

(work, study, etc.). Entrepreneurship is most often interpreted as the quality of opportunities and ideas manifested in the ability to translate them into value for others. Analytical activity carried out regarding the interpretation of the concept of "entrepreneurial competence" showed that this issue has been worked out by many scientists, but mostly in the field of professional education.

On the basis of the conducted analysis, it is summarized that entrepreneurial competence can be considered as the ability of a person to correlate his own economic interests with available material, labor and natural resources and interests of other people and society; to be ready to act actively, organizing one's own labor activity and the work of the team; timely adapt to the new needs of the labor market, assessing one's personal and professional capabilities and abilities; make economically justified decisions, draw up and implement activity plans, present information about their results.

**Key words:** ability, key competence, competence, entrepreneurship, entrepreneurship, entrepreneurial activity, entrepreneurial competence.

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## **THE CONCEPT OF AN INNOVATIVE PEDAGOGICAL SYSTEM FOR TRAINING FUTURE ENGINEERING TROOPS SPECIALISTS**

The article examines the concept of a training system for future engineering troops specialists for professional activity. Its development was a response to the challenges of the current state of military education and Russian armed aggression. The process of modernising the training of future engineering troops specialists is also driven by the fact that during the war, the Russian army mines objects where large and small groups of people could gather and widely use various explosive devices. These and other circumstances require thorough training of engineering service specialists in neutralising explosive objects and operating in mine-dangerous conditions, as well as preventing the death of personnel involved in Ukraine's war against Russia. Current realities dictate the need to find ways and means to improve the educational environment for training future engineering troops specialists. It is summarised that the concept of the training system for future engineering troops specialists is interpreted at three levels. The methodological level reflects the interaction and interconnection of fundamental scientific approaches to the study of the problem, which will be applied during the research: systemic, functional, axiological, environmental, person-oriented, activity-based, integrative, competency-based, multi-subjective, and others. The theoretical level made it possible to identify leading theories, ideas, initial parameters, and definitions underlying the understanding of the process of professional training for future engineering troops specialists, the scientific description of the studied facts and phenomena, their analysis, generalisation, and synthesis, as well as to substantiate the model of the professional training system for future engineering troops specialists, the main provisions regarding the directions, content, and legal framework for the activities of educational process participants and its management. The practical level involves implementing the professional training

*system for future engineering troops specialists under martial law by developing a model of the studied process, testing and implementing a methodology for digitalising military engineering education, and determining the effectiveness of this process at various stages of its implementation. Based on the methodological, theoretical, and practical levels of understanding the conceptual foundations of professional training for future engineering troops specialists under martial law, we believe it is appropriate to consider it as a component of the overall education system of Ukraine.*

**Key words:** *cadets, concept, system, digitalisation, educational environment, future engineering troops specialists, training, educational and training process, military educational institutions.*

**Problem relevance.** Modern foreign military equipment entering the Ukrainian army's arsenal and developing technical systems based on innovations in the military require fundamental changes in the training of military engineering personnel (Ananin & Uvarkina, 2022, c. 42). The relevance of modernising the training of future engineering troops specialists is heightened by the fact that during the war, the Russian army mines objects where large and small groups of people can gather and widely uses various explosive devices. These and other circumstances require thorough training of engineering service specialists in neutralising explosive objects and operating in mine-dangerous conditions, as well as preventing the death of personnel involved in Ukraine's war against Russia.

In the context of modernising weapons (Savitska, 2022, c. 68) and means of armed combat (Buinytska, Varchenko-Trotsenko & Hrytseliak, 2020, c. 65), increasing the share of new technologies in service-combat activities under martial law, and considering the specifics of the combat use of engineering troops units and subunits (Ananin & Uvarkina, 2022, c. 43), modern engineering troops specialists must not only be ready to perform professional functions but also be well-oriented in the information space of modern society.

The need to modernise the Armed Forces of Ukraine, adopted by the military-political leadership of the state, has become a stimulus for modernising all aspects of army activities, including the military education system. Several tasks have been set before military education:

- ensure a new quality of military education, reaching the level of military-professional training that meets current and prospective requirements for military specialists, including engineering troops;
- align the network of military educational institutions with the parameters of personnel orders for training military personnel under martial law conditions. Therefore, the substantiation of the conceptual

foundations of the pedagogical system for training future engineering troops specialists for professional activities remains necessary.

**Recent publications analysis.** The study's relevance in training future engineering troops specialists under martial law conditions is confirmed by the growing number of studies dedicated to this topic. Thus, scientists consider general issues of modernising military education (O. Vasyliiev; A. Halimov, M. Maslii; Yu. Prykhodko, and others), modelling the process of forming professional competence and readiness for military-professional activities (O. Bondarenko, Ye. Bryzhatyi, Ye. Denysenko, A. Ivchenko, I. Kovalov, O. Korniienko, P. Khomenko, and others); the use of innovative technologies in military education and training of cadets and future officers (V. Volovnyk, O. Danysko, B. Lebediev, O. Maslii, O. Kornosenko, and others); studying the specific factors of military-professional training and forming professional competence of future military specialists in various fields (S. Kaplun, O. Maslii, O. Torichnyi, M. Khrupalo, A. Shevchenko, and others).

Most developed countries of the global community prioritise the democratisation and informatisation of society, which contributes to the formation of qualitatively new approaches to professional training (Vasyliiev, 2022; Zaspа, 2021). Future engineering troops specialists must be capable of practical activity in an integrated globalised environment (Kovalova, 2020; Mitiahin & Chaikovskiy, 2017). For this purpose, educational activities for professional training in the specified direction should be based on competency principles and digitalisation. The general issues of implementing changes in the educational process are reflected in the works of T. Herliand, L. Lypska, and L. Nanivska, who focused on the educational process's strategies, tools, and methodology.

Ukraine's professional military education system, its specifics, structure, and related issues are thoroughly analysed in the works of V. Martsenkivskiy, Ye. Kamalov, M. Klontsak, and P. Khomenko, V. Denysenko. Researchers analyse the history of formation and principles of the military-educational environment's conceptual development and its transformation features. In addition, researchers pay special attention to the pedagogical foundations and moral-psychological support of the educational process, justifying the need to introduce modern information and communication technologies.

**This article aims** to substantiate the concept of a system for training future specialists in engineering troops for professional activities.

**Methods of research:** theoretical analysis of scientific literature on the research problem for the selection and understanding of didactic material; critical-analytical analysis of concepts, theories and methods in order to identify ways to solve the problem under study.

**Research results.** Modernising weapons and military equipment demands the professionalism of engineering troops specialists (Shumkov, 2024). Their fighting spirit and moral business qualities must contribute to the high efficiency of performing combat tasks within the scope of their professional activity. At the same time, the execution of these tasks usually occurs under extreme conditions, involving life-threatening risks, limited time, and a high level of responsibility, which undoubtedly requires psychological resilience and high military-professional training.

The quality training of future engineering troops specialists is one of the main tasks of military education under martial law conditions. In the current conditions of martial law, future engineering troops specialists must develop in such a way that they can effectively and in a relatively short period master not only the equipment already in the arsenal of the Armed Forces of Ukraine but also that which will be acquired in the future. Therefore, the training of future engineering troops specialists must be forward-looking. The principle of continuity in learning and upbringing is essential for military education. However, the current pace of scientific and technological progress cannot be compared to before. Military educational institutions periodically update training programmes for military-engineering-oriented cadets. Currently, there is a process of rapid development and implementation of computer technology in all spheres of human activity. The development of information technology leads to the emergence of a new military education system, providing high-quality educational services to military personnel.

New information technologies facilitate the advancement towards perfection in teaching. They are used in various armies worldwide to train highly skilled specialists with the necessary competencies. Information technologies allow for a highly enriched educational process, ensuring visibility and dynamism. At the same time, special attention must be paid to software. It allows for forming professional competencies in cadets of different levels of training within the same period without enormous financial costs.

In December 2022, a new Concept for the transformation of the military education system was approved in Ukraine, reflecting the real

problems, main tasks, and prospective transformation of the structure of the military education system. According to the Concept, the formation of a unified systemic approach to military education, which synergises the activities of sectoral management bodies and professional educational institutions, considering the existing standards of professional education and the legal framework, is considered a priority. The updated system should possess multi-level characteristics and interoperability with similar formations of NATO member states. It should also provide for centralised military training, continuous professional development, modern technology implementation, and increased foreign language proficiency requirements.

Scientists emphasise that the paradigm of training military specialists plays the role of a fundamental institutional component of the state's security system, as it creates the foundation for the capabilities of the military organisation and its adaptive improvement. The works of modern scientists dedicated to innovative teaching methods, conditioned by the specifics of wartime conditions, deserve special attention. Primarily, scientists attribute global digitalisation of the educational space, the potential for implementing digital tools in the educational process of higher military education students, and the impact of full-scale war on the trends in the development of the military education sector to these methods. Despite numerous studies on individual problems of training military specialists and considerable practical experience, it should be stated that the existing knowledge system on implementing innovations in the education of future engineering troops specialists is insufficiently developed.

Innovations often arise due to attempts to solve a traditional problem in a new way, following a long process of accumulating and understanding facts. Therefore, most modern innovations are historically linked, have analogues in the past, and often constitute a long, continuous innovation process. The basis of innovative educational processes lies in two of the most critical problems of pedagogy: the problem of studying pedagogical experience and the problem of bringing the achievements of pedagogical science into practice. In studying the specifics of professional training for future officers of engineering troops, it is essential to ensure the most realistic combat conditions through computer modelling to achieve contextuality and quasi-professionalism.

At the same time, there is a lack of scientific work in domestic pedagogy that substantiates the theoretical and methodological foundations of training future engineering troops specialists under martial

law conditions and implementing measures related to the digitalisation of such training. The study of literary sources, legal acts, and other materials, as well as the analysis of practical experience in training future engineering troops specialists under martial law conditions, has revealed several contradictions in this field that hinder the solution of current problems in training military personnel of this speciality, namely between:

- the required level of readiness of future engineering troops specialists for professional activity and the existing level of their military-professional competence;

- the absence of a methodology for organising integrative practical training using modern digital technologies and the need for continuous improvement of professional training in conditions of limited time resources and rapid updates of weapon models;

- the need to introduce innovative technologies in the training process of future engineering troops specialists in special training centres and the lack of methodological developments in the researched direction;

- the existing experience of applying innovative approaches to professional training of border guards in foreign education systems and the insufficient substantiation of information technologies and means for training specialists of the State Border Guard Service of Ukraine (DPSU);

- the requirements to reduce training time, which lowers the quality of the educational process, and the pace of implementing distance learning (DL), which ensures the quality of education;

- the required and existing level of methodological training of the instructor-teaching staff in special training centres concerning the formation of military-special competence of future engineering troops specialists.

Effective formation of the readiness of future engineering troops specialists for professional activity, considering modern requirements, is possible if the mentioned contradictions are overcome based on the theoretical and methodological substantiation of the processes of forming the announced phenomenon in cadets during training in specialised training centres. Expanding the directions of research objectively necessitates a deeper study of various aspects of this process; it involves the creation of a scientifically substantiated training system for future engineering troops specialists under martial law conditions based on the implementation of information and communication technologies, the creation of a specific military-educational digital environment, which will contribute to the comprehensive formation of readiness of future

engineering troops specialists to perform professional tasks. These preconditions formed the basis for developing an innovative pedagogical system for training future engineering troops specialists.

The work's purpose, its scientific-theoretical foundations, and the complex integrative professional training of future engineering troops specialists under martial law conditions have substantiated the research's conceptual foundations at the methodological, theoretical, and practical levels.

**The methodological level** reflects the interaction and interconnection of fundamental scientific approaches to the study of the problem, which will be applied during the research, namely:

- *systemic*, which allows for the analysis of the process of professional training of future engineering troops specialists under martial law conditions from the perspective of integrity, revealing the components of the system of the mentioned process and identifying the mechanisms of their interconnections and mutual influences;

- *functional*, which contributes to the specification of the main functions of digital technologies in the process of professional training of future engineering troops specialists under martial law conditions and ensures the focus of cadets' professional training for the effective execution of these functions in specific educational conditions;

- *axiological*, which allows for the formation of value orientations in cadets necessary for maximising the effectiveness of professional actions as defenders of Ukraine;

- *acmeological*, aimed at programming the process of professional training of future engineering troops specialists under martial law conditions as an essential aspect of their personal development;

- *personal activity*, which allows cadets to take a subject position in the process of professional training under martial law conditions, understand the motives of military-professional activities, and independently plan and implement them;

- *praxeological*, which contributes to the development and testing by cadets of optimal and effective professional actions;

- *integrative*, which acts as a kind of methodological imperative, taking into account which the content, technological, and methodological components of the system of professional training of future engineering troops specialists under martial law conditions are combined;

- *competency-based*, which ensures the unity of the processes of forming military-professional competence and essential personal qualities of cadets necessary for performing actions in extreme conditions;

- *poly-subjective*, which allows the participants in the professional training process to be considered partners capable of setting and adjusting their goals to form military-professional competence of future engineering troops specialists under martial law conditions.

**The theoretical level** will make it possible to identify leading theories, ideas, initial parameters, and definitions underlying the understanding of the professional training process of future engineering troops specialists under martial law conditions, the scientific description of the studied facts and phenomena, their analysis, generalisation, and synthesis, as well as to substantiate the model of the professional training system for future engineering troops specialists under martial law conditions, the main provisions regarding the directions, content, and legal framework for the activities of educational process participants and its management.

**The practical level** involves implementing the professional training system for future engineering troops specialists under martial law conditions by developing a model of the studied process, testing and implementing a methodology for digitalising military-engineering education, and determining the effectiveness of this process at various stages of its implementation.

Based on *the methodological, theoretical, and practical levels* of understanding of the conceptual foundations of professional training for future engineering troops specialists under martial law conditions, we believe it is appropriate to consider it a component of Ukraine's overall education system.

The main *provisions of the concept* of scientific research on the professional training of future engineering troops specialists under martial law conditions are defined as follows:

1. Today, in the conditions of full-scale war, the Armed Forces of Ukraine are in a state of constant reform. This necessitates corresponding changes in the military personnel training and education system. Military education and military science, as components of state education and science, must also be prioritised, especially during martial law and the simultaneous implementation of military reform. The change in the military education system and the reform of the principles of military personnel training occur primarily under the influence of crisis conditions

(in the case of Ukraine - a full-scale war with Russia) when traditional methods of regulating these processes prove ineffective.

In martial law conditions, the significance of the quality of training military personnel who possess stable, modern knowledge, skills, and competencies in engineering support increases. The success of military operations and the life and health of military personnel depend on the quality of the professional competencies formed in engineering support. At the same time, the rapid development of digital and advanced technologies and continuous improvement of weapons and equipment increase the requirements for engineering support and, accordingly, for the professional competence of military personnel - future engineering troops specialists. Therefore, the innovative training of future engineering troops specialists should be considered a systemic set of educational processes based on the active use of advanced information and organisational-pedagogical technologies involving theoretical, practical, and pedagogical innovations.

2. The training of future engineering troops specialists should be based on the synergy of fundamental engineering training in engineering support and enhanced creative development of tactical thinking and practical skills in unit command. This will ensure a more responsive adaptation to the continuous changes and improvements in the means of armed combat in terms of content and structure. Therefore, in the field of engineering support, cadets should acquire professional competencies in the objectives and tasks of engineering measures; technical and unique means; devices, tactical and technical characteristics of engineering means; preparation of engineering weapons for combat use; safety requirements in the operation of engineering means; performing engineering calculations for service-combat activities; and working in various combat environments.

3. The implementation of new educational technologies in the training of future military engineering specialists requires considering the fact that the training of military specialists in any specialisation significantly differs from the training of civilian specialists, as it requires: comprehensive personal preparation of the cadet as a future officer (citizen, defender of Ukraine, leader, organiser, public figure, bearer of Ukrainian values and legal norms); preparing the cadet as a professional who needs to effectively perform tasks under certain complexity conditions while maintaining work efficiency and optimal working parameters in actual extreme service conditions in the Armed Forces of Ukraine (or directly performing combat tasks on the battlefield); fostering cadets capable of active participation in

integrating the Armed Forces into the economic, political, legal, and social system of society; forming moral and psychological readiness to defend Ukraine, its Constitution, and military duty.

The impact of scientific and technological progress on the educational process has necessitated replacing outdated views with new ones and introducing new teaching technologies as the volume of educational information increases and the study periods gradually shorten. This is particularly relevant in conditions of full-scale war when the training of military personnel takes, at most, three months. Therefore, it is crucial to develop innovative technologies that activate the activities of instructors and cadets and allow them to acquire the maximum volume of military-engineering knowledge, skills, and abilities in minimal training periods.

4. A necessary condition for the successful functioning of the professional training system for future engineering troops specialists is the coordinated interaction of the system-forming and structural components that ensure the achievement of defined goals and results of the professional-personal growth of specialists in this field during professional training in special training centres.

5. The professional training system for future engineering troops specialists provides unity, interdependence, and continuity of the target, content, technological, and diagnostic aspects of all structural components that form it. The components of the professional training of future engineering troops specialists under martial law conditions should ensure coordinated interaction and the performance of functions by each participant in this process to form a high level of military-professional competence of cadets.

Conducting research based on defined conceptual approaches and the main provisions of the research concept allows for characterising the professional training of future engineering troops specialists under martial law conditions as a pedagogical system, which simultaneously is a component of the higher education system. Therefore, its structure and functioning are based on a set of general pedagogical patterns and principles with inherent characteristics that determine the specificity of this process.

**Conclusion.** The concept of the training system for future engineering troops specialists integrates a set of new knowledge about the studied phenomenon and functions on three levels. The developed systematic set of knowledge as an entirety of conceptual provisions is embodied in the general research hypothesis, which is that the system of professional training for

future engineering troops specialists will be successful if it is theoretically and methodologically substantiated and implemented based on the principles of integrity, continuity, and predictiveness, considering the specifics and needs of practice according to regulatory documents that regulate the process of obtaining military education in our country.

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## АНОТАЦІЯ

**Родіков Володимир.** Концепція педагогічної системи підготовки майбутніх фахівців інженерних військ.

У статті розглянуто концепцію системи підготовки майбутніх фахівців інженерних військ до професійної діяльності. Розробка якої стала відповіддю на виклики сучасного стану військової освіти та російську збройну агресію. Процес модернізації підготовки майбутніх фахівців інженерних військ зумовлений й тим, що в умовах війни російська армія мінує об'єкти, де можливе скупчення великих і малих груп людей, широко застосовують різноманітні вибухові пристрої. Ці та інші обставини вимагають ретельної підготовки фахівців інженерної служби зі знешкодження вибухонебезпечних об'єктів та дій в умовах мінної небезпеки, а також щодо запобігання загибелі особового складу, що бере участь війні України проти Росії. Сучасні реалії диктують необхідність пошуку шляхів та засобів вдосконалення освітнього середовища підготовки майбутніх фахівців інженерних військ. Резюмовано, що концепцію системи підготовки майбутніх фахівців інженерних військ витлумачено на трьох рівнях. Методологічний рівень відображає взаємодію та взаємозв'язок фундаментальних наукових підходів до вивчення проблеми, що будуть застосовані під час дослідження, зокрема: системного, функціонального, аксіологічного, середовищного, особистісно-зорієнтованого, діяльнісного, інтегративного, компетентнісного, полісуб'єктного та ін. Теоретичний рівень дав можливість виявити провідні теорії, ідеї, вихідні параметри, дефініції, покладені в основу розуміння процесу професійної підготовки майбутніх фахівців інженерних військ, наукового опису досліджуваних фактів і явищ, їх аналізу, узагальнення та синтезу, а також обґрунтувати модель системи професійної підготовки майбутніх фахівців інженерних військ, основні положення щодо напрямів, змісту та нормативно-правових засад діяльності учасників освітнього процесу та керування ним. Практичний рівень передбачає впровадження системи професійної підготовки майбутніх фахівців інженерних військ в умовах воєнного стану шляхом розробки моделі досліджуваного процесу, апробації та впровадження методики цифровізації військово-інженерної освіти та визначення ефективності цього процесу на різних етапах його здійснення. Базуючись на методологічному, теоретичному і практичному рівнях осмислення концептуальних засад професійної підготовки майбутніх фахівців інженерних військ в умовах воєнного стану, вважаємо, що її доцільно розглядатися як компонент цілісної системи освіти України.

**Ключові слова:** курсанти, концепція, система, цифровізація, освітнє середовище, майбутні фахівці інженерних військ, підготовка, навчально-тренувальний процес, військові навчальні заклади.