



Socio-psychological competence of future engineers

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Engineering education today has to overcome a dramatic gap between academic theory and real practice. Engineering university graduates should be able to solve various tasks in production and management, adapt to the rapidly changing challenging environment. All fundamental engineering skills, including mechanization, automation, creating new and modernization of existing technologies, and other kinds of activity, should, first of all, aim at society and its members. Existing social and technical reality requires professionals with broad outlook and systemic thinking, able to see interdisciplinary connections. Contemporary technologies create a specific environment. Nowadays every engineering decision intrudes into social reality, transforms it, creates and imposes new material needs, and sets up new quality standards.

Engineering training process in Russia on each stage of professional education is subject to Federal State Educational Standards (FSES). According to FSES of higher professional education, university has to provide socio-cultural environment for harmonized personal development.

Growing social significance of engineers in the contemporary global context of rapid technological changes and constant innovational processes in industry require engineering university graduates to be flexible and adaptive, to have open mind and be ready for innovations. Besides, future engineer should be able to integrate into global technological network, be mobile and communicate with colleagues all over the world. Therefore social-psychological competence of future engineers becomes one of the core factors of their professional performance, alongside with profound engineering knowledge and skills.

Socio-psychological competence, as an integral personal characteristic, means achievements in relations and interactions between individual with other people which allows resolving social situations efficiently, and choosing and implementing adequate strategies and tactics of interaction and cooperation, as well as self-regulation for the efficient social and professional activity. Socio-psychological competence allows successful achievement of several significant professional goals: adapt to new environment, be ready for inner and international professional mobility; work in teams, efficiently collaborate with peers and have experience in advanced industrial engineering and scientific management of labor; be a good team-leader and manage people and innovations; be self-aware, know personal strengths and weaknesses, manage self-development and life-long learning process; fully fulfill personal power and human resource of the team, etc. It is evident that future global engineer has to possess these characteristics to successfully perform in the challenging innovative environment.

An engineer today does not only create or improve machinery and technologies, but also bears responsibility for his activity, thinks about possible positive and negative physical, economical or psychological effects. Due to the global processes a contemporary engineer should be competent not only in his field of knowledge, but also in adjacent spheres, able to correspond to the global quality standards, ready to constant professional and personal growth, socially and professionally mobile. Society is interested in development of socio-psychological

competence of engineers. Socio-psychological competence ensures personal maturity, professional efficiency and social success of an engineering university graduate in various spheres of life activity. Contemporary innovative economy causes not only constantly changing state of the market, including labor market, but also new requirements to a college or university graduate. It is understood that institutions of higher education are expected to produce good professionals, experts in a specific professional field. However today it is not enough: graduates should know economical and political processes, be able to evaluate pluses and minuses of real situation and find optimal decisions in solving arising problems ^[1].

According to opinion polls, there is a list of characteristics that potential employers consider to be the most important for effective professional activity and good adaptation of technical and technological university graduates. This list includes not only professional knowledge and skills, but also personal traits. Among personal traits of an engineer employers mention diligence, devotion and loyalty to the chosen occupation, strive for self-actualization, sociability, eloquence and ability to express oneself correctly, honesty, initiative and enthusiasm, and ability to make decisions. Professional qualities are perfect computer skills, good theoretical professional knowledge, awareness of modern technologies and material, experience in draftsmanship, capacity to work with specifications, technical and regulatory documentation and references, knowledge of foreign languages, etc. According to inquiry data, employers consider personal qualities to be even more important than specific professional engineering competences ^[1]. It is reasonable because professional knowledge and skills may be acquired during the lifetime, meanwhile personality is rather stable and rigid and is changing less rapidly.

Although personality is a dynamic constantly developing system, student age (18 – 25 years old) is an important period that determines future life trajectory. It is the age of goal-setting, open mind, big ambitions and high intellectual power. Unfortunately modern youths are not always able to disclose their potential and manage their lives. University students as a social group, unlike other young people, are characterized by comparatively high level of motivation for active professional and social performance, strive to efficient fulfillment. Therefore the purpose of university education is not only to provide vocational qualification, but also to prepare student for various social and professional situations, encourage them to develop their personality, create environment for personal growth. Consequently one of the main educational tasks is to built up and develop socio-psychological competence of engineering students as it will actively influence the development of general and special professional competences, establish connections between acquired knowledge and professional practice, help coping with various real professional situations.

Socio-psychological competence of future engineers should be developed in the educational process at the university. Humanities, especially psychology and educational science as academic disciplines play an important role in developing socio-psychological competence. Psychological and pedagogical knowledge and skills are necessary to solve problems in HR, management, conflict resolving, information processing, etc. Humanities in the engineering education allow students to evaluate significance of innovations, implement them and overcome obstacles and difficulties. Besides education in psychology and pedagogics reveals potential for personal growth, influences motivation, general outlook, values, and consciousness as a whole. Therefore psychological and pedagogical subjects contribute to the development of independent,

creative, socially active personality and thus respond to the leading trend of the global civilization process.

Russian Federal State educational Standards for Bachelors in engineering pay major attention to professional competences. General cultural competences (including socio-psychological aspects) are mainly developed by means of humanities, social and economic courses. To reinforce socio-psychological skills and encourage its further development we suggested several courses to engineering Bachelor and Master curricula. Here we give some of the examples.

Academic course “Psychology of success” was introduced to Bachelor curriculum for a very up-to-date and in demand professional engineering area “Material science and material engineering” and “Chemistry and technology of highly-charged materials and articles”

The course “Psychology of success” consists of 36 in-class academic hours (18 hours of lectures, and 18 hours of seminars). The content of the discipline is aimed at developing socio-psychological and general cultural competencies, such as: strive for success, leadership, personal initiative; motivation for cooperation; skills for interpersonal relations; goal-setting and time-management; motivation for success; ability and readiness for independent performance; health-protecting motivation, etc. The discipline is aimed at developing personal representations of success as a concept, and acquisition of practical skills and communicative abilities. Among educative tasks of the course we may emphasize the following: familiarize students with various approaches to consider success as one of the leading values; study psychological peculiarities that influence success, either positively or negatively; acquire ability of time-management and scientific management of labor; develop conflict resolution and conflict management skills; through case study to show the possibilities to apply the knowledge acquired at the “Psychology of success” course in the engineering context.

Another socio-psychological discipline introduced for future engineers is “Efficient communications and in-company relations” for Masters “Product lifecycle management at petrochemical enterprises” in the area “Chemical engineering”. This rather long course (108 academic hours) is included into general scientific module of Master training and consists of lectures (24 hours), seminars (36 hours) and independent work of students (48 hours).

The main educational goal of the discipline is to familiarize students with communicational laws in the contemporary economic environment, patterns of efficient in-firm interaction and cooperation; train them for active participation in business-processes; develop ability to perform effectively in communicational space. The purpose of the course is also to study the strategies of efficient communication network in the company. The discipline allows students acquire and develop knowledge in the sphere of social communicational technologies in modern companies, investigate their effectiveness and accordance to business-processes, produce socially, psychologically, and economically appropriate decisions and improve infrastructure of their enterprises.

Although FSES allow including some disciplines aimed, among others, at development of socio-psychological competence of future engineer, as it has been mentioned, typical engineering curriculum does focus on arts and social sciences.

In our opinion the given problem (lack of academic hours for socio-psychological development) may be solved in the process of additional to higher professional education (APE) – Russian equivalent of minor degree. In the contemporary context APE acquires independent value and plays a decisive role being one of the main ways to be highly competitive at the labor market.

The system of higher engineering education suggests step-by-step development of multiple components of an engineer's professional competence. Competences trained at the major are updated and developed while studying minor, becoming core, distinctive competences for a particular engineer^[4]. Additional to higher professional education is an effective instrument that may be used within the process of training a specialist. It gives good possibilities for personal and professional development of future engineers.

Faculties and Departments of additional education at the universities suggest a variety of additional educational courses that attract more and more students. For instance, the Faculty of Additional Education (FAE) of the Kazan National Research Technological University suggests a minor program “Professional psychology”. During a period of almost twenty years a group of professionals have been teaching students basing on the developed curriculum that includes theoretical and practical psychological disciplines. One of the main purposes of the course is to develop socio-psychological competence of a person.

From the psychological point of view socio-psychological competence is a multidimensional phenomenon. It comprises communicative, perceptive and interactive components. Therefore the training process is designed in such a way to develop all the components^[5].

A long experience of educating engineers-translators at the FAE gives the opportunity to think over and analyze the efficiency of the program. Following the conception of continuous education the three-year-long “Professional psychology” at the FAE is divided into three stages: basic, practical and specialization. The first year of studies gives the students the opportunity to get acquainted with fundamentals: psychophysiology, history of psychology, general psychology, developmental and educational psychology, and psychology of personality. These disciplines are merely theoretical, however 70 in-class hours out of the total amount of 168 are devoted to practicums and seminars where students begin to solidify their knowledge acquired at the lectures. Lectures are also carried out interactively and include dialogical forms. This is done to motivate the students to start using the information concerning psychology in the real process of communication.

The second module includes social psychology, experimental psychology and psychodiagnosis, cross-cultural psychology, consulting and some other practical courses. These disciplines are aimed at active development of socio-psychological competence. The students are encouraged to make presentations, to take part in group discussions and team-work. Special

emphasis is given to the art of self-presenting and interactive ability in various social situations. Role-playing games, case-study and group trainings are also introduced into the educational process at this stage.

The final module suggests courses of specialization, such as clinical psychology, psychology of management and conflict resolution, advertising psychology, psychology of sex differences, etc. About 60 in-class academic hours of 170 are lectures, and all the rest is devoted to practicums and group training. Students are trained to resolve social situations, including conflicts, problem solving and negotiations. Much attention is given to actualization of creativity and coping with limiting beliefs. Students choose topics which they consider to be the most interesting and up-to-date for them (such as time-management, stress-management, psychological influence, image-building, art-therapy, etc.) and organize discussions, mini-researches and group exercises under the supervision of a teacher. At the end of the study the students are to defend a graduation paper. This final research systematizes, solidifies and broadens the psychological knowledge and competences, and includes theoretical and empirical study of a subject.

Practically all the educational courses for students getting additional to higher education in psychology at the FAE take into account the engineering major. This fact affects the content of theoretical and practical classes, selection of model situations, examples and cases, and subjects of graduation papers. Students decide about the area of research that is interesting for them within this area they are asked to focus at some professional or organizational application. For example, if they study motivation, conflict or decision-making, it should be a labor or achievement motivation research, conflict analysis or decision-making pattern for a definite company's personnel or a working group. This is done to make their knowledge and skills more applied and practical.

Alongside with the program "Professional Psychology" the Faculty of Additional Professional Education at the Kazan National Research Technological University has a wide variety of other minor courses, including "Educational study", "Human resources", "Enterprise management", "Legal fundamentals of business activity", "Economics and company management", "Professional translation and interpretation", "IT systems" and some others. Such programs as "Educational study", "Human resources", "Enterprise management" and "Professional translation and interpretation" also have disciplines aimed at socio-psychological competence development in their curriculum. For instance, the students who study professional translation and interpretation have disciplines "Socio-psychological competence of interpreters" and "Intercultural communication" where they train their communication skills in the situations of cross-cultural interaction and learn to cope with fears and other subjective barriers while interpreting.

Socio-psychological competence may be considered as a system of inner resources necessary to make efficient communication in some definite social situations. Therefore it includes both invariant panhuman characteristics and historically and culturally based peculiarities. This fact becomes especially significant in the contemporary context of international cooperation, integration and development of academic and professional mobility.

The necessity to develop academic and professional mobility of engineers is determined by innovative nature of modern industry, intrinsic demand for diversification of education and technologies. International cooperation and intercultural contacts require special communicative skills. Alongside with linguistic competence (good knowledge of foreign languages) a contemporary person and professional should have intercultural competence, i.e. be able to communicate successfully with people from different countries and cultures.

Intercultural competence is an integral part of socio-psychological competence. It comprises general and specific culturological knowledge; practical communication skills (including psychological and linguistic skills), intercultural psychological sensibility and ethnical tolerance^{[2][3]}.

To increase the external competitiveness of graduates the FAE of the Kazan National Research Technological University introduces courses aimed at development of intercultural competence. Such courses are suggested in the following curriculums: “Professional psychology”, “Human resources”, “Enterprise management” and “Professional translation and interpretation”. Besides there is an option for all the University students to take a 24-hour long group training “Cross-cultural interaction and intercultural communication” at the FAE.

Thus being more flexible in curricula and syllabus, additional to higher professional education is an up-to-date response to requirements of changed social, economical and cultural circumstances in Russia. It is hard to overestimate the role of additional professional training at the institutions of higher education. This experience of using minor degree for personal development of students may be applied in other engineering institutions where the main focus is given to engineering disciplines.

The main purpose of additional professional education (APE) is to prepare students for the constantly changing modern world. Therefore APE aims to improve competitiveness of graduating students of institutions of higher technological education at the regional and international labor market.

Graduating from the FAE students get additional career opportunities. Implementation of the APE model presupposes the following didactic basis:

- system principle,
- principle of continuity,
- principle of individualization and differentiation of education,
- principle of succession and interconnection with the major.

Therefore, innovative training of competent and competitive engineers in the contemporary instable circumstances may be put into effect if all the elements of continuous professional education at the technological university are implemented.

The APE system has some peculiarities. Although it has evident social value, there are some difficulties in choosing adequate methods and educational technologies and quality-control techniques. However the main advantages of APE programs are as follows: short-termed courses,

possibility to chose methods and forms of education, flexible schedule of the training process, innovative teaching and learning technologies, and heightened quality requirements.

Referances

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