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Humanization of Engineering Education: Current Challenges in Russia

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The paper deals with humanization of today's engineering education and analyzes interconnection between science and education in philosophical perspective. The author investigates different methodological approaches to engineering education, which were applied in Russia before and after the Revolution, in terms of humanization and dehumanization of the society.

Key words: humanization and dehumanization of the society, engineering education, technical education, scientism, education.

Engineering education in Russia is currently developing under complicated conditions due to significant social changes and fast technological progress. There is also an important question whether it is necessary for technical education to consider individual interests and needs. To answer this question, one should investigate engineering education as a social institution.

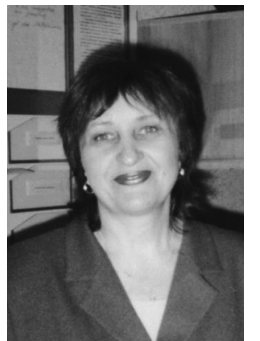
Engineering education as a social institution was established when the first complicated technical objects were created and the technics became the major factor boosting social development [1. p.3]. It was at the ages of Renaissance and Enlightenment when the paradigm of education was developed. This paradigm included a block of humanities, which were supposed to develop personal integrity and contribute to social positioning, as well as another block of natural and technical science disciplines necessary to understand the surrounding world.

Environmental problems, the threat of nuclear disaster, and resource depletion are the challenges which people face due to the intense development of technology. Technology is the link between theoretical knowledge and production activities and can be described as the sphere of human knowledge aiming at nature change, the bulk of human abilities and skills. J. Ellul

remarked that technology is the machines that make the human being an object of manipulation revealing everything that used to be concealed. Therefore, an engineer is supposed to play a major part in designing new social reality.

In the 18th century in Russia there was a contraversion between the natural sciences and humanities representatives in the spheres of science and education. Within the framework of classical rational science there were two approaches to analyze the correlation between morals and science, ethics and knowledge. "One pole implies scientific perspective while the other one is connected with establishing, strengthening and disseminating morals, human ideals and values" [2, p. 16]. This issue is currently urgent. The correlation between humanization of education and science should be based on interconnection of technology, science, and education, which will allow determining the proportions of humanities and technical sciences contribution to worldview formation.

The intense development of technics and natural sciences made some people think that science and technics fail to play a positive role in the development of the society and engineering education cannot secure social progress. This point of view derives from the age of Enlightenment: J.-J. Rousseau developed and disseminated the



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concept of education, according to which technical and humanities approaches to social development are set against. As J.-J. Rousseau stated, only humanities can help to bring up an ethical person in terms of humanist ideals.

The Russian gymnasium education broadened the European model of the “enlightened person” and a wide range of humanities were taught, such as ancient, early modern and modern history, theory and history of writing, history of verbal folklore and literature, several foreign languages, philosophy.

The foundation of the Russian engineering education rested on the German model of technical education enriched with national philosophical concept of education and spiritual V.S. Solovyev, L.N. Tolstoy, N.A. Berdyaev, N.F. Fyodorov [3. p. 48]. These scholars suggested the idea of interconnection between spirituality, education, and enlightenment: the human consciousness is formed by three aspects – sense, intellectual, and spiritual experience. Therefore, total perception of world is possible only through the synthesis of philosophy, science, and theology. The empirical experience was supposed to be acquired through studying natural sciences and rational thinking, humanities contributed to enculturation, and spirituality was developed by theology. If to analyze the concept of engineering education humanization, it is important to note that religion, education, science, and philosophy, three essential constituents in the system of Russian culture, conditioned and promoted its development.

In the second part of the 19th century an evolution of science, culture, and education began in Russia and Europe. The intense development of fundamental and applied natural science and technology resulted in new challenges faced by pedagogy and education system in general. The Russian system of education was not ready for technicalization of society and did not allow including a technocratic component into the long-established

educational model of the “enlightened person”.

One of the factors used to play an important role in the development of national engineering education was the struggle between two groups – liberal reform (or people’s education) and conservative one oriented towards gymnasium education regarded as securing and stabilizing.

The representatives of the liberal reform party were starving for people’s education. They did not have any particular plan but believed that illiteracy elimination and dissemination of culture and science would boost the technical development of the country.

Humanization of education and bringing-up were topical issues after the Revolution, however, the idea was politically determined and failed to secure universal human values and civilizational ideas. The national education in general was politically determined: in 1925 A.V. Lunacharsky identified three basic components of education as follows – communist ideological content, proletarian ideology, politics. As Lunacharsky stated, education has always been, currently is and will always be a political issue [4. p.74].

Any attempts to save humanization potential of national engineering education were regarded as relapses of bourgeoisness and ideological defeatism. Higher technical education was idealized and unified, development of scientific worldview came with development of conformist consciousness, which accepted all social and judicial changes in the country. This resulted in the system of pedagogic manipulation, especially in humanities, which was reflected in the pedagogy theory and practice of the Soviet period.

However, the situation was different at some higher education institutes. In the 20-30s humanities-oriented staff of technical institutes disapproved the national education policy and due to this fact the country witnessed the generation of the 60s, who first of all were moral. Teachers

of humanities were forced out from Russian schools and universities and there was no adequate substitution. New generation of teachers met the requirements of the unified socialistic education and science system of the end of the 30s.

Humanities were taught in compliance with unified programmes, which were responsive to any government interests and could be easily amended. In the 70-80s there was an urgent need in qualified personnel for the national industry, which resulted in changes in technical education. The amount of humanities disciplines was significantly reduced, especially at technical schools and training colleges. A new education pattern was developed in the USSR, which was based on the unified system of labour nurturing and unified school structure. At that time the secondary school, which technical schools and training colleges were based on, provided students with poor knowledge of humanities. Moreover, there was the only pattern in teaching humanities, i.e. Marxism-Leninism ideology. Many changes in teaching humanities were attributed to the heavy burden of marginality laid on the education system: the history was only taught in the perspective of formation approach and class struggle, which led to socialist revolution, was considered as the major factor of historical development.

Currently, national history within the framework of technical education is still taught in compliance with the Soviet pattern. Nihilist attitude to the national culture prevails over teaching tolerance and respect to the ancestors, which A. S. Pushkin considered to be the most important characteristic of the civilized society distinguishing “education from wildness”.

Therefore, by the beginning of the 90s humanization of technical education was kept to a minimum and humanities within the framework of higher technical education were oriented towards prevailing ideology and policy.

The processes mentioned above were

rather complicated and had to be deeply analyzed since the issue was crucial in terms of its practical significance and further development. This stipulated a complete rethink of content and structure of the education system to train not only cultured and well-educated humanities professionals, but also engineers performing their professional activities within the paradigm “science – technology – production – society”. It is noteworthy that humanities-oriented approach to the education was mostly developed by the staff of higher education institutes.

Humanist values suggested by the humanities and stipulating intellectual creativity and search for the truth failed to comply with current science and education patterns due to the prevailing opinion that humanities are “specific labour of producing thoughts and ideas”.

However, dehumanization of professional education was criticized by the most prominent European philosophers, such as A. Bergson, K. Jaspers, M. Heidegger. K. Jaspers supposed that dehumanization of education limits individual worldview. Natural science disciplines prevailing within the educational framework change the way people perceive the surrounding world and nature and make them oriented towards unsustainable consumption which impacts the environment. Education becomes rational knowledge embodied in the form of “learned knowledge” and “primitive truth”. In K. Jaspers’s opinion, modern education is in crisis due to the fact that humanities are substituted by natural science disciplines and technocratic approach based on experiment and calculation is predominant in education.

Having analyzed humanization of science and engineering education in Russia, one can make a conclusion that Russian history witnessed different education systems with various approaches to education. In this perspective, national education is a competition between different and even controversial ideas and concepts. Actually, there are two main

paradigms – humanistic and technocratic, and humanization of education within both paradigms will allow gaining a new perspective and changed worldview.

Modern education is a system with a number of functions: bringing-up, social, professional, cultural and educational, administrative, however, the only function currently accomplished is professional. Learning humanities, the students of technical universities and institutes

form their personality, acquire morals, develop a flexible way of thinking, etc. Unfortunately, the disciplines based on humanist values are beyond the scope of today's education programmes. We live in the world inherited from our ancestors and the question is what our children will inherit if we train narrowly-specialized technicians incapable of predicting the effects of their actions.

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Automotive Engineer Training: Challenges and Solutions

KAMAZ PTC

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The paper proves the necessity for using a specific tool in engineer training, namely, mobile training laboratory equipped with all necessary facilities and provided with educational and methodological support. This mobile class will allow solidifying theoretical knowledge and developing the team work skills effective at each stage of product life cycle.

Key words: engineering education, competencies, mobile training laboratory, innovations, engineering personnel, requirements.

Introduction

Today, the slogan “Personnel is a key to everything” is still popular. There is an urgent need in engineers with systemic thinking and interdisciplinary competencies, and this is the issue to discuss at the Government of the RF, development institutions, different conferences and forums, and also on the pages of many journals – “Inzhenernoe obrazovanie” (“Engineering Education”), “Forsait” (“Foresight”), “Problemy upravleniya v sotsial'nykh sistemakh” (“Problems of Governance”), etc.

It is noteworthy that many efficient measures have already been implemented to improve the quality of practice-oriented education. For example, there are federal target programmes and the President's Programme for personnel training; different competitions and grants to support young scientists and engineers; business, science, and education support provided by the Government in compliance with the Resolution № 218 dated April 9, 2010, etc. To improve engineer's competencies, national educational and professional standards have also been implemented. However, the measures mentioned above are not enough to solve all business and social challenges.

Based on business experience, corporate engineer training, and interaction between KAMAZ and national education system, the key corporate engineer's competencies have been specified:

- knowledge of sciences and fundamental technical disciplines;
- ability to apply systemic engineering approach and make forecasts;
- ability to use interdisciplinary knowledge;
- creativity and ability to generate innovations;
- skill to find efficient solutions for different hand-on tasks based on the knowledge acquired at university via TRIZ technology;
- knowledge in the sphere of cutting-edge CAD – CAE – CAM – PDM – PLM systems;
- knowledge in the spheres of business process and quality management;
- project presentation skills;
- wish and skills necessary to work in a project team and to ensure efficient management at all project stages;
- knowledge about the principles of sustainable production;
- English language skills.

The above-mentioned competencies prove the idea that the engineer should not only possess fundamental and interdisciplinary knowledge, abilities, and



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