

Reflections on Professional Engineering Ethics – a Personalistic Perspective

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| Abstract

Purpose

The article attempts to synthesize professional engineering ethics to find key characteristic features of a professional expert engineer and of a managing engineer, who do their duties on job contracts or as contracted professionals within a partnership.

| Methodology

A descriptive analysis has been applied to the content of engineering codes of ethics to obtain core engineering ethical competencies.

| Findings

A review of the content of professional engineering ethics indicates a deontological base of an educated engineer on earlier acquired values and formed attitudes from general and personal ethics. These are beyond the scope of professional higher education, but are an indispensable precondition for an engineer to have been taught effectively about his or her engineering rights and duties, and to have acquired correct attitudes toward professional ethical issues. The analysis of the learning process within technical curricula supports the proposition, generally accepted in engineering ethics textbooks, to apply a case study method during instruction and to adequately define prerequisite knowledge and skills of the students, to have them prepared for studies of the professional ethics subject.

| Originality

The author proposes that such prerequisites be formulated in engineering curricula and justifies this need by professional code norms that state the superiority of personal integrity of an engineer over all other professional qualities. Such integrity, the author foresees, can be attained on personalistic ethics grounds that foster learning through application and formation of an internally consistent system of values by a future professional who wishes to achieve such personal integrity.

Key words: professional engineering ethics, professional integrity, personalism, case studies, Christian ethics, teaching ethics

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| Introduction

Profession, from the Latin *professio* and called *Beruf* in German, initially designated a *profession of faith, testimony* and a *calling* of a person who practised a given profession. With centuries passed, it has lost its original meaning. Its present content of *vocation* is narrowed to certain taught and practised skills, which in a form of services are offered on the labour market. Modern vocations resemble those of skilled XIX-century workers, who offered their labour to the industry and to factory owners. However, these vocations should be distinguished from professions.

Observation and a deeper analysis indicate that such content of vocation is insufficient for performing many crucial public and private jobs or functions, since it does not always guarantee the emergence of social good in the results of such jobs. Vocations in modern economies need professions with code-of-ethics driven occupations of individuals. These professionals must exhibit highly specialized knowledge, skills, attitudes and values, which drive their decisions and behaviours in their private lives and professional careers. Because of these values, society can expect a substantial social or economic good to be created. Such professional occupations include among others manager, judge, attorney, physician, university professor and engineer.

If those first five occupations generally do not suggest doubts in the reader, engineering as a profession may sometimes bring concerns, even among engineers themselves. Rare are organizations of engineers who act on their own account and are responsible for their services to one another and before customers, by working in the partnership. The employment contract is still the most prevalent form of engineering professional employment.

Organizations of engineering experts, construction project architects or contractors are examples of engineering professionals who perform such activities that bring substantial value to society

in a form of expert opinions and construction projects. Responsibility in such organizations is based on the personal responsibility of partners who participate in a firm and on *professional ethics* common to all of them.

Professional ethics in performed duties is distinct here from the common notion of vocation, because it is accompanied by the professional code of ethical values and specific obligations that guarantee social good is created in the course of vocational practice. Professions with such values, which were formed before and independently of the knowledge and skills of the practised vocation, provide a counterbalance to purely economic and technical criteria for evaluation of acts made and decisions taken during the vocational practice¹.

For example, a lawyer professing a certain ethical code of conduct shall not accept a defence in the case of a potential client that is connected to another case in which the lawyer is a suitor. Similarly, an engineer professing an ethical code of conduct to his employer shall not order preparation of a project for a contractor who offered him some collateral personal advantages either financial or in kind. If these above individuals were motivated merely by economic considerations, like monetary stimuli, they would not see in such profit bearing cases anything wrong, which might prevent them from entering such contracts.

Evaluation using purely technical criteria determines the rightness of a working engineer who plans to build a superhighway through inhabited areas of a national park exclusively based on technical feasibility of such a project. Similar technical-economic evaluation criteria will allow an inventor of in-vitro fertilization or an euthanatic technique to commercialize it on the grounds of its technical feasibility and economic profit potential. However, the ethical code of values that he or she professes obligates him/her to evaluate such a deed intended to create a substantial social or economic good, and to make such an evaluation before the projected activities start. The objective of such an evaluation is to determine whether other equally or even more valuable goods or values are not at risk of being lost or limited in result.

This justifies the contention that professional ethical values codified and taught to the would-be professionals must balance out the economic and technical criteria in the decision making process, in the course of which a substantial social good is to emerge (cf. Fledderman 2008: 3; Harris et al. 2006: 2–3).

| The value of professional integrity

Various ethical codes of engineering professionals underline their duties that strive to achieve *professional integrity*. An example of this norm is contained in the National Society of Professional Engineers code of ethics, which in its preamble specifies:

¹ Also possible and beneficial to an engineer is a situation in which attitudes and values, as stated in the code of ethics, are formed during the vocational hands-on experience or by participation in good practices.

(...) *Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity*².

Also under the title *Professional obligations*, the code underlines:

1. *Engineers shall be guided in all their relations by the highest standards of honesty and integrity (...).*
- e. *Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession”* (cf. Baura 2006: 206).

Similar positions can be found in other ethical codes of the engineering profession³. Professional integrity is a highly appreciated value, mentioned twice and in the preamble above. Integrity as well as dignity refer here to a human person, an engineer, and to that profession, its image and its values. Personal integrity may be achieved by practising the profession at the same time and building a hierarchy of values of ethical conduct, which remain in harmony with one another. Such a harmony can be achieved if the person is able to resolve moral conflicts and contradictions arising during professional conduct in his or her world of values. Without such a resolution of conflicts and values, a person is not able to achieve harmony, but will end with some form of contradictions and illogical and incongruent actions. Here, the person of an engineer is the warrant of professional integrity. His or her appropriately formed values influence the values associated with the profession and *vice versa*.

The attentive reading of the above code offers an important conclusion. Professional integrity cannot be achieved by an engineer concentrating only on the technical competences or instrumental expertise as expressed in an attitude: *I am an excellent (professional) engineer, because I am an excellent expert*. Such a separation of vocational competences from moral values of a person limits his or her abilities to consciously and meditatively evaluate oneself and his or her own vocational conduct. Specifically, it limits his/her moral evaluation of their own decisions, choices, and purpose of their expertise, which results in a lack of ability to consciously build his/her personal professional integrity.

Therefore the above attitude expressing mere expertise can be modified and formulated as follows: *I am an excellent (professional) engineer, because I am an excellent expert and the way of practising of my profession makes me a good human person*. Such an attitude emphasizes the need for development of the human person, covering various spheres and not concentrating only on narrow expertise. It also imposes a duty on the person who practises a profession to regularly examine whether the daily practice of the profession is reflected in the development of his/her personal professional integrity as a human being, i.e. whether it broadens and deepens his or her personal humanity.

² NSPE Code of Ethics for Engineers, in Baura (2006: 203).

³ E.g. FEANI (Fédération Européenne d'Associations Nationales d'Ingénieurs) Code of Ethics, point 1, <http://www.simp.pl/kodeksfeani.htm>.

Major moral professional duties of an engineer

Engineering codes of ethics specify main groups of duties for a person who practises this profession. These groups of professional duties are mentioned in the first title of the NSPE code:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honourably, responsibly, ethically, and lawfully so as to enhance the honour, reputation, and usefulness of the profession (Baura 2006: 203).

These duties should be considered as a result of an education of the engineer, formation of his personality and virtues above all during formal university education. The virtue ethics makes clear is that good deeds are committed by a person who exhibits virtues. These are permanent abilities to make good choices and good decisions, and choosing the good and avoiding evil after an accurate recognition of a situation. Such an acquisition and development of virtues require constant and enduring ethical practice taken within a longer time.

Unfortunately, available engineering ethics handbooks often omit this important educational aspect of practising moral virtues. They concentrate instead on an often scant *description* of select ethical theories: utilitarianism, duty ethics, rights ethics, virtue ethics. They assume these abilities and virtues as *states* rather than *processes of becoming* a moral person. They unrealistically assume that if a person has already acquired these virtues, he or she possesses them in the degree required, rather than perhaps having them more by his/her own diligence, or losing them by his/her negligence. Since virtues are volatile goods to some extent, a person might work them out in the course of enduring good practices (Baura 2006: 7 and following; Harris et al. 2009: 58 and following; Fleddermann 2008: 36 and following). Also, there is no ethics handbook based on the view of a person practising his/her profession and containing such a description of the professional ethics (in this case, engineering ethics), having assumed the standpoint representative of *Christian personalism*.

Personalism is the appropriate perspective for the description and formation of personal integrity of an engineer. Christian personalism serves to describe, develop, and evaluate a moral human person, various aspects of personality, and builds lasting dispositions for making good acts by using *personal conscience*. Personalism emphasizes this and develops the means that enable evaluation of advances made in these areas. Such a personalistic approach to ethical analysis and the presentation of general, personal, and social duties is represented in the excellent ethical handbooks of T. Ślipko (2004; 2005a; 2005b), which however lack the counterpart covering professional duties. It has been used in the undergraduate engineering course as an introduction to some select issues of general, personal and social ethics of an engineer.

Christian ethics with its various streams shows a spectrum for investigation of moral issues within and around engineering specific issues, e.g. work ethics. Suffice here to mention the personalistic (Ślipko 2005a) and Protestant work ethics (Mæs, Schmitt 2001; Weber 1994; Ermer 2008) as examples of two approaches to this particular issue, both based on the appropriate social ethics⁴. More in-depth investigation would require a separate evaluation.

| The role of professional conscience in engineering recognition

Engineers, as in other professions, bear certain social responsibilities and must often depend on their own recognition of obligations, rights and duties in cases where they are involved. They must make decisions by using their “professional instinct”, often after their own recognition, without consultation with colleagues or superiors. Sometimes such demands are found in situations where an engineer works under time pressure, or on one’s own account.

Personalistic ethics, of which K. Wojtyła was an eminent proponent (Wojtyła 2000; Buttiglione 2010), determines an important role for personal *professional conscience*, which more or less correctly leads a person to sufficiently accurate choices and decisions both in personal, social and professional spheres. For an engineer, the correctness of his or her acting conscience depends on its appropriate training, sensitivity and formation. The investigation of conscience (Ślipko 2004: 373 f) allows one to discern a few of its types, some which permit a deed and some do not. When rightness of a considered deed is certain, its evaluation has been achieved in *certain conscience*, and justifies this deed to be made. When doubts arise in *doubtful conscience*, *pharisaic*, *perplexed*, or *scrupulous*, the considered deed should not be made until certainty is achieved (Ślipko 2004: 369 f).

An engineer has a *right of professional conscience* (Fleddermann 2008: 97) to evaluate decisions or actions, before they are made, even if delegated by his/her direct superiors. The engineer also has a *right to conscientious refusal* (Fleddermann 2008: 97 f) in cases, when he or she finds doubts or conscientious objections about whether the considered actions are morally justifiable.

| Differentiation of professional vs. social obligations

Professional obligations of an engineer are expressly mentioned in the titles of engineering professional codes of ethics. For example in a conflict of interest, an engineer must be able to recognize, define, and discern *actual conflict* from a *potential one*, and those from *alleged conflict* of interest, and find ways of the proper conduct in such situations (Fleddermann 2008: 96). Another example of professional obligations is *confidentiality* of customer information about employer and employer’s related subjects.

⁴ Cf. e.g. Novak (1993) for Catholic and Weber (1994) for Protestant social ethics.

Social obligations of an engineer contain his or her obligation to inform society, appropriate representatives or institutions about real, forthcoming or potential dangers that cause, might cause or result in large casualties or social costs. Such a practice called *whistleblowing* (Fleddermann 2008 f) can take many forms of reporting such as a forthcoming flood, absence of necessary precautions or insufficient safety measures against it. It might also be about wrongdoings, waste or frauds made by employees or cooperatives. It might even be about acts committed by the engineer's own supervisors and employer, especially when he/she cannot prevent them in any other way than by blowing the whistle to institutions other than his/her own employer.

Such actions can result in substantial personal and economic costs to an engineer, including the loss of trust of his/her colleagues, prestige, job and even professional career. But professional codes of engineering ethics contain such values and impose such obligations upon the engineer.

Engineering organizations in Poland, such as the Polish Federation of Engineering Associations (NOT⁵), Association of Polish Mechanical Engineers (SIMP⁶), and Association of Polish Electrical Engineers (SEP⁷), formulate ethical norms of engineering professions, interpret those norms and implement professional ethics in practice. They also have certain control institutions for evaluating professional conduct among individuals who work as engineers. These institutions define procedures and demand compliance with ethical norms through fellow arbitration.

| Ethics teaching method of an engineer: case studies

From this analysis of the professional duties of an engineer, a complex method of education emerges. It should comprise an engineer's ability to acquire a permanent ability of accurate ethical analysis of decisions and actions. It cannot be made merely on the level of higher education and should be preceded by requisite fundamentals achieved on previous levels of general, non-technical education.

Professional engineering ethics uses previous learning effects as prerequisites in the spheres of general, and specific (Ślipko 2004; 2005a, 2005b), both personal and social ethics. These learning effects in professional ethics are largely achieved as derivatives of the effects attained earlier. The degree to which previous learning effects of knowledge, skills and attitudes were achieved should be a condition for admitting a student to a course in professional ethics. Unfortunately, there is a lack of systemic tools that would allow appropriately scaled and evaluated advances in terms of personal integrity. No such possibility also exists, at least so far, to evaluate the professional ethical education advances in terms other than mere knowledge and skills. In ethical education, the key role is played not only by knowledge and skills, but above all by attitudes and

⁵ Naczelna Organizacja Techniczna.

⁶ Stowarzyszenie Inżynierów Mechaników Polskich.

⁷ Stowarzyszenie Elektryków Polskich.

personal traits. These qualities should have been adequately scaled and reported to a controlling institution.

The multifaceted reality in which engineers have used to work implies the case studies to be used. This method should use some textual description of situational cases, as well as movies and multimedia materials. Other types of tasks given to students are short situational descriptions, which are aimed at sensitizing moral judgment in the initial phase of ethical education, before students are asked for more complex analyses.

First and second levels of engineering education are dominated by technical content. Ethical subjects are contained in a group of humanities, and are taught to sensitize the students to the role of ethical norms in engineering practice.

Unfortunately, there is a painful lack of good and professionally prepared teaching materials, including handbooks of Polish case studies of engineering ethics and movie materials of vernacular-narrated situations. The latter would be recorded by local authorities, companies, or single persons who came across moral dilemmas and ethical conflicts and tried to resolve them with different degrees of success.

There are numerous movies and series of American cases, catastrophes, and decisional mistakes. These include examples of corrupt professional practices excerpted from real world engineering practice and contingencies of economy, in which engineers took more or less eminent parts. They provide differential levels of ethical background for teaching engineering ethics by experts in the field. There are also a few quite good handbooks of engineering ethics available (Baura 2006; Harris et al. 2009; Fleddermann 2008), but not in Polish and with the previously stated limitations. Not all of them are appropriate to be used in the whole for engineering ethics courses, because of the inadequacy of their content related to Polish realities.

The author suggests undertaking steps that would lead to more commonplace ethical engineering education on the technical university level. It should be done to the degree sufficient to make it possible to prepare and publish a few handbooks on engineering ethics in Polish, as well as teaching materials on media other than paper, similar to those currently available in the USA.

| Differentiation of personal values from professional norms and vocational interests

Learning outcomes in the professional ethics of an engineer comprise the ability to discern his/her personal duties from professional ones and those toward society, and moral duties from spheres of interest. Hence, there is the need for engineers to be able to name and define such duties and values in relation to ideas, to themselves, to other persons, society, natural environment, and cultural heritage. This also includes many other common areas of both present and future gene-

rations that describe interests that might be represented in the professional practice. Evaluation of existent consistency of the professed values with represented interests may allow an engineer to take a decision or action, while conflicting norms in one or many spheres may detain him or her before existing moral conflicts are removed.

Professional ethics takes precedence over *personal ethics*, however with some exceptions. For example, a client can form expectations concerning certain paragon behaviours and values to be cherished implicitly along with the rendered engineering service (lack of conflict of interests, confidentiality), even if the client remains unfamiliar with the personal ethics of the servicing engineer.

On the other hand, exceptions to the above rule may occur, if some ethical issues arouse strong personal commitments. For example, if environmental protection is considered and existing professional ethical norms do not cover it sufficiently, an engineer may refuse to accept a project of a dam or a highway that might bring damage to the environment. The engineer might then refer the client to a colleague engineer to do the work. In this case, norms of the personal ethics are more restrictive than professional ones.

A somewhat different situation occurs if an engineer is requested to participate in project management and implementation of an early warning system against tornados or earthquakes to protect communities from excessive damage and casualties. He or she may not personally believe in the effectiveness of this technology, even if appropriate provisions are set out in the professional code. But he or she should follow the more restrictive code, and therefore should observe the norms set out in the professional ethical code. Here the professional code is more restrictive than the personal one.

As far as the *vocational interests* are concerned, an engineer is obligated to follow professional ethical norms, especially in the case of incongruity of these norms and vocational interests of an employer. This differentiation of interests from professional norms plays a very important role in resorting to the whistleblowing discussed earlier.

| Research methods in investigation of engineering morality

The concepts of *attitudes* and *values* have been used many times in this analysis of professional engineering ethics. Research in attitudes formation and their scaling and explanation is a domain of psychology and management. The method of examining the degree of personal professional integrity of an engineer created in the course of formal education and professional development is based on empirical research in attitudes and personality formation of an engineer.

Factor analysis is an analytical technique used in research to determine latent constructs of personality traits and perceived attitudes, especially moral ones. It also allows one to formally and

quantitatively investigate their properties such as stability or validity. This method is widely applicable in psychology and other social sciences since the beginning of the XX century. Other useful methods are *focused* or *individual in-depth interviews* conducted with prospective engineers. The latter qualitative methods are used for less formal forms of attitude and personality assessment.

From this analysis, one can see the potential application of empirical and field research methods and factor analysis in at least three distinct areas important to professional engineering ethics:

1. Description of existing norms and attitudes in a researched population (descriptive ethics);
2. Investigation of causes or influences upon already shaped attitudes;
3. Investigation of personality dimensions of research units for the evaluation of their degree of personal professional integrity.

| Conclusions

In summary, this article portrays a picture of the professional ethics of an engineer. In it, the author attempts to present a sketch of the rights and duties of a professional engineer as seen from the norms of engineering codes of ethics. The concept of engineering ethics is based on personalistic Christian ethics on one hand, which forms a context for examples of professional codes analyzed during lectures. On the other hand, an attempt is made to justify certain professional duties of an engineer in this ethic. Thereby the author attempts to form a link between general and professional ethics, especially by means of concepts of conscience, virtues, dignity and personal integrity, which build on the engineering ethics concept and become components of professional integrity.

It also notes that there is a lack of a professional engineering ethics handbook based on a personalistic view of the deontology of a human person, as well as appropriately prepared curricula specifying previous competencies of the professional ethics attendees. These would enable a measurable influence on the professional ethics curriculum tailored to the previously achieved competencies.

The author proposes an empirical research method for investigation of professional moral attitudes among engineers, which is derived mostly from psychology and other social sciences. Professional ethics is not limited to an analysis of norms and behaviours of individuals or groups, but attempts to find deeper motives for explaining causes or sources of these moral behaviours. It is a task for field research with the description of the state of morality in a given population through an appropriate construction of research instruments along with select categories of variables. This would provide a researcher with the probable causes that shape or influence the observed morality in the examined population.

The shape of a moral person of an engineer is a challenge to a technical university, and does not take place in an empty space. Professional education adds its effects to an already partially

formed personal, general and social morality of a young person. It must be coherently composed with his or her professional duties and rights towards society and the employers. It is still a challenge for future educational programs and for teachers of vocational training of young engineers. Various vocational training programs already address the ethical issues, but existing systemic and instrumental limitations, both instructional and institutional leave ethical engineering education with many wishes and needs still to be fulfilled.

The author expects that the compelling topic of teaching engineering ethics sketched in this article will draw sufficient attention from many instructors and professionals alike, so that it will lead to these inconveniences disappearing soon.

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