

1.2. FEATURES OF PROFESSIONAL AND PRACTICAL TRAINING OF CONSTRUCTION INDUSTRY SPECIALISTS IN MARTIAL LAW CONDITIONS

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*The features of professional and
practical training of construction
industry specialists in the conditions
of martial law and post-war
reconstruction are studied. Key
challenges affecting the educational
process are analyzed, in particular, the
problems of staffing, access to material
and technical resources, and the need to
implement modern teaching methods.
Attention is focused on adapting
curricula to the real conditions of
reconstruction, in particular, practical
training in conditions of active construction.
The introduction of innovative eco-*

1.2. ОСОБЛИВОСТІ ПРОФЕСІЙНО-ПРАКТИЧНОЇ ПІДГОТОВКИ ФАХІВЦІВ БУДІВЕЛЬНОЇ ГАЛУЗІ В УМОВАХ ВОЄННОГО СТАНУ

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*Досліджуються особливості професійно-
практичної підготовки фахівців
будівельної галузі в умовах військового
стану та повоєнного відновлення.
Проаналізовано ключові виклики, що
впливають на освітній процес, зокрема
проблеми кадрового забезпечення,
доступу до матеріально-технічної бази
та необхідності впровадження сучасних
методів навчання. Акцентовано увагу на
адаптації навчальних програм до
реальних умов відбудови, зокрема
практичного навчання в умовах
активного будівництва. Окремо
розглянуто впровадження інноваційних*

technologies in construction, aimed at increasing energy efficiency, minimizing environmental impact and using renewable resources, is separately considered. Modern methods of training specialists are analyzed, which will contribute to the effective restoration of infrastructure, emergency construction of housing, social facilities and strategic structures. Particular attention is paid to issues of safety, psychological training of future specialists, as well as cooperation between educational institutions, construction companies and government agencies to ensure high-quality training of personnel capable of working in crisis situations and post-war reconstruction of the country.

Keywords: construction industry, vocational education, qualification, vocational and practical training, adaptation of education, energy efficiency, green building.

екотехнологій у будівництві, які спрямовані на підвищення енергоефективності, мінімізацію впливу на довкілля та використання відновлюваних ресурсів. Проаналізовано сучасні методи підготовки фахівців, які сприятимуть ефективному відновленню інфраструктури, екстреному будівництву житла, соціальних об'єктів та стратегічних споруд. Особливу увагу приділено питанням безпеки, психологічної підготовки майбутніх спеціалістів, а також співпраці закладів освіти, будівельних компаній та державних структур для забезпечення високоякісної підготовки кадрів, які здатні працювати в умовах кризових ситуацій та післявоєнного відновлення країни.

Ключові слова: будівельна галузь, професійна освіти, кваліфікація, професійно-практична підготовка, адаптація освіти, енергоефективність, зелене будівництво.

Modern challenges related to the military situation in Ukraine and the need for post-war reconstruction of the country create an urgent demand for highly qualified specialists in the construction industry.

The large-scale destruction of infrastructure, residential, and industrial facilities, the shortage of building materials, and complex socio-economic conditions create new demands for vocational education, which must be not only high-quality but also adapted to the emergency conditions of reconstruction. Particular attention is needed for the practical training of specialists who must possess not only traditional professional skills (hard skills) but also continuously improve and develop soft skills. All of this requires future construction industry specialists to have a high level of professional competence, readiness for innovation, and mastery of modern sustainable and environmentally friendly construction technologies.

Traditional approaches to the vocational and practical training of construction industry specialists do not always meet the modern demands of the wartime and post-war period, when flexibility, speed of learning, and practical focus are essential. This necessitates new approaches to vocational training, including innovative methodologies for the vocational and practical

preparation of future construction industry specialists, with a focus on energy efficiency technologies, green building, robotic systems, and more. Thus, the research and development of innovative methodologies for the vocational and practical training of construction industry specialists during the wartime and post-war period is extremely relevant. In our opinion, the implementation of innovative methodologies for the vocational and practical training of construction industry specialists during the wartime and post-war period will contribute to the effective formation of the human resources potential necessary for the country's reconstruction, improve the quality of education, and integrate Ukraine's construction industry into global standards.

Issues of restoring and developing vocational education in the post-war period primarily involve ensuring close interaction between education and the domestic labor market to prepare competitive, mobile specialists capable of navigating and making sound decisions in the unpredictable conditions of today. Addressing this task requires concentrating the efforts of educational process participants on the formation and development of professional competencies of future specialists, who are able to work effectively in wartime conditions (Radkevych, 2024, p. 3).

The specifics of modern construction are defined by the fact that, in addition to knowledge and skills in the construction profession, information technologies are becoming a tool of labor for builders (calculations of non-standard building structures, design, planning, and reconstruction of buildings, selection of necessary materials, issues of equilibrium, deformation, strength, etc.). It is precisely informatization that is a common trend in the development of both construction production components and the educational process.

Mastering the construction profession as a science-intensive and high-tech field requires fundamental changes in the content of education. The differentiation of production functions in the process of working towards a common labor result by builders of various specialties necessitates the strengthening of integrative connections between academic disciplines. This outlines the problem of scientifically grounded integration of two promising technologies in education – information and integration technologies. An analysis of the problem's state has shown that one of the means of integrating professional knowledge of future builders is information technology.

The main features of the modern labor market for builders are flexibility and high innovative dynamics. This places new demands on job

seekers, including readiness for continuous self-education and modernization of professional qualifications, professional communication, cooperation, actions in non-standard and unusual situations; the ability to make responsible decisions, critical thinking, self-management of behavior and activities, skills in working with various sources of information and effective behavior in a specific environment, under stress factors. At the same time, employers' requirements are formulated not only in the format of knowledge of graduates from vocational (vocational-technical) education institutions, but also in terms and methods of practical professional activity (skills, ability, readiness). Thus, we are talking about specific educational outcomes of the vocational training system, within which knowledge is a necessary but insufficient condition for achieving the required quality of professional competence.

Libanova (2022) states that currently and in the future, during the post-war reconstruction of the country, the construction industry of Ukraine is experiencing an acute need for highly qualified workers. In the context of the innovative development of the construction industry through new technologies and materials, the need for continuous improvement of workers' qualifications and the implementation of the "lifelong learning" concept becomes a priority. Due to active hostilities in various regions, varying security conditions for participants in educational processes, the obsolescence of the material and technical base of vocational (vocational-technical) education institutions, which has not been updated for many years, the reduction in the number of students and the fullness of training groups, the construction market is releasing workers of the 2nd-3rd category, while it requires workers of the 4th–5th category. Researcher Beletska (2011) states that today's graduate of a vocational (vocational-technical) education institution possesses general theoretical and technical knowledge, but does not possess the competencies, practical skills of working on modern equipment using new building materials, therefore requiring "additional training" for 1–2 years. The share of highly qualified workers in Ukraine is 10%, while in foreign countries it approaches 50%.

The results of the analysis of scientific research and publications have shown that the issue of professional training of future specialists in vocational (vocational-technical) education institutions is not a new phenomenon in pedagogical science and is currently being studied by domestic researchers. It is worth noting that certain aspects related to the disclosure of this problem are highlighted in the research of N. Nychkalo, V.

Oliinyk, L. Serheieva (conceptual foundations of the development of the vocational (vocational-technical) education system), S. Vitvytska, O. Kovalchuk, O. Usata (problems of modeling professional training of specialists in the context of European integration processes), V. Kovalchuk, T. Stoichyk (processes of organizing educational activities in vocational (vocational-technical) education institutions), V. Radkevych, T. Sorochan (aspects of the development of continuous professional education).

The problems of professional training in crisis situations have also been partially addressed in scientific research dedicated to adapting educational programs to the labor market, implementing dual education, and introducing innovative technologies in construction. However, the issues of integrating eco-technologies into the educational process, safety during training in wartime conditions, and effective interaction between educational institutions and the construction industry in the post-war period have not been sufficiently explored.

The purpose of this study is to analyze the current trends in the vocational and practical training of construction industry specialists in wartime conditions, to study the specifics of vocational and practical training for future workers for the country's reconstruction, to formulate tasks for the innovative development of the educational process and forms of its implementation, and to consider interactive teaching methods for acquiring professional competencies by students of construction professions. Particular attention is paid to the adaptation of educational programs, the use of innovative eco-technologies, as well as mechanisms for training specialists capable of working effectively in the country's reconstruction and creating safe and energy-efficient infrastructure facilities.

The active reform of vocational (vocational-technical) education in Ukraine began in 2019 and continues even under the conditions of full-scale war. Equally important today is the renewal of content and improvement of the quality of vocational education, the development of new educational standards, short-term training programs, increased attention to the work of educational and practical centers based on vocational (vocational-technical) education institutions, modernization of existing teacher training programs, development and adaptation of online training courses and materials. All these steps are aimed at the final result – a competitive graduate of a vocational (vocational-technical) education institution. Now, more than ever, Ukraine needs specialists in working professions who will rebuild the country (Oliinyk et al., 2024).

The war has caused a crisis in the construction industry: there is a catastrophic shortage of labor, especially qualified specialists. Even those companies that have received investments are unable to ensure quality work. Ukraine faces the problem of training professional personnel for all areas of construction. And with each passing day, this problem becomes more acute.

Analyzing the current trends in the construction industry in wartime conditions, several key areas can be identified, one of which is the priority of reconstruction construction. The war necessitates specialists capable of quickly restoring destroyed buildings and infrastructure. Given the need for rapid reconstruction of the country, the implementation of the Sustainable Development Goals in reconstruction according to the principles of green building becomes extremely relevant. The construction, operation, and maintenance of green building facilities require specialists who possess modern green technologies. Accordingly, educational programs for the training of such specialists, including methodologies for the vocational and practical training of future construction industry specialists, must be modernized and adapted to current realities. Special emphasis here should be placed on the study of:

- quick construction technologies, including modular and frame structures; restoration of critical infrastructure (bridges, roads, residential complexes, energy facilities), use of local materials to minimize logistical costs;
- green building technologies, focused on saving material resources, economical consumption of natural and energy resources, reducing negative impacts on the environment, preserving human health, etc.;
- energy-efficient technologies.

Another important direction in the context of modern trends in the vocational and practical training of construction industry specialists is the implementation of modern information technologies.

Creating a modern digital space is a priority direction in construction in the near future. Therefore, for the further effective digital transformation of the construction business, it is necessary to improve the tools designed to increase the accuracy of planning construction processes, their optimal organization and control (Marchenko & Koliadenko, 2023).

Due to limited resources and the danger of traditional construction, digitalization and automation are actively developing: Building Information Modeling (BIM) for effective reconstruction planning; drones for assessing damage and monitoring construction; 3D printing of building structures for

the rapid erection of temporary housing. Simulators, trainers, virtual and augmented reality open up new opportunities for training and educating future construction industry specialists. They can significantly increase the level of safety in production.

Another potential direction is the use of the Internet of Things (IoT). IoT allows connecting various devices to the Internet and exchanging data between them. For example, IoT can be used to monitor and manage the energy efficiency of buildings, optimize the use of water and other resources (Lytvyn & Lakiza, 2023).

In wartime conditions, construction industry specialists constantly work in high-risk zones, so training must be supplemented with courses on mine safety and work in hazardous areas; preparation for emergency engineering tasks, including the construction of fortifications; skills to work in conditions of lack of centralized communications.

The modern construction industry is actively developing in the direction of implementing energy-efficient technologies, which is a necessary condition for reducing energy consumption, reducing negative environmental impact, and ensuring sustainable development. In this regard, there is a growing need for highly qualified specialists who also possess energy-efficient competence and are able to implement modern energy-saving technologies in construction (Kuprievych, 2025). The construction industry is focused on energy efficiency and sustainable construction, including green building, and there is a rapidly growing demand for specialists who possess "green" energy technologies (solar panels, heat pumps); passive building methods to reduce energy consumption; and skills in recycling and reusing materials.

Green building is becoming widespread in Ukraine and is finding its application in the current realities of reconstruction and post-war recovery of the country. Issues of green building are considered in the works of R. Aliyev, O. Bilyk, O. Bondar, M. Vovk, T. Halushkina, M. Danyliuk, M. Dmytryshyn, O. Doroshenko, Yu. Ishchenko, Yu. Kaliukh, T. Kryvomas, S. Mashchenko, H. Myhal, Yu. Orlovska, O. Protasenko, A. Savchenko, L. Sargsyan, H. Farenjuk, V. Chala, and others, which indicates the relevance of this issue.

Ukraine is actively joining international conventions on environmental protection, improving legislation and national standards in accordance with international requirements, in particular, the adopted Law of Ukraine "On the Basic Principles (Strategy) of the State Environmental

Policy for the Period until 2030" (2019). In the field of green building, laws and regulations are in force: the Law of Ukraine "On the Energy Efficiency of Buildings" (2017), which establishes the basic requirements for the energy efficiency of buildings, their mandatory certification, the use of energy-efficient technologies in the construction and reconstruction of structures; 2. The Law of Ukraine "On the Regulation of Urban Development Activities" (2011), which regulates the planning and development of territories, including the inclusion of the principles of sustainable development and green building in the design of new facilities; National standards for energy efficiency and environmental safety of buildings, which define standards and criteria for environmentally friendly construction (use of materials, energy saving, waste management).

Since the life cycle of a green building, from design to construction, operation, repair, and demolition, affects a wide range of people who provide it, specialists are involved not only from various fields of the construction industry but also from different sectors of the economy. The growing demand for green building leads to an increase in the number of employees involved in this area, an increase in employment opportunities, and the emergence of new skills, qualifications, and specialists – green professions.

Professional skills are a set of sequentially deployed actions based on theoretical knowledge and practical skills. Some of these actions can be automated (practical skills). The structure of professional competence includes a set of such categories: motivation, knowledge, abilities, skills of professional culture. The formation of these qualities contributes to the formation of professional competencies. The process of forming the professional competence of a future qualified worker in the construction profile must necessarily include practical activities – in this case, industrial training at construction industry enterprises. The problem of developing the professional competence of specialists in various fields is one of the main tasks of education.

The set of competencies of a specialist is determined by the main customers of the vocational education system – employers, the state, and society, and reflects the current needs and interests of all labor market participants. Indicators of professional competence are not only a common set of objectively necessary knowledge, skills, and abilities, but also the ability to properly manage them when performing their functions, knowledge of the possible consequences of certain actions, practical experience, the result of human labor, flexibility of method and critical

thinking, as well as professional positions, individual psychological qualities. In this context, the essence of the professional competence of a builder is appropriate to consider in the unity of theoretical and practical readiness to carry out activities in the field of construction, while the basis of the structure of the builder's competence consists of numerous relevant skills that characterize this readiness.

In the current realities, without involving the employer in vocational training, without using their resource base, it is impossible to obtain the practical skills and competencies that a modern builder must possess. Due to the obsolescence of the material and technical base of the vocational (vocational-technical) education system, the difficult safety conditions for participants in the educational process, the acquisition of practical work skills by vocational education students should largely be transferred to enterprises or created resource centers at regional modular training centers.

Beletska (2010) states that the process of continuous training of workers in the construction industry, in addition to using the modern resource base of enterprises, also requires innovative teaching technologies and the implementation of continuous vocational training. The modern market of educational services must quickly respond to the needs of the labor market through the constant expansion of competencies, practical skills, and the improvement of the quality of workers. The most important and integral component of the vocational education system is vocational and practical training, that is, industrial training in a vocational (vocational-technical) education institution and internships at enterprises and organizations, pre-diploma (pre-graduation) practice in production or in the service sector.

Vocational and practical training of future specialists is carried out in accordance with the Law of Ukraine "On Vocational (Vocational-Technical) Education" (1998), the Regulations on the organization of the educational and production process in vocational schools (2006). Vocational and practical training of students is carried out in close connection with the production of useful products and the provision of services that are paid for in accordance with the law.

The process of industrial training in vocational (vocational-technical) education institutions is the most favorable platform for ensuring the professional motivation of future qualified workers in the construction profile, as it involves increasing the internal motivation of students for professional self-improvement, professional initiative and self-improvement, awareness of the importance of professional growth in a

reality-approximated competitive market of the construction industry. However, to achieve these personal and professional characteristics, it is not enough to practice labor skills in an industrial training session; there is an urgent need to organize a purposeful process of forming professional motivation, which is determined by both the content of training and the quality of teaching, the ability of the industrial training master to apply innovative pedagogical technologies during classes. Numerous experimental studies on the formation of professional competence, the indicator of which is professional motivation, confirm the pedagogical and professional effect of using innovative pedagogical technologies in the process of professional training of future qualified workers.

Industrial practice aims to familiarize students with the real process in which the knowledge acquired by future construction industry specialists in the process of theoretical training is implemented. Accordingly, forms of organization are selected – excursion visits, practical work in production or at an enterprise in workplaces. At the same time, the initial stage of the future profession is formed, what the future qualified worker must know at the lower stage to realize it at the higher stage, this is what industrial (professional) practice also provides; it also allows the student to perform the duties of a specialist in the workplace, the intern performs the entire cycle of duties in their specialty, understands the mechanism of action of the department in which the industrial practice is conducted, and the general picture of the entire practice object.

Industrial practice for students is conducted at workplaces of enterprises, institutions, and organizations that have modern equipment, a high level of work organization, and use progressive production technologies, to improve acquired practical knowledge, skills, and abilities, to achieve the appropriate level of qualification. The industrial training master selects appropriate workplaces and assists in concluding agreements with enterprises, institutions, and organizations for students to undergo industrial practice, monitors the creation of necessary conditions at the enterprise for the implementation of the industrial practice program, and the compliance of the work performed. Students have the opportunity to independently choose the place of industrial practice, including at their place of residence, which contributes to their further employment. The educational institution and the enterprise providing workplaces for industrial practice for future specialists conclude an agreement on the provision of workplaces for practice. At the beginning of the industrial practice, the enterprise manager

distributes students to workplaces by their order and appoints practice supervisors from among the engineering and technical personnel, qualified workers of the enterprise, who are responsible for its conduct and ensuring working conditions and safety in accordance with the regulatory requirements established by law. Upon completion of the industrial practice, the enterprise provides an industrial characteristic for each student.

Methodological support and organization of practical training play an important role in the training of future builders. It should also be noted that the selection of educational and technological works for students is considered a serious matter in the organization of practical training.

The methodological mechanism for forming the professional competence of qualified construction workers is pedagogical technologies that reproduce didactic goals, content and procedural aspects, and direct training towards a unique production and technological process with a guaranteed result. The achievement of learning goals and results is carried out through activities that are expressed in pedagogical interaction, labor actions of the student, designing professional activities for the performance of technological work, etc. We are talking about strengthening the role of the project-technological approach in updating the content of vocational training for future qualified workers.

The war radically changes the approach to training construction industry specialists, shifting the emphasis to speed, adaptability, and safety. Modern education in this field must be flexible, practically oriented, and integrated into the processes of post-war reconstruction. The organization of industrial training and industrial practice of future qualified workers in the construction profile using modern methodological approaches and teaching technologies allows to improve the process of forming professional competencies of graduates, and methodological support and organization of practical training play an important role in the training of future qualified workers in the construction profile.

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