 pm —Saturday and Sunday excluded. Instead, we need a more realistic conception, one which does not reduce people to functions or roles. Certainly, to decide as a person may be harder than to decide taking into account solely the code of ethics of a profession. But this is our fate; moral dilemmas are not easy problems to solve.

3 THREE HANDICAPS FOR ENGINEERING STUDENTS

First. We prepare our students by means of technical work, for a technical job in a technical world. This is what they mostly believe, but it is far from how things really are. No one doubts that technology (technologies) is today a main subject in every engineering career. Nevertheless, the future engineer needs to develop many competences and attitudes which are not technical, at least not mainly technical. Engineers work for people and among people. Thus, the results of their work sooner or later have an effect on people. As Coeckelbergh[2] says,

> "If the engineering profession is understood as the improvement of people's lives and environment through the imaginative design and application of technology, ethics and ethical reasoning is an integral part of what it is to be an engineer."

Our society puts much confidence on them, so the engineers take on a serious responsibility which affects not just what they do but also how and why this is done. Unfortunately, many times this message is not underlined enough during the years students spent qualifying for a degree. And this is our fault, mainly because they learn what we taught them. In this sense, their indifference just reflects our negligence.

Second. It is possible to consider responsibility from two different points of view. Legal (passive) responsibility and moral (active) responsibility.[3] The first one depends on laws and appears after the facts, whereas the second one is a virtue and exists always before any fact. Both of them are important, each one in its proper place, but only the active responsibility has ethical relevance. Perhaps because legal responsibility is today so influent in every activity of contemporary life, it has appropriated the responsibility arena. This type of responsibility is made public and bears punishment (usually a fine, a professional disqualification or, in worst cases, prison). On the other hand, moral responsibility may remain unrecognized and it is not

regulated by public trials and verdicts. Bearing in mind these characteristics it is easy to understand why active responsibility is not very popular, and why so often only passive responsibility is accepted (with resignation). In the case of students, this misunderstanding is a serious obstacle in their education. For instance, the claim for excellence, understood as first quality work, can only be accepted if active responsibility is fully assumed. Otherwise, this demand seems to be exaggerated, something that can be ignored.

Third. The last handicap is due to the unrealistic formulation of many exercises and problems studied and solved at home or in the classroom. Students get used to analyzing only technical difficulties with material or artefacts in oversimplified situations where people are not involved. Thus, the human factor is forgotten as though technology were an autonomous world justified by itself. The development of empathy and moral imagination requires facing complex dilemmas where interests, beliefs and feelings of several persons collide and some fair way out has to be found.

3.1 The case in computer science/engineering

All the above mentioned difficulties appear and, indeed, may become even sharper when computers are the centre of gravity in undergraduate education. In this case, when considering their professional future, students' reasoning easily adopts the logical scheme characteristic of computers. At the beginning, there is nothing against logical or formal reasoning in human deliberation. In fact, many false disputes can be exposed by showing that a position is untenable because it does not resist a simple logical analysis. Nevertheless, some problems can appear when consistent logical arguments are considered fit *per se* when analyzing moral dilemmas in practical cases. Contradictions, doubts and ambiguities are present in all of us, so they have to appear —more or less dramatically— whenever we are involved in important disagreements. In these circumstances, logical reasoning may result insufficient or inadequate because a more flexible or open treatment is required.

Anonymity and detachment are two other characteristics introduced or reinforced by the use of computers, especially when working through networks. Day after day, we can see how an easy, fast exchange of information between machines does not ensure close or real communication among people. Again, the emphasis put on the use of computers and on the computer itself may be fully justified in many subjects, but it does not help the students to understand how and why their work with these machines can affect the life of other people.[4] The machine imposes a distance and interposes its law in the communication process. As an example, it is quite surprising to realize that E-mail interchanges often degenerates into an open quarrel when strong differences appear in a controversy. Apart from other circumstances, this happens because some important mechanisms regulating the dialogue (touch, gesture, look, rephrasing, tone, silence, etc.) are excluded by the system.

4 CONCLUSIONS

Some of the several hindrances appearing in engineering education when ethical elements are considered have been shown above. Our opinion is that both professors and engineers teaching undergraduate students should do the best we could to change this dynamic. With this purpose in mind, five of the possible elements to reinforce are referred to below.

- Active responsibility as the proper sense of professional responsibility.

- Commitment to the best profile of engineer.

- Meaning (sense, motive) in both of them, data and processes.

- Attention to details, context, circumstances.

- Development of moral imagination.

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