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TO THE QUESTION OF FORMATION OF ENGINEERING EDUCATIONAL STANDARDS TAKING INTO ACCOUNT COMPETENCE AND THE BOLOGNA MODEL

Ukraine is reforming the system of higher engineering education to improve its quality and eliminate the shortage of engineering personnel. New curricula should be formed taking into account the Bologna model and competencies. The basis of the new education standards is to put the existing training modules of the Ukrainian and foreign universities of the countries participating in the Bologna process.

Keywords: engineering education, educational competences, Bologna system, education standards.

Despite globalization, which affected both industrial production and engineering education, a single effective system for training engineering personnel has not yet been created. Most countries of the former USSR, and even a number of Western European countries, are experiencing a shortage of engineering personnel [1], they note a decrease in students' interest in a scientific and engineering career [2], despite unemployment. Countries that do not allow a shortage of engineering personnel effectively compete in global markets and more easily endure the effects of the global economic crisis. For example, China [3], where only 1.32 million bachelor-engineers study, which is 1.4 times more than in European countries and 2.4 times more than in the USA. Large manufacturing companies often recruit engineers from different countries. Multinational creative teams that speak different languages have a different mentality and cultures are emerging. Engineers are taught to cooperate and tolerant relationships in special programs. Then "horizontal collaboration" gives the best results [4]. The internationalization of science brings not only problems, but also has advantages: in the form of academic and professional mobility, recognition of diplomas, and even the issuance of "double diplomas" (Double degree programs) [5; 2]. The connection between the quality of education and international scientific and professional cooperation is obvious. Therefore, academic student exchange programs are widespread. For Ukraine, professional mobility has a negative side in the form of high labor migration of the most qualified specialists [6].

Analysis of the experience of training engineers in the USA, Germany, Russia, Ukraine [2;5] proves the need to change curricula, using a competence-based approach, more flexibly and quickly integrate international experience into curricula, use distance learning (for example, webinars), increase professional and academic mobility, learn foreign languages (primarily English), delve into the patterns global economy and key world problems, to be tolerant to foreign cultures and traditions, to

know certain issues of international law and copyright. To create commercial engineering projects, business incubators and technoparks are needed, more research grants and inventions, including from the state. For engineers, it is important to be not just a "good engineer", but to become a "global engineer", competitive in the labor markets of other countries. For this, continuous education (lifelong learning) is needed, as technology is constantly being improved. Continuing education allows you to build an individual flexible educational trajectory [1].

The training of engineers in the world is becoming more targeted. Manufacturing enterprises practice orders for training the specialists they need in higher education institutions (HEIs). Ukraine has insufficient experience in such models. This is not justified, since in large cities engineering HEIs coexist with large industrial enterprises of the same profile [5]. When training on technical specialties, technical thinking is formed, aimed at solving theoretical and practical issues [7]. The practical side is, first of all, inventions, technical ingenuity, logic, solution of constructive and technological problems, understanding of the device and algorithms of work, determination of serviceability and repairs. In all their research objects, technical sciences determine the relationship between the device and functions. Progress in technical knowledge is the development of technical creativity, which is based on knowledge of technological processes and the work of technical means. Technical education allows us to solve production and technical, technological, economic and other problems. Before you start training you need professional selection. Predisposition to engage in technical disciplines should be determined a few years before the end of high school by solving special tests [8].

In the process of technical education, both theoretical knowledge and practical skills are important, therefore the forms of study should be in the form of lectures, practical and laboratory classes, writing and defending supervisory, course and diploma projects, independent studies [9]. Modern engineers need knowledge of computer equipment and special engineering programs, knowledge of foreign languages, a high level of engineering, general and speech culture [10,11].

To improve training courses for engineers, it is necessary to rely on the principles of modular division and assessment, as well as on the formation of competencies. The modular principle is embodied in the Bologna model, which Ukraine has been following since 2005 [5]. Effective implementation of the reform of Ukrainian higher education according to the Bologna model is hampered by inconsistency, indecision, poor communications between the Ministry of Education and Science (MES) and universities, the MES's reluctance to provide academic and financial autonomy to universities, insufficient financing of the reform [10; 11].

To create national standards of higher engineering education, the MES of Ukraine will have to involve universities, as the National Agency for Quality Assurance of Higher Education, in our opinion, cannot cope with this task. The standards can be based on the core of existing curricula, and similar training modules in the curricula of the countries participating in the Bologna system. Most educational engineering programs in Ukraine have already been divided into modules, even while working with the modular rating system. The revision will be required by the scoring system, the European Credit Transfer and Accumulation System. And the necessary

modern pedagogical accents will help to put the competence developed by scientists [12]. For example, environmental, energy-saving, engineering-design, linguistic and others, [13].

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