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### Pedagogical Education: History, Present Time, Perspectives

# RESPONSIBILITY FOR FUTURE GENERATIONS AS A BASIS FOR ENGINEERING ETHICS

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### *Abstract*

The article is devoted to highlighting the basic ethical challenges of engineering activity in times of globalization and multiculturalism. We insist that Responsibility is the basis of engineering ethics. The core of their ethical education should be their relation to the public and the communication between them. Empathy becomes the necessary component of communication. The ability to talk on behalf of «an ideal communicative community» allows one to be responsible for the Future Generation in the engineering practice. Virtue Ethics and Normative Ethics are both important for ethical education of engineers. However, the existing Codes of Ethics of Engineers do not guarantee the fulfilment of moral demands of society. Moreover, the introduction of Ethical Codes in the educational process of future engineers in a new way reveals the problem of virtue that exists today in ethical education. In the article, the authors seek to determine what should be the foundation of ethical education: virtue ethics or normative ethics. The main aspect here is not the issues of ethical principles and coherence of universal ethical constructions, but the issues of proper professional education of a future engineer, formation of individual traits of their character. Ethics is deemed not a rational understanding of principles, but a virtue of certain mental and motivational predispositions that establish an effective link between explicitly formulated moral rules and real behaviour.

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**Keywords:** Engineering ethics, ethical education, future generation, responsibility, virtue ethics, normative ethics.



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## 1. Introduction

The lack of value orientation in practical activities of a person not only leads to decomposition of society but also provides for even more harmful results of fundamental activity, social consequences of which are defining for development of modern society. An engineering activity is the activity which defines the image of future world. Even now, the Kyoto Protocol is aimed at reducing the usage of “dirty” technologies and special attention in it is paid to the technological development of the humanity. It is necessary to understand that the personality of engineering community representatives, their moral and value orientation are more significant for society, than their new developments or optimization of the existing engineering solutions. It is important to minimize risks of new developments and application of the engineering solutions and technologies, which can catalyse a series of irreversible large-scale social destructions. By now functions of the engineering profession, its representatives have significantly changed. The quality of the product made by an engineer completely depends on their technical literacy and they are completely responsible for safety of the product.

## 2. Problem Statement

The main challenge of an engineer is to create new advanced designs which will be high-demanded in various production branches. Orientation toward the development of a new, which is common for the modern world of science, brings up an issue of plagiarism. The ban on plagiarism is caused by orientation toward the inadmissibility of tautological expansion of scientific researches and developments. In ancient Rome, the term “plagium” (literally abduction) implied the illegal sale of a free person in slavery. The modern meaning of the term plagiarism is ambiguous; it means imitation, borrowing or direct theft. Anyway, the plagiarism violates copyright, encroaching on liberty of the author.

Honesty is deemed the inadmissibility of scientific results falsification. Engineers, as well as the representatives of other professions that are important for the world (including scientists), unite in associations to spread useful practices worldwide and to advocate their interests easier.

We agree (with Buvakov, Kazakova, Vorontsova, & Krivvykh, 2017) that «Educational system is a complex structure with the following components:

- “goals given in the original concept (i.e. set of original ideas and educational system is created for their realization);
- activity which provides the educational system realization;
- educational activity subjects which are responsible for its organization, and also participate in it;
- relationships developed thought activity and communication which integrate subjects into a certain community;
- system environment successfully completed by subjects;
- management providing components integration into the wholesome system and development of the system” (2017, p. 431).

To sum up, we can say that the main thing in the engineering profession is the conscientious performance of obligations. Ethical Codes of engineers were created for these purposes also. For example, in Code of Ethics for Engineers (2007), developed by National Society Professional Engineers, Professional Obligations are framed in the following way (as cited in National Society Professional Engineers, n.d.):

- Engineers shall be guided in all their relations by the highest standards of honesty and integrity.
- Engineers shall acknowledge their errors and shall not distort or alter the facts.
- Engineers shall advise their clients or employers when they believe a project will not be successful etc.

National Society Professional Engineers, having formulated the Code of Ethics for Engineers, also developed Fundamental Canons. According to these Canons, engineers, while fulfilling their professional duties, shall (National Society Professional Engineers, n.d.):

- Hold paramount the safety, health, and welfare of the public.
- Perform services only in areas of their competence.
- Issue public statements only in an objective and truthful manner.
- Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

However, these Ethical Codes of Engineers do not guarantee that the moral requirements will be carried out. Moreover, the implementation of knowledge of Ethical Codes in the educational process exposes the problem that exists in ethical education in a new way. What should be the foundation of the ethical education: virtue ethics or normative ethics?

Virtue ethics considers the concept of virtue as a fundamental ethical category. An originator of virtue ethics is Aristotle who laid emphasis upon ethical (moral) virtue and diagnostic (intellectual) virtue.

Alasdair McIntyre and Gertrude Elizabeth Margaret Anscombe stand at the origins of modern virtue ethics. They headed an “aretaic turn”(Anscombe, 1958; MacIntyre, 2007). The main idea of which is switching attention from the consequences of actions, principles, norms and rules to the person's character as a whole, its perfections and virtues. From the motives and results, ethics is redirected to the issues of a person's character, the formation of predispositions to virtuous behaviour of the person.

Virtue ethics is opposed to the theories that use the concepts of moral duty, right, principles, etc., as the key points and analysing, first of all, the actions and behaviour of a person.

Normative ethics operates with the forms of obligation, acting in relation to a certain person and their circumstances as an external, objective measure, according to which a person must act, despite their own understanding of factual circumstances and a limited perspective. The most striking example of normative ethics is the ethics of Immanuel Kant. It prescribes strict adherence to the categorical imperative: “Always act according to that maxim whose universality as a law you can at the same time will” (Reath, 2015). In the normative ethics, the world of the certain person is concerned from the “objective” point of

view – whether it is “Kingdom of Ends” of Kant or the hedonistic result of the consequences of an action calked by the utilitarian.

This methodology is often used in the modern deontic moral theories, which are aimed at creating common rules of behaviour that are acceptable for ethical education of people with different life values and people brought up in different cultural and historical contexts.

### **3. Research Questions**

This article analyses the problems of ethical education of engineers from the historical point of view and in modern era of globalization and multiculturalism. The fact is that by understanding of psychological ontologies of various ethnic, racial, religious, class groups, trade unions and even marginal groups that due to the new technologies have access to a wider audience, we expand the vocabulary of our inner world. On the one hand, this approximates the period of relative homogeneity of society. On the other hand, the socially filled world leads to the fact that there is no correspondence between expression and context, since we are living among multiple models and life styles.

### **4. Purpose of the Study**

Based on works of Rorty (2014), Billig, Condor, Edwards, Gane, Middleton, and Radley (1988), Dvoretckaia, Melekhina, and Sotnikova (2015) and others, our research answer the question of how to educate responsibility, conscientiousness, avoiding plagiarism, data falsification and “dual use” of the inventions in the era of globalization and multiculturalism. According to the Rorty’s (2014) ideas of “changing the subject” and Billig’s and his colleague’s (1988) social constructivist ideas the thesis of “the development of professional competencies focuses on its problematic-practical aspect, then for the development of common competences semantic and communicative aspects are the most significant” (Dvoretckaia, Melekhina, & Sotnikova, 2015, p. 3229).

### **5. Research Methods**

We used the analysis of philosophical, sociological and psychological works, generalization, synthesis of theoretical approaches, and formulation of hypothesis.

### **6. Findings**

Unlike poststructuralism, the social constructivism does not place the emphasis on symbolical systems and joint mastery of semiotic practices by means of which the sense is formed and confirmed. Such systems are cultural manifestations and precede an individual. Participants of the action should morally recognize and respect that is “in-between” them, and in that case the joint action becomes possible. This gives each participant the opportunity to make a serious contribution to the constructing of the situation and its meaning. However, they cannot respond the way they want since the influence of others determines the “speaking” of a particular moral agent. Joint actions “provoke” only the limited reality of the following possible acts. Thus, the position of the personality in the discourse is not free but given. The priority of the

joint action means that the participants know and recognize that the event is more important than any single participant is.

How is it possible to preserve personal liberty, the statement of values and trans-subjective content of these values? The approach to the solution of this problem offered by social constructivists, post-structuralists, communitarianists, etc. eliminates the free will of an individual. Despite various interpretations, all these approaches are united by orientation towards personality, which goes beyond the limited by a situation community and speaks on behalf of a larger community.

At the beginning of the last century, G.H. Mead defined the originality of intersubjective communication. According to Mead, “The importance of what we term “communication” lies in the fact that it provides a form of behaviour in which the organism or the individual may become an object to himself” (Mead, 1934, p. 97). Indeed, communicative relations differ from direct, sexual relations between people, subject-subject relations of love and friendship in the fact that they are mediated. Unlike the relationship between I and the Other, the face-to-face relationships mean no indirect relationship (Puddephatt, 2017).

In developing the idea of an unlimited communicative community, Habermas (1992) reinterprets the “I–Me” division proposed by Mead. “Me” is an I-passive in relation to a social group, occupying the perspective of the social group, which means that “I” is in a certain position. “I” is an I-active, which is able to speak on behalf of the larger community, going beyond the limited by the situation community. Unlike “Me”, oriented at the past, “I” is oriented at the future. This orientation to the future gives the personality an opportunity to not identify itself with any particular life story or role taken. According to Habermas (1992), the modernism laid the groundwork for such the future-oriented “I”, which consider present a prognostication of the future but not as the result of the past. Habermas (1992) is convinced that only an appeal to the unlimited communicative community can allow an individual to be autonomous. In his opinion, in communicative actions the prerequisites for self-determination and self-realization retain precise intersubjective significance: whoever judges or acts morally, they must be able to anticipate an unlimited communicative community to come to an agreement of some sort.

Responsibility in the face of future generations is possible only on the basis of recognition of the external the Other. The relations with the Others are mediated by institutions and organizations. This Other with whom we partner up acts as a faceless partner, “anyone”. This theme has been well thought out by Paul Ricoeur. According to his views, “semantics provides the occasion for an initial sketch of the person as a singularity” (Ricoeur, 1999). In other words, the language is able to define individuals in terms of the means of individualization such as definitions, proper names, personal and possessive pronouns, and tenses of verbs. We differentiate one personality from the others by these linguistic means. In order to begin, approve or continue communication, we abandon the usual homophonic interpretation and for better understanding we use the heterophonic interpretation. Quine explains it this way: in order to understand the word “cool” of our neighbour, we interpret this word heterophonically into a string of verbal signs of our own dialect. Of course, we usually use homophonic interpretation, but we must be prepared to “regulate, relate homophony” to the principle of well-meaning in order to make the message of another personality less absurd. In other words, we need to leave some space for alternative interpretation in order to establish communication and understanding.

This way, the relation to the Other constructs a responsibility based on empathy, due to the uncertainty of the statement. Therefore, upbringing empathy and moral sensitivity is a challenge that must be met by the ethical education of engineers.

Another direction in the development of modern ethical education is determined by the ethical developments of L. Wittgenstein. Wittgenstein's ethics, like Kant's ethics, supposes the existence of some illogical necessity that ethics deals more with what should happen than what happened. Wittgenstein proceeds from the fact that the meaning of the world should be outside the world. According to Wittgenstein, if the facts of the world could be different than they are, then neither of facts would exist as the content of moral necessity. Like Kant, Wittgenstein considers that the will is valuable, which itself is not a part of the empirical world. Empirical will is just another fact in the world. The will in the quality of such a fact can be neither good nor bad. Ethical will is transcendental, and there is no logical relationship between the will and the world, since all the facts of the world are random, dependent on circumstances. So that, Wittgenstein argues that "The world is independent of my will". According to Wittgenstein (2018), the ethical will can only change the boundaries, the limits of the world, and in this sense "The world of the happy man is a different one from that of the unhappy man" (p. 108). Developing the concept of a language-game, Wittgenstein develops the idea of the words and activities. He introduces the idea of linguistic community establishing the grammar of our statements by means of everyday learning in the activities shared by them, instead of metaphysical subject which constructs logical structure of thinking. In this way, there is a change from the first-person singular to the first-person plural. Wittgenstein moves from the concept of "I" as a certain witness to the concept in which "I" is considered as a member of a certain community, since "I" is constituted through the participation in this community. Under this approach, facts cannot be ethically neutral. In human society facts are systematically interlaced with values. The ethical problem exists because the search for good is associated with one activity and interferes with the obligation of another activity.

Consequently, Wittgenstein's ethics sets other parameters for the ethical education of engineers. The main thing is the personal perspective, which is constructed within the community, albeit partially. We agree with the statement that the relevance of ethical education is because an individual is provided with a certain degree of freedom. This degree of freedom expands and requires more and more. It should bring into the balance the whole society that normatively "confused" due to the dissociation of the traditional society. Ethical education is aimed at the moral perfection of the personality and the development of the public's moral mind (Dvoretckaia, Melekhina, & Sotnikova, 2015).

Modern changes in thinking, paradigm and in education itself require searching for new approaches in education. Today's students belong to the "shift generation" and represent a change in the paradigm of thinking.

"The ethical education of a new generation should respond to the challenges of the collapse of rationality, to the challenges of a deconstructed and decentralized subject in a fragmentary contemporary world, and to the plurality of goods. Challenges and calls for developing new contents and methods of Education in Ethics make root of the young generation which is called a Shift generation. Allegorical thinking is more characteristic for them than rational, critical reflection. Regular shift from one point to another is a core of contemporary students' worldview and demands interactive ways of teaching and

hermeneutic approach to understanding of contents. Symbolic approach to Education in Ethics was developed on the basis of and with accordance to Paradigm shift. Its distinguishing features reside in:

- Universalism vs. Pluralism;
- Rational vs. Visual;
- Analogical thinking vs. Allegorical thinking;
- Reflection vs. Hermeneutical articulation» (Dvoretckaia, Melekhina, & Sotnikova, 2015).

We are convinced that the main features of the paradigm shift derive from the contradiction between rationality and visuality. We cannot appeal to rationality, logic, memory, which are the main characteristics of the knowledge-based education paradigm. Shift generation appeals to visualization, associative and allegorical thinking. This helps the generation not only to infer one from the other logically, but also to match the unsurpassed. The knowledge-based education paradigm is being replaced by the communicative paradigm. Social issues prompt students not only to gain knowledge, but also to obtain teamwork skills and develop their communication skills.

## 7. Conclusion

To sum up, it can be assumed that the ethics of responsibility replaces the self-lawgiving autonomous ethical subject of Kant. It is based on responsibility instead of freedom and on “we” instead of self-lawgiving. This transformation of ethics really happens in the 20th century. Ethical education of engineers, education of responsibility, ability to speak on behalf of the larger communicative community and future generations are based on the development of empathy, amiability and the development of personal perspective. The engineer of the future will adequately cope with all challenges and will faithfully relate to his duties, understanding the scale of responsibility to future generations.

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