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PECULIARITIES OF THE METHODOLOGY OF TEACHING TECHNICAL DISCIPLINES IN THE INSTITUTION OF HIGHER EDUCATION OF THE CONSTRUCTION PROFILE

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To indicate the importance of the problem of modernization of the operational and activity component of educational activity, further scientific development of theoretical and technological components of technical educational disciplines in the institution of higher education of the construction profile, determinists, which define peculiarities of their teaching methods, clarified approaches on the formation of the content of education, oriented on the priority of personal-oriented learning and competence-based approach. Recommendations for improvement of the basic types of training in lecture, practical, and laboratory classes have been developed. The content of the stages of implementation of the technique of teaching technical disciplines in the institution of higher education of the construction profile is determined.

Keywords: educational process, methodology of teaching technical disciplines in higher education of construction profile, student-centered approach, educational program, professional competence, educational content, stages of implementation of teaching methodology.

Problem statement. The current stage of development of the higher education system is inextricably linked with the integration of Ukraine into the European Space, which determines the introduction of the latest information technologies, solving problems in the provision of high-quality educational services. World and European level documents [39, 43, 44] and Ukrainian legislative documents [1, 2, 3] state that the capacity development of university teachers in the context of teaching and learning should serve the purpose of improving the quality of education. N. Fisunenko stresses that construction is the main link in the country's construction complex, consisting of the following main blocks: production of building materials, own construction, construction mechanical engineering, design, and research work in the sector [37, p. 40]. In addition, with the development of the construction industry develops the production of building materials and related equipment, machine-building industry, metallurgy and metalworking, petrochemical industry, glass

production, woodworking and porcelain-earthenware industry, transport industry, energy industry, and more. Also, construction, like no other branch of the economy, contributes to the development of small and medium-sized businesses. The development of the construction industry is inevitably causing economic growth in the country and solving many social problems [13]. According to the results of a monthly analytical research «Review of the development of the construction industry of Ukraine» from the information and analytical agency «Personal Analytical Unit», which specializes in providing information and analytical services and is the leading Ukrainian operator in the field of marketing services on industrial markets and business brokerage in the market of building materials and technologies, only for nine months of 2021, the Ukrainian construction market grew by 3.2%, and the building materials market - by 14.9% compared to the same period in 2020 [26]. The continuation of pre-war construction trends will probably make Ukraine one big construction site. Post-war Ukraine will be rebuilt at a rapid pace. In our opinion, the issues related to the post-war revival of Ukraine, including economic recovery, are undoubtedly in the plane of development of the construction industry. The drivers for this should be the continuation of the program of the Ukrainian president's «Big Construction» program to rehabilitate, construct and renovate facilities based on the principles of energy efficiency and high quality, inclusiveness, and targeting every Ukrainian as a client; sixteen cultural projects and ten cultural heritage sites are included in the program, such as the 'Great Restoration' project and the National Bridge Restoration Program, among others; the state program on mortgage crediting; tasks of the State Inspection of Architecture and Urban Development of Ukraine, namely: Digitalization of processes, creation of a productive environment of construction business activity, transparent regulation rules, etc. Thus, the general trend of the Ukrainian construction industry market is to resume its growth.

The fundamental changes that will take place in the construction industry actualize the need to improve the training of future professionals ready to work in conditions of constant updating of techniques and technologies since the high level of their competence and competitiveness serves as a basis for effective functioning and dynamic development of production. In The Concept of implementation Building Information Modelling Technologies (BIM-technology) in Ukraine [4] indicates that there are problems in the construction industry that need to be solved, namely: significant resource intensity of the construction process; inefficient management of design, construction, and operation processes, in particular, due to low level of communication between the participants of the mentioned processes; inefficiency of material resources aimed at construction, in particular, the use of raw materials and related construction products that have no reuse; lack of approaches to effective management of the life cycle of objects as a set of successive in content and time stages (periods) of the existence of the construction object – from the Concept of its creation (survey, design, construction) to termination of operation (liquidation), including the reuse of its parts (elements) for a new purpose; obsolescence of regulatory support in construction, which does not correspond to

the current level of construction technologies; significant consumption of energy produced from fossil fuels (non-renewable sources) in the construction sector leading to significant pollution of the environment; accidents at operating facilities. The outlined problems of the construction industry within the framework of the Concept are proposed to be solved in research, normative-legal, normative, technological, organizational, communication, practical, and educational directions. For our research, it is interesting to outline the concept of the educational direction – providing training for specialists in the field of BIM technology, and creating appropriate educational programs and courses.

Despite the achieved results in the sphere we are considering, the development of the issue on the improvement of educational process in the institution of higher education of construction profile has not yet acquired proper system thinking and interpretation in modern researches and needs prolonged study.

Analysis of recent research and publications. The conceptual basis of the development of the mentioned problem is laid in the scientific research of scientists, in particular, T. Horokhivskoi [8], L. Dolnikovoi [11], I. Kozlovskoi, K.Khoroshev [14], O. Stechkevych, O. Bilyk [16], H. Lokarievoi, E. Bazhminoi [20], M. Pryshchaka [31], N. Lytvynovoi, A. Petrykei, L. Hrytsenko [19]. Theoretical and methodical aspects of preparation of future engineers-builders are considered in the works of N. Dubininoi [13], O. Hulai [10], M. Kondratova [17], V. Lytvyn [21], M. Mykhniuk [24], M. Nakonechna [25], Yu. Pryshupa [30] and N. Sydorchuk [34].

At the same time, despite the deep analytical material and scientific achievements of scientists, the methodological aspects of teaching technical disciplines for applicants for higher education in construction specialties remain insufficiently disclosed.

The aim of the article. To determine the importance of the problem of modernizing the operational and activity component of educational activities, further scientific development of theoretical and technological components of the methodology for teaching technical disciplines in higher education of construction profile.

Presentation of the main research material. The awareness of managers and scientific and pedagogical workers of higher education institutions of the public-state requirements to the quality of professional training of future bachelors and masters allows for effectively introduce modern educational technologies, best managerial practices in practical activity obtained by the results of scientific research to form and develop a self-sufficient person capable of creative professional activity. This is in line with the goal of higher education, which is declared in the Law of Ukraine «On Higher Education» concerning the preparation of competitive human capital for high-tech and innovative development of the country, self-realization of the individual, provision of the needs of society, and labor market [1]. In modern conditions, the necessity of application of new pedagogical technologies in higher education institutions in the process of teaching technical disciplines was especially acute, due to peculiarities of perception of information by modern students, the necessity of

formation of motivation to study, and the provision of high quality of mastering of relevant competencies. In particular, the Kyiv National University of Construction and architecture cultivates a student-centered approach to the design and implementation of the educational process by scientific and pedagogical workers, which contributes to the continuous development of students of self-educational competence and analytical abilities. Besides, as the analysis of educational practice shows, there are a huge number of educational Internet resources available to students today, but the level of analysis, synthesis, and evaluation of the information received without the participation of teachers is often beyond their power due to the nature of technical disciplines, as a rule, they are quite difficult for some higher education students to perceive. Therefore, the creation of an innovative educational environment, in our opinion, is impossible without qualitatively new content of higher education, without the proper level of scientific-methodical and information-technological support for the educational process, improvement of research activity of scientific and pedagogical workers, educational technologies and teaching methods, their search (development), introduction into educational programs and introduction into practice.

The scientific and pedagogical staff of the Kyiv National University of Construction and Architecture constantly update the content of the components of educational programs in connection with dynamic changes in the legislative field, the needs of higher education applicants, graduates, teachers, and other stakeholders, expansion of cooperation with national educational institutions, activation of participation of teachers and students in international scientific and educational projects, etc. In our opinion, the content of academic disciplines should ensure the formation of such professional qualities among applicants for higher education that would correspond to the nature of the competitive environment in which their future professional activity will take place. Therefore, the aspects are quite fully taken into account in the conclusion of educational programs «Professional Education (Construction and Welding)» of the first Bachelor's level in higher education (components of the educational program «Engineering and Computer Graphics», «Fundamentals of Building Theory», «Building Structures», «Organization and Construction Management», etc.), «Design» of the first Bachelor's level of higher education (component of the educational program «Fundamentals of Interior Design»), «Computer Systems and Networks» of the second Master's level of higher education (components of the educational program «Parallel Information Processing Systems and Neurocomputers», «Device Modeling and Linear Components of Computer Systems»), «Engineering of Logistics Systems»of the second Master's level of higher education (components of the educational program«Structural Synthesis of Hydraulic and Pneumatic Systems of Logistics Equipment», «Systems of Earthmoving Technologies in Transport Construction»), «Branch Mechanical Engineering (Construction)» of the second Master's level of higher education (component of the educational program «Synthesis of Machinery and Equipment of the Construction Industry»), «Electromechanical Automation Systems and Electric Drive» of the first Bachelor's level of higher education

(components of the educational program «Power Supply to Industrial Plants and Construction Sites», «Automation of Electromechanical Systems in the Construction Industry»,etc.), «Thermal Power Engineering. Energy Management, Energy Efficient Municipal, Industrial and Domestic Thermal Technologies» of the first Bachelor's level of higher education (components of the educational program «Resistance of Materials», «Technology and Organization of Installation Work»), «Environmental Protection Technologies» of the second Master's level of higher education (components of the educational program«Development of Construction Projects in Accordance with the Sustainability Categories of Green Construction»), «Architecture of Buildings and Structures» of the second Master's level of higher education (components of the educational program «Modern Structures of Buildings and Structures», «Architectural Activity in a Market Economy»), «Construction and Civil Engineering» of the first Bachelor's level of higher education (components of the educational program «Technology of Construction Processes», «Construction Mechanics», etc.), «Industrial and Civil Engineering» of the second Master's level of higher education (components of the educational program«Engineering Protection and Preparation of Territories», «Experimental Research on the Topic of Certification Final Work»), «Water Management Construction and Management of Water Resources and Systems» of the first Bachelor's level of higher education (components of the educational program «Hydraulic Structures», «Hydraulic and Aerodynamic Machines», etc.).

The work of scientists in the field of didactic methods and the development of multilevel systems of teaching methods deserves special attention, and substantiation of the ratio of components of such systems [5, 6, 7, 10, 12, 16, 17, 24], because the level of development of professional competencies of students in a certain component of the educational program (academic discipline), their ability to analyze, synthesize, evaluate, compare, systematize educational information determines the activities of scientific and pedagogical staff of higher education institutions of construction profile in the choice of methods of teaching technical disciplines. In particular, at the Kyiv National University of construction and architecture, teaching is carried out with the help of traditional methods (verbal, visual, practical) and innovative methods that are aimed at activating the educational and cognitive activity of students, and information educational technologies. To improve the organizational and methodological support of the educational process, an Internet-support site on the Moodle 3 platform was created (http://org2.knuba.edu.ua), where the academic disciplines taught by the departments are presented. The web page of each academic discipline has a mandatory part containing basic information and electronic versions of the documents that make up its information and methodological support: working program, guidelines for laboratory, practical, coursework and diploma projects, recommended literature, examination (test) questions, assessment system, lecture notes, tasks for practical (laboratory) classes, etc.

In this context, innovative methods of teaching educational disciplines, which promote the development of creative activity and research initiative of students, deserve special attention and lay the basis for the successful application of

acquired competencies in practice. The concept of «innovativeteachingmethods» asdefinedby N. Artykutsy [6], is multicomponent, since it combines all those new and effective ways of teaching (obtaining, transferring, and producing knowledge) that contribute to the intensification and modernization of the educational process, develops the creative approach and personal potential of its participants. V. Luhovyi [22] in the content of the concept of «methods/technologies of teaching» invests ways and methods of processing educational (pedagogical) information, aswellastypes of training sessions and partially forms of organization of the educational process (independent work, practical preparation). Thus, in Kyiv National University of Construction and Architecture on the Department of Structural Mechanics, which teaches one of the most important fundamental disciplines for the training of civil engineers, a cycle of educational and methodical publications and materials has been developed that form a methodological complex for studying structural mechanics by students of various specialties at different educational and qualification levels. In addition to a number of textbooks, the most complete of which is the one published in 2013 under the general editorship of Academician of the Academy of Pedagogical Sciences of Ukraine Professor Bazhenov V.A. the textbook "Structural mechanics. Computer technologies and modeling" (in Ukrainian) developed a number of guidelines and individual tasks for solving problems. which laid down didactic principles of optimality and rationality of presentation of educational material, individualization and differentiation of educational and cognitive activities, problems – to stimulate activity and independence of higher education students in achieving educational results and developed on a single conceptual basis of learning. A list of these methodological developments is available on the KNUBA website [35].

Consequently, given the modern requirements to ensure the quality of the educational process, teachers are stimulated to improve methods of teaching professional disciplines and, in particular, to promote innovative technologies as leading in the organization of educational and cognitive activity of students. However, scientists, in particular I. Khomiuk and V. Khomiuk [38], believe that despite the considerable work of scientists, the issue of the introduction of innovative technologies it is in the teaching process of technical disciplines remains open and requires further research.In this context, the study of the content of scientific developments of foreign scientists on the design of youth innovation centers, creative spaces, and hubs in the structure of higher education institutionscanserveasrelevantforour research. Thus, J. Fournier, C. Grape, P. Grummon, J. Morelli, S. Whitmer, and J. Cevetello in a thorough study «Designing educational space: current status and future trends» give some recommendations to improve the educational environment through architecture and design, considering innovations and current trends in education, technology, and society [45]. C. Spinuzzi [42] in his work noted that is innovative learning environment (including coworking) provides a unique opportunity to accelerate the generation and dissemination of innovation itself. K. Holubchak [9], considering the peculiarities of the formation of innovative creative spaces in the

structure of higher education, argues that innovative creative spaces should promote the generation of ideas, innovative thinking, and communication.

We share the opinion of the authors that the emergence of the latest design and digital technologies significantly expands the design space of architecture. The spatial structure of modern creative hubs cannot be formed only physically: transformed partitions, and modular furniture that can easily adapt the space to specific needs - from private work areas to group coworking spaces, it should have a wide range of digital and lighting components built-in. Analysis and generalization of the needs of higher education seekers, experience in organizing innovation centers, including the Kyiv National University of Construction and Architecture, allows identifying several functional areas of creative innovation space in the structure of higher education institutions of construction profile: educational, educational and scientific, educational and methodical, research, coordination, internationally, recreational, technical and technological, communicative, information and library, exhibition and exposition, portfolio, trade and household services.Along with this, A. Panchenko, A. Voloshyna, O. Titova, I. Panchenko, A. Voloshyn [27] draw attention to the ways of introducing interactive teaching methods in the teaching of technical disciplines. Especially - the most common forms of classes that use active and interactive teaching methods in the teaching of technical disciplines: lecture discussions, educational games, laboratory and practical classes, watching and discussing videos, working in small groups, and excursions. According to the authors, the organization of interactive learning in the study of technical disciplines should include the following elements: formulation of the problem topic, goals, and questions of the lesson; preparation of the classroom, multimedia equipment, layouts for active work of students; formation of motivational readiness of the student and teacher for joint actions in the process of studying technical disciplines; optimization of the system for evaluating the process of cognition and results of joint activities; development of the general group and interpersonal skills and ability of analysis and self-analysis. In their opinion, interactive forms of study provide high motivation, the strength of knowledge, creativity and imagination, communicability, active life position, team spirit, the value of individuality, freedom of expression, emphasis on activity, mutual respect, and democracy. To the effectiveness of interactive learning in the study of technical disciplines, scientists include: the development of active cognitive and mental activity of students; attracting students to the process of studying technical disciplines and mastering new material as active participants; the development of skills, abilities and analysis and critical thinking; strengthening motivation to study technical disciplines; creating a favorable, creative atmosphere in the classroom; the development of students of communicative competencies; reducing the volume of traditional classroom work and increasing the volume of independent work; development of skills and proficiency in modern technical means and technologies of information processing; development of skills and abilities to independently find information and determine the level of its reliability; use of such forms of control as current Test control, final module

control, final control (exam), which allow to increase the objectivity of assessment of knowledge, skills and competencies of students [27].

V. Petrovskyi and A. Bondarenko [28] believe that the use of interactive technologies puts forward certain requirements for the structure of the lesson, which should consist of five stages: motivation; announcement, presentation of the topic, and expected results; updating knowledge, providing the necessary information; awareness; reflection. When evaluating the results of interactive learning, researchers consider it necessary to take into account the following conditions: to maintain a balance of testing the knowledge and skills of students; use traditional and interactive assessment technologies; apply group, competitive and individual assessments of students, self-assessment and mutual assessment; discuss the criteria for evaluating students; taking into account the academic achievements of the group and the individual progress of students.

I. Batsurovska, O. Samoylenko, and V. Hruban [7] consider the peculiarities of studying technical disciplines using electronic educational resources. Researchers have identified a problem that consists in using electronic educational resources when studying technical disciplines and involves building a new or changing the traditional methodological activity of the teacher. The analysis of the main requirements for the use of electronic educational resources in the study of technical disciplines allowed the authors to identify pedagogical and methodological goals that can be achieved through the use of electronic educational resources such as MathCad, Maple, MatLab, Mathematica, SMath Studio, Advanced Grapher, MasterGraph, Wolfram Alpha, etc., more effectively than with the help of other pedagogical technologies. To such goals, scientists include the formation of an activity-based approach to the educational process; individualization and differentiation of the educational process while maintaining its integrity; strengthening the awareness of the educational process, increasing its intellectual and logical level; strengthening the motivation for learning, self-control, and self-correction; monitoring the training stages of the educational process; monitoring with feedback, diagnostics, and evaluation of the results of educational activities; introduction of new cognitive tools into the educational process: computational experiment, modeling, and imitation of the studied objects and phenomena, conducting laboratory work in conditions of simulation in a computer program of real experience, solving problems using electronic educational resources; the possibility of creative research activities. The peculiarities of the use of electronic educational resources in the study of technical disciplines include [7]: the ability to visualize the process of solving the problem by automatically building graphical dependencies on the computer screen according to a model that describes the situation in question; the need to use an electronic educational resource to automatically perform any calculations only after the skill of performing these calculations without the help of electronic educational resources has been formed; periodic conducting computational classes without the use of a computer, followed by checking the results on a computer; modern electronic educational resources are systems for self-study and distance learning of technical disciplines; educational electronic resources - is the opportunity to use simulators, models and laboratory work, not feasible in

real conditions for the study of technical disciplines; use of computer testing programs, as well as other organizational forms and technologies to solve technical problems; implementation of network consultations, work with simulators, control and self-control.

O. Kletskov [15] considers the main types of classes in distance learning and the problems that arise in their organization. Thus, the difficulty in conducting video lectures on technical disciplines is to create a quality presentation that not only presents all the necessary material but also presented it in a format that would be accepted by the students of education. The limited-time available for Zoom lectures, for example, also adds complexity to the teaching of technical disciplines. The most acceptable variant of laboratory work is the format of practical work with the display of a video. When teaching technical disciplines, the main tool for teaching students is to perform practical tasks, but in terms of distance learning controlling the progress of practical tasks by individual students is almost impossible. Also, when teaching certain topics and questions it is necessary to teach students to perform tasks according to a certain pattern, which in turn requires the performance of practically identical tasks by all students of the group, which in conditions of distance learning does not promote academic integrity of students. Testing students' knowledge is an integral part of the study, but it is difficult to create test tasks within the framework of teaching some topics that would exclude the possibility of students «guessing the answer». It is not always possible to create tests that require you to record your answer or compare pictures and meanings.

Significant for our research is the experience of teachers of the Kharkiv National University of Construction and Architecture, in particular A. Medvedievoi, T. Aloshechkinoi, and N. Makovetskoi [23] outline the range of problems related to the organization of teaching technical disciplines remotely in quarantine and identifies areas for further quality assurance of higher education students. Thus, lectures on resistance of materials, structural mechanics, a special course on resistance of materials, and the basics of the theory of elasticity and plasticity were conducted directly according to the schedule of classes on the Zoom platform, or after a prepared presentation was sent to academic groups in advance for students to independently study the content of the lecture and then discuss it, which is organized by the teacher during a scheduled lecture using Google Meet, or Zoom platform. The expediency of one or another option was determined by the complexity of the material. The most effective option, according to teachers, is when the content of the lecture is considered by students in advance. The practice of teachers of the Kharkiv National University of Construction and Architecture in conducting practical classes shows that the best result is achieved when the task is explained by the teacher during a meeting with the group in a chat when performing independent work (consulting work). In general, preparation for classes should be more thorough and perfect, with the use of visualization of appropriate calculations.

T. Labutkina [18] notes the possibility of a progressive combination of «online» technologies in the process of providing educational services with

«offline» and highlights several aspects regarding the presentation of lecture material in «online» and «offline» forms. M. Sashnova and A. Zahorulko [32] believe that the introduction of gamification in technical disciplines in higher education institutions is possible to ensure the mental activity of students during lectures and laboratory-practical classes and improve the assessment system. The structure of gamification is conditionally divided by them into individual (assessment points, virtual goods, time limits, etc.) and social (interactive interaction), and the implementation of gamification in distance learning conditions is possible through the use of various plugins, depending on the platforms used for distance teaching of technical disciplines. In this context, teachers of the Kyiv National University of Construction and Architecture use the capabilities of the Moodle and Microsoft Teams platforms, wherein the course parameters activate the dynamics of student activity and set up the deadline for educational tasks, which serves as a motivational factor for students to complete them. The completed task can be stimulated by rewards in the form of performance points, Awards (commendations or accolades) (in particular, using the LuckyDraw Microsoft Teams plugin). In our opinion, a positive trend is the focus of scientists on analyzing such a problem of modern higher technical education as insufficient humanitarian training of the students of higher education technical specialties. In particular, N. Aksakova emphasizes that in institutions of higher technical education, the principle of technocracy dominates both in the content of academic disciplines and in approaches to the organization of the educational process. However, the researcher expresses a reasonable opinion that it is the humanitarian component of the educational process that ensures the development of creative potential and cognitive activity of students [5]. The author notes the importance and expediency of using interdisciplinary connections for the mutual enrichment of related subjects within the humanitarian block and the application of a transdisciplinary approach to the relationship between special and humanitarian knowledge, which allows students to form a systematic idea of their future profession and their role as a Technical Graduate in modern society.

We agree with N. Aksakova's assertion that the teaching of humanities disciplines in technical specialties should differ from teaching in humanities faculties both in the structure of the subject content and in the presentation. Nevertheless, T. Osborne points out a significant factor that, in our opinion, should be taken into account in the learning process, namely, the dominance of rational thinking among technical students, and their skills to work with systematized, logical and concise material [41]. In addition, it is necessary to pay attention to the fact that in the process of acquiring university education, the following types of innovative thinking are formed: paradigm (develops methodological innovations of fundamental research, is characterized by the acquisition and mastering of a system of scientific knowledge, the application of which ensures the production of necessary innovations, their implementation and replication, has the ability to determine a strategic model for the development of a specific direction of professional innovation reality), conceptual (generated by constructive innovations in the context of Paradigm implementation, it manifests

itself in a complex innovative solution of key issues and develops new scientific approaches and design principles), technological (creates knowledge-intensive innovations in order to implement conceptual development like new technologies, innovation processes, implementation activities, etc.), predictive (has a high level of forecast, which determines the perspective of development and inhibition of innovation mechanisms through knowledge of theoretical doctrines, concepts, systems, etc.), modeling (characterized by the level of heuristic generation of innovations and the creation of Information Computer Products, modeling of the process of solving contradictions, etc.), combinatorial (generates innovations, new knowledge, synthesizing them from various branches of science, empirical knowledge and experience in the sphere of challenges and problematic tasks) [36, p.20–21].

Based on the above, we can specify the method of teaching students of higher technical education, proposed by N. Aksakova [5], the inclusion, taking into account the inherent rationalism of students, in this process of problematic tasks, including pedagogical, psychological, social and managerial aspects which are their development (self-development) as subjects of future professional, research, social, cultural, and managerial activities. We consider the management of knowledge in university education as a synthesis of the following components:

– student-centered learning (characteristically individualized, emotional-cognitive style of learning and behavior that determines the features of educational and cognitive activity of higher education students and educational interaction);

– information resources (both external and internal to the institution of higher education; information competence of educational subjects to provide access to knowledge bases for their integration);

– own knowledge (transformation of information into knowledge through technologization of forms, methods, and means of teaching to achieve program results of assimilation of components of the educational program; introduction of innovative systems of pedagogical diagnostics of the level of development of relevant competencies by students higher education; formation and development of a system of knowledge, skills, abilities, ways of thinking, views, values, and other personal qualities that determine the ability of a future specialist (professional) to successfully carry out professional activities and produce new knowledge, increase intellectual and emotional-volitional potential).

Training of higher education seekers in the relevant specialty, competitive in the labor market, competent, able to effectively operate important tasks of the educational process, which can't be solved without increasing the role of independent work students of higher education, the willingness of teachers to stimulate their professional growth, formation (development) of creative activity and initiative. O. Skliar and R. Skliar [33] define independent work as planned educational, educational-research, research work of applicants for higher education, performed in extracurricular (classroom) time on the task and with the methodological guidance of the teacher, but without his direct participation (with partial direct participation of the teacher, but with the leading role of the student

of higher education). Scientists pay attention to the technological aspect of the organization of independent work of applicants for higher education, which may include the technology of selecting the goals of independent work; the technology of determining its content (the basis for selecting the content of independent work is the standard of Higher Education, sources of self-education (literature, experience, introspection), individual psychological characteristics of students – learning ability, intelligence, motivation, features of educational activities; technology of designing tasks (tasks for independent work should correspond to the goals of different levels, reflect the content of each academic discipline, include different types and levels of cognitive activity of students of higher education; technology of control organization (selection of control tools, determination of stages, development of individual forms of control). Therefore, the Kyiv National University of Construction and Architecture has created a digital environment for independent development of the content of technical disciplines and consolidation of the acquired knowledge by future engineers. Educational content is presented using a variety of tools: multimedia presentations for practical work, online laboratory work with multimedia support, educational computer interactive simulators, interactive lectures with audiovisual support, interactive lectures with audiovisual support, and online glossary, etc.

The level of enrichment of professional competencies of higher education students, in our opinion, depends entirely on the state of pedagogical skills of teachers, the content of teaching methods of educational disciplines, and methodological support for the implementation of components of educational programs. O. Ponomarov and M. Chebotarov [29] draw attention to the need for constant development of professional competence and the culture of the teacher as a factor in the formation of the humanitarian and technical elite. The scientists have formulated a well-grounded conclusion that the professional-pedagogical culture of the teacher in combination with its developed pedagogical skill create conditions of proper perception, understanding, and mastering of educational material by students. This is achieved due to the unity of what they are taught (it provides professional competence of the teacher), and how this material is presented, how their rational and emotional cognitive abilities are used (and this provides a pedagogical culture of the teacher).

Analysis of scientific research on methodological aspects of the educational process [10, 12, 17, 21, 24, 25, 30, 34] allowed to define the concept of methods of teaching technical disciplines in higher education institutions of construction profile as a set of psychological and pedagogical components containing a specific educational goal (determined by the content of the relevant educational program of higher education at the appropriate level in a particular specialty and specialization, as a single set containing the amount of ECTS credits required to obtain the appropriate degree, list of graduate competencies, normative content of higher education, formulated in terms of learning outcomes, forms of certification of students for higher education, requirements for the system of internal quality assurance of higher education); subjects of the didactic process; operational and activity elements (principles, learning conditions, educational

tasks, technical and educational process (forms, methods, teaching aids), educational information technology, and technical and resource support, which ensure the achievement of the projected result through their optimal selection, scientific justification, objective assessment of goal achievement, proper adjustment and mobile allocation of resources. In our understanding, the peculiarities of the methodology of teaching technical disciplines in higher education institutions of construction profile are determined by the fact that each subject of the educational process operates in an environment, the components of which are a source of educational information, which forms the definition of competence of higher education students for their independent mental activity, constructive educational interaction, reflexive actions and the use of interactive technologies that have a problem-search character, are based on a person-oriented approach, include a planned learning result, they stimulate the educational and cognitive process.

A learning problem situation and the process of solving it is an invariant component of a particular interactive technology. The variability of didactic forms, methods and means used in the methodology of teaching technical disciplines in a building-profile higher education institution will contribute to the implementation of invariant components and is the basis for a variety of interactive technologies, namely: the technology of personal «discovery» of knowledge, skills and abilities, the technology of educational research (studying objects in natural circumstances, observation, laboratory research, design, etc.), project technology (provides for the implementation of creative projects, integration of knowledge, skills, and abilities of various educational components, branches of science and technology; mastering communication skills, working in pairs or groups, making joint decisions, a sense of responsibility for activities in the educational community, developing research skills, system and critical thinking, showing your own creative personality and creating an appropriate product, etc.), Information Technology (IT programs, computational experiments, distance learning, etc.), technology of research activities (deepening the student's motivation for future professional activities, using his own creative potential, through participation in research, development or methodological work according to the Department's plan or according to an individual plan – work in scientific circles, problem groups, participation in scientific conferences, seminars, cooperation in the implementation of works on state budget topics, publications in scientific publications, collections of works, etc.), educational and research work (performing coursework, master's works, Research tasks during training practices), organizational and mass events (subject Olympiads, reviews, competitions of scientific papers, etc.), «brainstorming technology», technology for solving heuristic Research tasks, technologies of cooperative (collective-group) training, technologies of situational modeling, technologies of modeling future professional activity, technologies of formation of an individual creative style of professional activity in the aggregate of certain forms of its manifestation: the ability to solve professional (quasi-professional) tasks, motivation for educational results, active adaptation of the graduate to the professional environment (individual-

psychological, socio-psychological and professional-activity), mastering the specifics of joint professional activity to coordinate their own style with the styles of other subjects, awareness of their own capabilities of intellectual, emotional and subject activities, and so on. Thus, the competencies defined by educational programs should be learned by higher education students as a product of their search and discovery. The content of the training material the lessons should contain reflective-cognitive conflict or conditions of its occurrence, be at the level of need for a high concentration of mental forces, and logically structured for the fullest stimulation of the reflective-cognitive activity of students. In such circumstances interactive educational technology is transformed into reflex-cognitive and is characterized by the following features: interpersonal, dialog, equal educational interaction, focus on cooperation and social values, pleasure from education, and leadership. In addition, the methodology of teaching technical disciplines in a construction-profile higher education institution should focus on differentiation and individualization of the educational process, on the priority of personality-oriented training in the implementation of its goals and objectives. It is in the personality-oriented educational process that the mission of its subjects is transformed: the student turns from an object of activity into a subject of activity, and becomes a co-author of training; the teacher, in turn, expands participation in the design and development of the active personality of the future specialist (professional) as an andrologist, humanist, adviser, consultant, researcher, coach, mentor, psychotherapist, facilitator, moderator, tutor. The means of training individualization are the knowledge, which differs by the level of complexity, novelty, and integration and is applied to take into account the rationality of didactic forms, methods, techniques, and tools, taking into account the individuality of their particular carrier – the subject of study.

Among the main means of personality-oriented learning on the formation of professional competence of students, it is advisable to define competence-oriented tasks as integrative didactic units of content, technology, and monitoring the quality of student training, which are focused not only on the assimilation of knowledge but also the development of skills to independently acquire and actively use them to solve actual problems in specific production conditions with predictable consequences. Competence-oriented tasks, on the one hand, should cover certain aspects of the content of the academic discipline, and on the other – be creative, and personally oriented. The construction of a competence-oriented task involves: identifying a problem that requires integrated knowledge to solve; defining goals and objectives, predicting results and ways to achieve them; planning activities (specifying content through highlighting subtasks; analyzing input data and synthesizing ideas for solving); selecting methods for solving (updating reference knowledge; establishing intersubject connections; developing an algorithm for actions aimed at achieving intermediate goals); effective work with information resources (search for information and its critical evaluation, data analysis, and generalization according to certain criteria); evaluation of the results obtained, formulation of conclusions. The current conditions for ensuring the personalization of students

of learning hypothetically can be the following: restructuring the content of Education based on the principle of fundamental knowledge, problematic content of training, humanization of the content of education, as well as the principles of flexibility, variability and scientific orientation of the content of education; the development and expansion of educational communications according to the principles of accessibility and interactivity, sensitivity, targeting, redundancy, versatility, integration; personalization of the teacher's activity according to the logic of building the author's pedagogical system, which is implemented in the practice of cooperation with students. Thus, personality-oriented learning includes professional knowledge and optimizes the process of developing and implementing an educational project aimed at developing the student's personality, and meeting his needs and interests.

Solving the problems of the modern educational process in a construction-profile higher education institution to ensure its compliance with the needs of the labor market is associated with the implementation of a competence-based approach. The competence-based approach, within the framework of the methodology of teaching technical disciplines in a building-profile higher education institution, focuses attention on the results of education, not so much as the amount of information learned, but the ability of a specialist (professional) to act creatively in various situations of the professional sphere and life; the orientation of the educational process to the formation of general competence, which is an integrated characteristic that is formed in the educational process and contains knowledge, skills, attitude, experience of activity and behavioral models of the individual; a set of general principles for determining the goals of Education, selecting the content of education, organizing the educational process and evaluating educational results; reorientation of the dominant educational paradigm with the predominant translation of knowledge, the formation of skills and abilities to create conditions for mastering a complex of competencies, meaning the potential, the ability of a graduate to sustainable life in the conditions of modern multi-factor socio-political, market-economic, information and communication saturated space; a fundamental paradigm shift from «subject-centricity» to «student-centricity», which involves involving students in independent learning activities and increasing personal responsibility for its results (individual planning, self-assessment, self-organization, individual monitoring, presentation and protection of their academic achievements, etc.). In our opinion, the use of the competence approach allows to strengthen its effectiveness due to the activity component, focusing on the ways and nature of actions, strengthening the relationship between the motivational and value-oriented spheres of personality; reproduction in the educational process of real conditions of professional activity, solving real professional tasks and problems; the use of modern educational technologies that provide for the systematic development of functional competencies; the implementation of educational and cognitive tasks of the research type; creating conditions for students to choose individual educational trajectories, which, in turn, will contribute to the implementation of the principle of variability of education and the development of students of positive motivation to learn; updating the content, forms and

methods of professionally oriented training, coordination of educational activities, aimed at the formation of a competitive professional in the modern labor market, his adaptation to modern conditions of professional activity.

The main source of educational information is, of course, a lecture. Its main purpose is to provide students with a systematized foundation of scientific knowledge on the relevant branch, to reveal the state and prospects of its development, and to focus on problematic issues. The traditional structure of a lecture includes the announcement of the topic, academic problems, the list of recommended sources, reminding the content of the previous lecture, linking it with the new material, implementing the content, fixing conclusions on each issue, and summarizing the lecture, answering questions from the audience, setting tasks for independent work and announcing the topic of the next study session. However, the announcement of the topic may be preceded by a small introduction, information about the specific situation of professional activity, which, on the one hand, will help to focus students of attention, on the other, motivate them to further study the proposed topic. In addition, this list can be supplemented with an indication of intersubject connections or methodological recommendations for preparing for practical and laboratory classes, performing small tasks to provide «feedback» to the audience, and adjusting the teaching process. The main features of the lecture in the methodology of teaching technical disciplines in a higher education institution of construction profile are a high scientific level of information presented, a significant amount of generalized and systematized modern scientific information, evidence and argumentation of judgments and conclusions, the sufficiency of argumentation of solving presented educational problems, teaching skills and a high level of activation of students of thinking activity, a thorough analysis of various points of view on solving problems, the introduction of new terms and concepts, use of didactic materials and technical teaching tools, assessment of students of assimilation of lecture content, setting higher education students for independent search work, clarification of recommended literature, methodological advice, answers to questions, etc. It is also necessary to take into account the relevant rules for presenting the content of the lecture as a means of teaching and a way of presenting educational information using multimedia technologies with the leading role of the lecturer and his pedagogical skills. The use of multimedia technologies in lecture classes is effective from a psychological and didactic point of view, as it allows: for optimization of the educational process and effectively uses the time of the lecture session; to carry out cognitive development of the student – all types of thought processes, such as perception, memory, imagination, and logic; increase the visibility of training and make the educational material convincing through the use of various forms of presentation of educational material (text, formulas, graphs, drawings, diagrams, tables, photos, animations, videos, etc.); facilitate the process of perception and memorization of educational information by students through the use of vivid images; carry out psychological relaxation and increase the audience's attention during the period of its decline approximately every 25-30 minutes. lectures through the use of drawings, photos, small animated or video clips that are a

visual representation of the presented educational material, the sound effect after deducing a heavy formula or constructing a complex graph or diagram, which help to relieve psychological tension and set the audience to move on to the next question; increase the level of accessibility and perception of information; repeat the most difficult moments of the lecture or repeat («scrolling») the material of previous lectures; to increase the motivation of learning through the use of new, that is, interesting technologies for the student and visual presentation of educational material; to keep in touch with the audience – tasks on slides allow you to quickly and efficiently check the level of perception, understanding and assimilation of educational material by students, as well as provide appropriate explanations and clarifications; to increase the dynamism, persuasiveness, emotionality and brightness of the presentation of the lecture material; to create comfortable working conditions for the teacher at the lecture. Thus, a lecture in a higher education institution is a responsible multidimensional pedagogical action. It is the pinnacle of the teacher's pedagogical skill. The lecture should carry not only informational and semantic potential but also social and pedagogical. The latter requires a high pedagogical culture from the teacher.

Modern trends in the transformation of society, its transition from the industrial stage of development to the post-industrial one, put forward fundamentally new requirements for the practical component of educational activities. Therefore, the main didactic goal of the practical lesson is to expand, deepen and detail the scientific knowledge obtained by applicants for higher education in lectures and the process of independent work and aimed at improving the level of assimilation of educational material, the formation of professional competencies. In this regard, a practical lesson is a form of the training session, during which the teacher organizes students to consideration of individual theoretical provisions of the academic discipline and forms the skills and abilities of their practical application by individually performing the tasks formulated accordingly. Conducting a practical lesson is based on pre-prepared methodological material tests to identify the degree of students of mastery of the necessary theoretical provisions, a set of tasks of varying complexity for students to solve in the classroom. Peculiarities of the purpose of practical classes in the context of methods of teaching technical disciplines in higher education institution of construction profile can be presented as follows: consolidation of knowledge through active repetition of lecture material, specification and expansion of this material, its transposition to certain tasks; development of the ability to independently use the acquired knowledge to perform certain actions and acquire new knowledge and skills; establishing the connection of regularities, formulations, measuring indicators with the practice of their application; acquaintance with scientific methods and means in their practical application; acquisition of experimental skills and abilities; acquaintance with various methods of analysis and assessment of the state of the object of study, reference information materials; mastering the skills and abilities of independent solution of educational-methodical and scientific-practical issues; integration of knowledge into a certain system and the formation of a certain competence. The development of practical classes should be consistent with the appropriate

direction of the lecture course and include: setting the general problem of the teacher and its discussion with students, preliminary control of knowledge, skills, abilities, and competencies, and solving practical problems with their further discussion, solving tests tasks, their verification and evaluation. In the process of conducting practical classes, it is advisable to use various teaching methods. Since the main task of this type of educational work is the formation of skills and abilities, the leading place should be given to a variety of exercises: preparatory, trial, sample, training, creative, practical, graphic, oral, written, professional, technical, etc. Planning of practical classes is based on the content of relevant educational programs, curricula, and work programs of academic disciplines that ensure and determine the continuity, systematicity, and sequence of training, the list of questions (educational problems), the time allotted for all types of tasks; forms and deadlines for reporting students. It is important for successful practical training to prepare working journals and methodological developments. As a rule, a work journal can contain the number of the work, its title and purpose, brief theoretical information; a work task (work completion plan, data processing); control questions, and a list of recommended literature. At the beginning of each practical lesson, it is advisable to plan a check of students of readiness to perform practical work. It is appropriate to start a practical lesson with a generalization of the main scientific and theoretical provisions, which are the starting point in the practical activities of students. It is best when the teacher and students jointly determine specific ways to complete the tasks of a particular lesson, form a theoretical base, and characterize the methods of working in the lesson. After generalizations, the teacher should give answers to individual questions that students have encountered in the process of preparing for the practical lesson, and move on to the practical part of the lesson. At this stage, the teacher needs to carefully monitor the time allotted for the consideration of each issue, performing practical tasks, exercises, and solving situations, that is, following the rules, which especially disciplines students, and teaches them to the rules of time management. Students of activity in practical classes increase if they acquire additional theoretical knowledge and practical skills to solve applied problems, build diagrams, graphs, etc., consolidate and improve already formed ones, and develop the ability to independently improve professionally-oriented actions. It is important to use interactive teaching methods: non-simulation (discussions, virtual excursions, etc.); simulation non-game (analysis of specific situations, solving production problems, analyzing documentation, actions according to instructions, etc.); Simulation (business, role-playing games, game design, etc.). The recommended structure of practical classes is: organizational part (checking the readiness of the academic group for the lesson, entrance control of students of knowledge, skills and abilities, communicating the goals and objectives of the lesson, setting a general problem and discussing it, introductory safety instruction; motivation of educational and cognitive activity of students (discussion of the role and place of the topic of the lesson in the training system, informing students about the complex of practical skills and abilities that they should master in the course of the lesson, stimulating the activity of students with the prospects for future professional activity);

preparatory stage of performing practical tasks (providing individual practical tasks to students, instructing on workplace safety, explaining the requirements for the design of the report and the procedure for its protection); independent work of students to perform practical tasks under the guidance of a teacher (performing the theoretical part of the work, checking theoretical provisions with experiments, experiment observation, performing exercises, drawings, calculations, plotting graphs, filling in tables, etc., demonstration by the teacher of rational methods of performing operations, showing the performance of production and technological operations, instructing on safety during students of performance of practical work); the final part (explanation by the teacher of the technology of completing practical work, final safety briefing, acceptance of reports, analysis of the practical lesson, assessment of students of performance of practical work, provision of tasks for independent work). Thus, the effectiveness of practical training largely depends on the ability of the teacher to own the attention of students, introduce elements of competition, implement a differentiated approach, select groups for joint activities in practical classes, and provide direct (planning, special construction of tasks, control) and indirect (influence on motivation, instructions, prospects of the student) management of educational and cognitive activities.

An important component of the methodology of teaching technical disciplines in a construction-profile higher education institution is laboratory classes, where students, under the guidance of a teacher, personally conduct full-scale or simulation experiments or experiments for practical verification and confirmation of certain theoretical provisions of the relevant topics of the educational discipline, acquire practical skills in working with laboratory equipment, equipment, measuring equipment, computer equipment, master the methodology of experimental research in a specific subject area. Laboratory work (tasks) can be reproductive, partially searchable, or searchable. Reproductive works are characterized by the fact that during their execution, students use detailed instructions that indicate the purpose, provide explanations (theory, main characteristics), the order of work, tables, conclusions (without wording), control questions, and literature. Part of the search work is characterized by the fact that during their conduct students do not use detailed instructions, they are not given the procedure for performing the necessary actions. In this case, students need to choose the method of laboratory work. In the works of exploratory nature, students solve a new educational problem for them, based on the formed theoretical knowledge. In the educational process, frontal, cyclic, and individual forms of laboratory classes deserve attention. The frontal form of conducting laboratory classes is characterized by the fact that students perform the same laboratory work simultaneously according to special programs and instructions. In this form, students of cognitive independence during task completion are quite low. In addition, performing laboratory work simultaneously by all students of the group leads to borrowing techniques and receptions for performing and even solving problems without a deep understanding of the essence of the phenomena being studied. The cyclical form of laboratory classes provides for the division of laboratory work provided in the

work program of the academic discipline into several cycles corresponding to certain sections of it. Laboratory work is performed in this way according to the established schedule. This form allows you to simultaneously perform various laboratory work of a certain cycle. The individual form of laboratory training involves each student performing a certain laboratory work independently. It should be noted that this form requires special organization, individual guidance, and control over the work of students by teachers. The use of this form of laboratory activity should take into account the interests and inclinations of specific students and provide for the variability of tasks. Therefore, it can be noted that the individual form of conducting laboratory classes corresponds to modern educational trends, in particular, it implements a personality-oriented approach and promotes individualization and differentiation of training. Therefore, taking into account the advantages and disadvantages of certain forms of conducting laboratory classes, as well as based on the understanding of laboratory work as a specific experimental study conducted by the student independently, it is advisable to use their combined form. The combined form of conducting laboratory classes consists in the fact that each of the certain experiments of certain laboratory work is distributed among all students of the academic group. That is, a particular student by appointment of a teacher receives an individual task. At the same time, the task must be accessible, understandable, and partially searchable. Under such conditions, the student faces several separate tasks: to understand and independently clearly formulate the purpose of the experiment, present its course, select the necessary equipment, conduct an experiment, and record the results of the experiment. During the lesson, the student must justify the results obtained with appropriate theoretical provisions. The teacher should act as a consultant, providing the student with the necessary and appropriate methodological assistance. Conducting classes in this way will allow students not only to master the methods of experimental activity but also to learn how to convincingly explain the results obtained. At such laboratory classes, theoretical knowledge is consolidated through practical activities, as well as the formation of the ability to present the acquired knowledge, and the level of formation of the corresponding professional competence. When performing laboratory work, you need consistency and interrelation using the knowledge and skills of previous work to perform subsequent ones. The appropriate structure of the laboratory lesson is the organizational part (checking students readiness for the laboratory lesson, instructing on safety techniques); updating the basic knowledge and practical experience of students, communicating the topic, goals of laboratory work, motivating students educational and cognitive activities; advising on the performance of laboratory work (explanation of the work plan, explanation of tasks that need to be solved, providing advice on the methodology of experimentation), independent work of students on the performance of laboratory work (performance of theoretical tasks, performance of practical tasks, registration of experimental results in the form of tables, graphs, etc., registration of general conclusions of laboratory work); registration of students of report on the performance of laboratory work and its defense; the final part

(analysis and evaluation by the teacher of the effectiveness of laboratory work performed by students, providing tasks for independent work). Under such conditions of conducting laboratory classes, students of the teacher will thoroughly master the skills of carrying out experimental activities.

We have defined the stages of implementation of the methodology of teaching technical discipline in a construction-profile higher education institution, namely-preparatory, content-procedural, reflexive-analytical, control-evaluation, and effective-corrective. The preparatory stage of implementation of the methodology for teaching technical disciplines in a construction-profile higher education institution provides for the development of its educational and methodological support, and preliminary diagnostics of the level of formation of relevant competencies among higher education students. The content-procedural stage includes the design of the educational process to ensure that higher education students master the program competencies: integral, general, special (professional), and achieve the program learning outcomes defined in the respective educational programs. The volume, composition, and quality of the procedural component (informational and educational-methodological support of training) must fully comply with the licensing conditions of educational activities. Different forms, methods, and means of teaching must fully ensure the mastery of the content of relevant disciplines, the implementation of educational tasks, and meet psychological and pedagogical, technical, ergonomic, and ethical requirements, which are focused on forming an information technology environment that contains the necessary resources for educational programs. provides a favorable emotional background for educational activities, develops the adaptability of the personality of the future specialist (professional) to the communicative, industrial, and managerial spheres, and promotes self-realization of the individual. The reflexive-analytical stage of implementation of the methodology of teaching technical disciplines in a construction-profile higher education institution is a process of self-identification of subjects of educational interaction, their entry into an active research position about the educational environment, educational content, educational technologies, conditions for the development of the educational situation. Reflection forms the basis of educational activities, the effectiveness of which is due to the need for constant feedback, and acts as the ability of a person to predict, analyze and evaluate potential and real educational results, rethink and rebuild their activities, value orientations. The control and evaluation stage of implementation of the methodology of teaching technical disciplines in an institution of higher education of a construction profile is an important condition for ensuring the quality of the educational process to provide participants of the educational process, with the help of appropriate tools of the current and final assessment, objective information on the results of mastering higher education by students observing basic didactic principles – objectivity, planning, consistency and systematicity, openness, timeliness, effectiveness, differentiation, individual nature of assessment, ethics, methodological diversity, etc. These requirements should be carried out based on humane educational cooperation, when the applicant for higher education is not only the object of control but also, of

course, the subject of control and evaluation activities, given its diversity of types, forms, methods, and tools, which will help increase the motivation of students educational and cognitive activities, and the search for effective educational technologies by research and teaching staff. The effective-corrective stage is closely related to the control and evaluation and other stages. The results of mastering program competencies by higher education students are subjected to systematic analysis by teachers. Based on the relevant generalizations (establishing the discrepancy between the results of educational achievements of higher education students and the expected ones), a decision is made to adjust the component composition of educational programs, mechanisms for designing components of the educational process, implementing and applying scientific and methodological developments, and so on. In addition, the reasons for making changes may be the adoption of relevant standards of Higher Education, the growth of current requirements for the level of competence of higher education students, recorded in the results of scientific research, surveys of higher education students, graduates, and stakeholders.

Conclusions. In the content of the article:

1. The determinants that determine the features of the methodology of teaching technical disciplines in a construction-profile higher education institution are clarified.
2. The main approaches to the formation of learning content and components of interactive educational technology focused on the priority of personality-oriented learning in the implementation of its goals and objectives are clarified.
3. It is established that solving the tasks of the modern educational process in a construction-profile higher education institution to ensure its compliance with the needs of the labor market is associated with the implementation of a competence-based approach. Among the main means of personality-oriented learning on the formation of professional competence of students, competence-oriented tasks are defined as integrative didactic units of content, technology, and monitoring of the quality of student training, which are focused not only on learning but also on developing skills to acquire and actively use linking current issues in specific production conditions with predictable consequences.
4. The content of current conditions for ensuring personalization of students of learning and recommendations for improving the methods of conducting the main types of educational tasks – lecture, practical and laboratory-has been developed.
5. The content of the stages of implementation of the methodology of teaching technical disciplines in a construction-profile higher education institution is determined, namely, preparatory, content-procedural, reflexive-analytical, control-evaluation, and effective-corrective.

The results of the research in the future can be used for the creation, improvement of educational technologies, and optimization of the content of technical disciplines in the institution of higher education of construction profile.

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ОСОБЛИВОСТІ МЕТОДИКИ ВИКЛАДАННЯ ТЕХНІЧНИХ ДИСЦИПЛІН У ЗАКЛАДІ ВИЩОЇ ОСВІТИ БУДІВЕЛЬНОГО ПРОФІЛЮ

З метою означення важливості проблеми осучаснення операційно-діяльнісного компоненту освітньої діяльності, подальшої наукової розробки теоретичного та технологічного компонентів викладання технічних дисциплін у закладі вищої освіти будівельного профілю з'ясовано детермінанти, які визначають особливості методики їх викладання. Уточнено основні підходи щодо формування змісту навчання та компоненти інтерактивної освітньої технології, зорієнтованої на пріоритетність особистісно-орієнтованого навчання щодо реалізації його цілей та завдань. Аналіз наукових розвідок з методичних аспектів освітнього процесу уможливив визначення поняття методики викладання технічних дисциплін у закладі вищої освіти будівельного профілю як сукупності психолого-педагогічних складників, що містять визначену освітню мету, суб'єктів дидактичного процесу, операційно-діяльнісні елементи, освітнє інформаційно-технологічне і технічно-ресурсне забезпечення, які забезпечують досягнення спроєктованого результату шляхом їхнього оптимального підбору, наукового обґрунтування доцільності застосування, об'єктивного оцінювання досягнення мети, належного коригування та мобільного розподілу ресурсів. Встановлено, що вирішення завдань сучасного освітнього процесу у закладі вищої освіти будівельного профілю щодо забезпечення її відповідності потребам ринку праці пов'язано з реалізацією компетентнісного підходу. Серед основних засобів особистісно-орієнтованого навчання щодо формування професійної компетентності студентів визначено компетентнісно-орієнтовані завдання як інтегративні дидактичні одиниці змісту, технології та моніторингу якості підготовки студентів, які орієнтовані не лише на засвоєння знань, але і вироблення умінь їх самостійно здобувати та активно використовувати для розв'язування актуальних проблем у конкретних виробничих умовах з передбачуваними наслідками. Розроблено зміст актуальних умов забезпечення персоналізації навчання студентів та рекомендації щодо удосконалення методик проведення основних видів навчальних завдань – лекційних, практичних та лабораторних. Визначено зміст етапів реалізації методики викладання технічних дисциплін у закладі вищої освіти будівельного профілю, а саме – підготовчий, змістово-процесуальний, рефлексивно-аналітичний, контрольно-оцінювальний та результативно-коригувальний.

Ключові слова: освітній процес, методика викладання технічних дисциплін у закладі вищої освіти будівельного профілю, студентоцентрований підхід, освітня програма, професійні компетентності, зміст освіти, етапи реалізації методики викладання.

Chernyshev D.O., Maksymiuk Yu.V., Krasylnyk Yu.S., Korchova H.L., Rudenko M.V.
PECULIARITIES OF THE METHODOLOGY OF TEACHING TECHNICAL DISCIPLINES IN THE INSTITUTION OF HIGHER EDUCATION OF THE CONSTRUCTION PROFILE

In order to determine the importance of modernizing the operational component of educational activities, further scientific development of theoretical and technological components of teaching technical disciplines in higher education institution of construction profile, the determinants that determine the peculiarities of their teaching methods were clarified. The main approaches to the formation of the content of education and components of interactive educational technology, focused on the priority of personality-oriented learning to achieve its goals and objectives. Analysis of scientific research on the methodological aspects of the educational process made it possible to define the concept of methods of teaching technical disciplines in higher education in construction as a set of psychological and pedagogical components containing a specific educational goal, subjects of the didactic process, operational elements, educational information technology and technical and resource support, which ensures the achievement of the projected result through their optimal selection, scientific substantiation of the feasibility of application, objective assessment of the achievement of the goal, proper adjustment and mobile allocation of resources. It is established that the solution of the tasks of the modern educational process in the institution of higher education of construction profile to ensure its compliance with the needs of the labor market is associated with the implementation of the competence approach. Among the main means of personality-oriented learning for the formation of professional competence of students are competence-oriented tasks as integrative didactic units of content, technology and monitoring the quality of student training, which are focused not only on learning but also developing skills to acquire and actively use linking current issues in specific production conditions with predictable consequences. The content of actual conditions for personalization of students' education and recommendations for improving the methods of conducting the main types of educational tasks - lectures, practical and laboratory. The content of the stages of realization of the methodology of teaching technical disciplines in the institution of higher education of construction profile is determined, namely - preparatory, content-procedural, reflexive-analytical, control-evaluation and result-corrective.

Keywords:educational process, methods of teaching technical disciplines in the institution of higher education of construction profile, student-centered approach, educational program, professional competencies, content of education, stages of implementation of teaching methods.

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Особливості методики викладання технічних дисциплін у закладі вищої освіти будівельного профілю // Опір матеріалів і теорія споруд. – 2022. – Вип. 108. – С. 35-62.
Для означення важливості проблеми осучаснення операційно-діяльнісного компоненту освітньої діяльності, подальшої наукової розробки теоретичного та технологічного компонентів викладання технічних дисциплін у закладі вищої освіти будівельного профілю з'ясовано детермінанти, які визначають особливості методики їх викладання, уточнено підходи щодо формування змісту освіти, зорієнтованого на пріоритетність особистісно-орієнтованого навчання та компетентнісного підходу. Розроблено рекомендації щодо удосконалення основних видів навчальних занять – лекційних, практичних та лабораторних. Визначено зміст етапів реалізації методики викладання технічних дисциплін у закладі вищої освіти будівельного профілю.
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Peculiarities of technique of teaching technical disciplines in the institution of higher education of the building profile// Strength of materials and theory of structure. – 2022. – Vol. 108. – P. 35-62.
To determine the importance of modernizing the operational component of educational activities, further scientific development of theoretical and technological components of teaching technical disciplines in higher education institutions of construction profile clarified determinants that

determine the peculiarities of their teaching methods, specified approaches to forming educational content focused on priority personality-oriented learning and competence approach. Recommendations for improving the main types of training sessions - lectures, practical and laboratory. The content of the stages of realization of the methodology of teaching technical disciplines in the institution of higher education of construction profile is determined.
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