Current approaches to the training of mining engineers

Mykola Stupnik

D.Sc. in engineering, Professor,
Discharging responsibilities of rector of State Higher Educational Institution "Kryvyi Rih National University", Ukraine

Volodymyr Morkun

D.Sc. in engineering, Professor,
Acting Vice-Chancellor for research,
State Higher Educational Institution "Kryvyi Rih National University", Ukraine

Zinaida Bakum

Doctor of Pedagogy, Professor,
Head of Department of Engineering Pedagogy and Language Training,
State Higher Educational Institution "Kryvyi Rih National University", Ukraine

Abstract
In the article the main current approaches to the training of mining engineers were reviewed. Attention were focused on the person-centered, *competency-based*, systematic and problem-based approaches. Competences that should be formed in the future mining engineers (personal and social, general scientific, instrumental, general professional, special professional) were defined.
Key words: CURRENT APPROACHES, COMPETENCES, COMPETENCIES, MINING ENGINEER, EDUCATIONAL OBJECTIVES.

Analysis of scientific literature shows that each stage of Pedagogics of higher school is characterized by certain approaches. Observation and experience give grounds to state that in the mining engineer training at the current stage the following approaches should be implemented:
1) person-centered (I. Bekh, S. Goncharenko, S. Rubinshtein, O. Savchenko); 2) competency-based (O. Ovcharuk, H. Pometun, S. Sysoieva, O. Savchenko, A. Hutorskoy); 3) systematic (S. Karaman, N. Nychkalo); 4) problem-based approach (M Mahmutov).

In the current context of Higher School person-centered training is dominated, it involves providing optimal conditions for the all-round development of each student, taking into account his/her individual characteristics, cognitive needs, interests and stimulation of independence in various subjects study. Taking all of this into account, *person-centered approach* can be considered as the main approach that characterizes the current stage of higher school Pedagogics development. Its approval has been caused by changes taking place in society, which gradually turns from industrial to information, places new demands on graduates.

Noted approach in mining engineer training can be realized through the variation of updated educational objectives: the formation of a high level of professional competence and mobility, broad mind, which is based on knowledge of related subjects connected to the major branches; the development of high creativity, which is implemented in creative thinking during solving complex engineering problems in the information environment; the study of the state and dynamics of engineering productivity and intellectual production market at the regional, inter-regional, national and international levels; taking into account the personal organization role of professional engineer in shaping of engineering type thinking, in his own way of entering the engineering culture and professional creativity, etc.

So, person-centered approach ensures the development of the personality, based on the identification of the individual characteristics of the student as the subject of knower and substantive activity.

The competency-based approach, the implementation of which involves students acquiring of necessary *life* or *key*, *subject* or *industry* competences completes a number of classical approaches. During the implementation of competency-based approach knowledge is acquired, skills deal with improvement of competences are shaped. Under the circumstances, the primary target is not the presence of a certain amount of knowledge, personal skills, but the ability to apply competences in specific situations.
The aim of competency-based approach is to shift in the emphasis from the accumulation of certain regulatory knowledge and skills to the formation and development of the students' ability to act practically, to use individual techniques and experience of successful actions in situations of professional activity and social practices. In other words, it promotes the formation of professional competence.

Professional competence of a mining engineer is considered by scientists as a system of organizational, technological, planning and design, management, social and communicative knowledge and skills, professionally important qualities that ensure their successful implementation and adaptation in professional activity [2].

On the basis of professional competence the definition of *engineering competence of the future specialist* is based. Researchers in the field of engineering education consider an engineering competence as the presence of fundamental basis in specialist; educational engineering competence as the ability to combine theory with practice; engineering education as knowledge of social, economic and cultural conditions that are shown in the workplace; graduate's engineering competence as the ability to adapt to the technologies that change constantly, and social conditions; specialist's engineering expertise as the ability to use the means of interpersonal communication effectively [1, 10].

Nowadays the following system of key competences of future specialists of engineering specialties is pointed out: motivational (for successful acquisition of professional orientation); personal (involves a readiness to the constant improvement of the educational level, needs for implementation of self-potential, the ability to self-education); social (forms: the ability to take responsibility; to make decisions together with others; different religions and ethnic cultures tolerance; reconciliation between the personal interests and the needs of the enterprise and society); methodical (it develops the ability to obtain information independently, to find ways of problem solving, do paperwork); science (it involves data handling of physical phenomena, chemical processes, performing of calculations and application of mathematical apparatus);

humanitarian (it promotes reading and translating of foreign documents, mastering of labour and law legislation, psychology of communication); general professional (it involves acquiring of specialized knowledge); special (it promotes the familiarization of production technology).

For example, in the educational and qualification characteristic (EQC) field of knowledge, "Mining of useful minerals" training direction "Mineral processing" qualification "Specialist in the field of mineral processing" competences which should be formed in the future mining engineers: *social and personal; general scientific; instrumental; general professional; special professional are defined* [3; 4].

Great potential for the formation of professional competence of future mining engineers is laid in studying of the fundamental (mathematics, physics, chemistry, geometry, mathematics, etc.) and professional disciplines ("Fundamentals of the mining industry", "Labour Protection", "Geotechnology in the mining", "Ecology" "Land recultivation", " Rock failure and blast safety", "Fundamentals of the transport theory ", etc.).

Mathematics is the universal language for describing various processes and phenomena of nature, without which it is impossible to solve modern engineering problems, including mining. Studying the experience of mathematical training of mining students in higher educational institutions has shown that quite often it is based on not competent, but subject and knowledge paradigm, that involves the acquisition of basic mathematical knowledge and skills. Junior students are usually not aware of the importance of mathematical knowledge in mastering future profession, poorly motivated to study mathematics course and demonstrate a low level of knowledge. Freshmen, as experience shows, cannot correlate the presence of mathematical knowledge to solution of interdisciplinary and professionally oriented mathematical problems.

Senior students have already been aware of the importance of mathematical knowledge in mastering of special disciplines, but have difficulties in their use during the studying of special subjects.

Analysis of curriculums, math programs, textbooks, and methods of teaching mathematics has shown:

1) all the mathematical disciplines are studied mainly on the first and second year of university, and special courses related to their future profession are studied on the senior;
2) math programs are not sufficiently focused on the future profession, their content is not pointed at the necessity of applying of investigated mathematical methods in studying professionally oriented tasks;
3) in the process of mathematical training of mining students low active methods and teaching techniques with targets for the formation of basic skills only are commonly used;

It will be recalled that in the final stage of training at the university future miners study disciplines related to geodesy and surveying, mining machinery and equipment, the mechanics of underground structures, processes of open-pit mining, exploitation of mining equipment, pit designing, mine ventilation, mineral dressing. In the process of teaching of these disciplines mathematical apparatus is used, but senior students as well as junior, have considerable difficulties in applying mathematical knowledge beyond mathematics, in particular in the field of engineering tasks.

Taking in consideration the above, we can state that in the process of teaching mathematics it is necessary to form mining students' mathematical competence - a set of learned mathematical knowledge and methods of mathematical activity, the experience of their use in problem solving that are beyond the subject, and serve as a basis for professional problem solving [61].

Thus, competency-based approach does not conflict with the academic but deepens, expands and completes it.

Interest in systemacity of investigated objects is now one of the main methodological aims in many fields of science. This aspect is directed to a deep insight into the relationship of categories of the whole and its parts, the interaction of elements and systems. Studying of different systems occurs through a *systematic approach*, which aim is to develop methods of research and construction of organizationally complex objects as a system. In didactics mentioned approach is aimed to show the integrity of the pedagogical objects, identify different types of links in them and gather them into a single theoretical system. Taking this mining engineer must have profound knowledge of fundamental sciences, an excellent knowledge of the equipment and technology, mastering technical drawing

techniques and computer equipment, navigate freely in the economy and the industrial management.

For example, in the context of a systematic approach realization to the process of mining engineer training it is necessary to take into consideration the transformation of engineering education in the field of learning of cognitive and engineering activities, which fundamentally changes the idea of the higher educational establishment. An important direction of engineering education development is a special organization of student's work throughout the training in the complex multidisciplinary practical-oriented groups, organic engagement of students to creative activity, ensuring their mass participation in scientific and research work, creating goal-defined forms of training. All these create the preconditions of transition in engineering education from educational to scientific and educational process.

Training of mining engineers is based on *problem-based approach*, which ensures cooperation of teachers and students. In such approach the student is not only the object but also the subject of study. The basic strategy of the teacher is to identify individual potential and bent of the subject of education, create the conditions for the further development, self-knowledge and self-development in a purposeful and harmonious formation of skills, such as analytical and synthetic, perceptual-mnemonic, creative, etc..

To implement problem-based approach in the course of studying of various disciplines students can use models of educational games such as "Analysis", "Solving", "Industrial accident in the mine", "Scientific and Technical Seminar." It is also necessary to conduct a lecture/analysis of the particular professional simulation (PPS), a lecture presentation, create a simulation bank, named "Storage of solved particular professional simulation." To organize the round table discussion on the theme: "Youth for safe work," "Man-made influences of MC (mining complex) on the environment." At this stage, the professional identity begins to form, providing reflexive perception and confirmation of effective internal and external professional identity in a particular area of professional activity, therefore seminars on the theme: "Mineral Resources of Ukraine", "Reconstruction, modernization and development of the oil pipeline system", which contribute to the development of organizational, planning and design, technical, socio-communicative and managerial skills become very important.

Today it is necessary to select certain models on the basis of which it is possible to analyze and develop the educational process: an approach in terms of content, in which the set of students' knowledge opportunities is the main; approach in terms of the learning process, during its implementation real phenomena occurring in the classroom, when students with the teacher carry out cognitive activities, must be analyzed; approach in terms of results aims at a specific set of competences (knowledge, skills, attitudes, etc..), which have been mastered by the students - future specialists.

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