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ANALYSIS OF PEDAGOGICAL STUDIES AT THE UKRAINIAN FREE UNIVERSITY IN GERMANY

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Abstract

The relevance of the study stems from the need for self-reliant educators capable of working with children and youth exhibiting varying degrees of trauma and stress, as well as the importance of examining the positive experience of training such educators at the Ukrainian Free University (Munich, Germany) for its potential implementation in Ukraine's education system.

Objective: To investigate the features of the educational design of teacher training within the master's and doctoral programs at the Ukrainian Free University (hereinafter: UFU), and to formulate recommendations for Ukrainian institutions of higher pedagogical education regarding the implementation of UFU's positive experience in fostering educators' agency.

Methods: Analysis of scientific sources on the research problem, relevant documents, and educational-methodological materials; content analysis; SWOT analysis; observation; interviews; systematization; and generalization – applied to identify the specifics of the pedagogical education structure and to develop recommendations for integrating UFU's positive practices into teacher training in Ukraine at the master's and doctoral levels.

Results: From a cultural-historical perspective, it was established that UFU is the first and only Ukrainian higher education institution abroad, one of the oldest private universities in Germany, meeting German university standards for integrating research with education and engaging students in scientific activities. It adheres to Western university education principles, with the specifics of its pedagogical studies shaped by their historical establishment and development. From an informational-content perspective, the educational and scientific components of pedagogical studies were analyzed, along with the research-informational and educational-methodological support for master's and doctoral courses in pedagogy, and the role of the library and archive in enhancing the educational environment. From a subject-process perspective, the properties of the teacher training process were examined, including a content analysis of its key features and a SWOT analysis of teacher training in the context of digitalization.

Conclusions: The Ukrainian Free University is a unique educational institution that combines Ukrainian pedagogical traditions with European standards. Its historical trajectory underscores the importance of preserving academic freedom and national identity in emigration contexts, while its prominent figures laid the foundation for pedagogical studies oriented toward humanistic values and the formation of a Ukrainian educational ideal. UFU's uniqueness is characterized by its preservation of pedagogical traditions and support for innovations by contemporary educators, creating a space for transformational pedagogy; its focus on inclusive education and psychological-pedagogical support for working with children who have experienced trauma, particularly in wartime conditions; the provision of additional specializations; and its

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multicultural approach. The results of the research project under the DAAD program "Analysis of Pedagogical Studies at the Ukrainian Free University" demonstrate the development of self-reliant educators capable of supporting national identity, critical thinking, introducing innovative approaches, and working in multicultural environments. This underscores the significance of UFU's experience for advancing Ukrainian pedagogy amid global challenges and European integration, as reflected in the formulated recommendations.

Keywords: *Ukrainian Free University, pedagogical studies, transformational pedagogy, positive experience, development of educator agency.*

Introduction. In the context of war, the role of the Ukrainian pedagogical community, which ensures the socialization and upbringing of children and youth, becomes critically important for societal development. Particular attention is required for fostering the agency of educators in general secondary education institutions. According to data from the Ministry of Education and Science of Ukraine, at the onset of the war in the first half of 2022, over 670,000 students and 25,000 teachers left Ukraine (Kabanets, 2022). Consequently, the task emerged of collaborating with the governments of various countries and ensuring the inclusion of a Ukrainian studies component. Ukrainian experts have identified the need for self-reliant teachers capable of working with children exhibiting varying degrees of trauma and stress.

The laws of Ukraine "On Education" (2017), "On Higher Education" (2014), and the "Conceptual Foundations of Pedagogical Education in Ukraine and Its Integration into the European Educational Space" (2004) outline the requirements for the quality of training future teachers. The Strategy for the Development of Higher Education in Ukraine for 2022–2032, aimed at achieving the strategic goal of "Internationalization of Ukrainian Higher Education," includes operational objectives such as the adoption of the best foreign educational practices in Ukraine, increasing the number of international educational and scientific collaboration projects, and integrating scientific and academic staff into the global scientific community (Strategy for the Development of Higher Education in Ukraine for 2022–2032, 2022). Thus, studying the experience of teacher training in universities across European Union countries is a priority for the successful integration into the European educational space and the fulfillment of Ukraine's national objectives.

In this regard, the study and implementation of positive practices in teacher training at the Ukrainian Free University (hereinafter: UFU; Munich, Germany) are relevant both for Ukraine and for other countries currently providing assistance to its citizens. The university has long established itself as an innovative hub of Ukrainian education abroad, offering educational programs that blend Ukrainian traditions with European educational standards. Its unique experience merits attention, particularly in the context of its active engagement at the intersection of two cultures and its provision of opportunities for high-quality pedagogical education that considers global trends, the specifics of Ukrainian culture, and the needs of the diaspora.

Sources. The theoretical and methodological aspects of the Western system of pedagogical education have been explored by N. Avshenyuk, L. Zyazyun, N. Nychkalo, L. Pukhovska, S. Kohut, O. Lokshyna, and others. Studies on foreign experiences in teacher training have been presented in the works of V. Bauer, N. Zhuravska, Ye. Neroba, O. Ohienko, T. Osadcha, and others. The preparation of educators in Germany has been the focus of research by N. Abashkina, O. Haiduk, L. Diachenko, N. Kish, L. Pasichnyk, O. Melnyk, O. Pryshliak, and others. The foundation for scientific inquiries into the training of future teachers in Germany is provided by the works of German researchers whose scientific investigations center on this topic, including H. Altrichter, S. Blömeke, F. Weinert, M. Winter, H. Hentig, W. Klafki, R. Messner, S. Robinsohn, A. Nolle, and E. Terhart. Aspects of the development and activities of UFU have been elucidated in publications by I. Mirchuk, A. Kokosh, M. Pryshliak, L. Rudnytskyi, T. Sydorchuk-Potulnytska, M. Shafoval, and others.

Purpose of the Article. The article aims to investigate the features of the educational design of teacher training within the master's and doctoral programs at the UFU, and to formulate recommendations for Ukrainian higher pedagogical

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education institutions regarding the implementation of positive experiences from the UFU in fostering educators' agency.

Methods. The study underlying this article employed methods such as analysis of scientific sources related to the research problem, examination of relevant documents and educational-methodological materials, content analysis, SWOT analysis, observation, interviewing, systematization, and generalization. These methods were used to identify the specific characteristics of the structure of pedagogical education and to formulate recommendations for integrating the UFU's positive practices into the training of educators in Ukraine at the master's and doctoral levels.

Results and Discussion. The research project titled "Analysis of Pedagogical Studies at the UFU in Germany," conducted under the DAAD program "Future of Ukraine: Research Grants for Ukrainian Master's Students and Researchers," consisted of three stages: preparatory, main, and concluding. During the preparatory stage (December 2024 – January 2025), scientific studies on pedagogical education in Germany were analyzed with a focus on key trends in teacher training. The main stage was implemented at the UFU (Munich, Germany) over a one-month period from January 29, 2025, to February 28, 2025. During this time at the UFU, the educational programs for master's and doctoral degrees in pedagogy, along with their components (academic disciplines), were analyzed. The relevant scientific-informational and educational-methodological resources were examined, in-depth interviews were conducted with university leadership, structural unit representatives, faculty, and students, and the role of the university library as an entity in designing the educational environment for teacher training was investigated. Archival materials and publications concerning the establishment and development of pedagogical studies at the UFU were also analyzed. At the concluding stage (March 2025 – April 2025), recommendations were formulated for incorporating the UFU's positive practices into teacher training in Ukraine at the master's and doctoral levels, and an article and project report were prepared. In accordance with the project's goals and objectives, its implementation at the UFU can be viewed through several perspectives: cultural-historical (the establishment and development of pedagogical studies, the influence of prominent faculty figures), informational-content (educational and academic programs, scientific-informational and educational-methodological resources), and subject-processual (classroom observations, in-depth interviews).

During the preparatory stage, attention was focused on the fact that modern approaches to the development of pedagogical education in Germany hold significant importance for reforming this field in Ukraine, necessitating an analysis of the German experience. The authors of the monograph *Competency-Based Approach to Teacher Training in Foreign Countries: Theory and Practice* emphasize that one of the leading trends in the development of pedagogical education in Germany is the active introduction and implementation of a competency-based model for teacher preparation (Avshenyuk et al., 2014). Among the promising directions for the development of pedagogical education in Germany within the context of creating a European Higher Education Area, N. Kish highlights the trend of incorporating a European dimension into the content of teachers' professional training (Kish, 2016).

During the main phase of the study, while working in the library and archive of the UFU, it was established that, from a historical perspective, this institution is one of the oldest private universities in Germany. Investigating its history, L. Rudnytsky (2011, pp. 88-106) convincingly demonstrates that UFU meets the requirements for German universities in terms of integrating academic research with education, involving students in scholarly activities, and adhering to the principles of Western university education, including scientific rigor, responsibility, independence, honesty and integrity, tolerance, the popularization of scientific knowledge, and collaboration. At the same time, it remains faithful to the ideals of its founders and the principle of academic freedom, functioning as "a university that serves Ukraine and is open to the world."

UFU is the first and only Ukrainian institution of higher education abroad, and in 2026, it will celebrate its 105th anniversary. The university's founders, including D. Antonovych, O. Kolessa, I. Horbachevsky, M. Hrushevsky, S. Dnistryansky, S. Rudnytsky, and others, realized a unique vision in the global history of academic institutions: establishing a higher education institution with the right to award

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doctoral degrees and habilitation outside its homeland and without its support. This was done to preserve the spirit of academic freedom, ensure objective truth in the humanities, and represent the Ukrainian nation. Based on the three European cities associated with the institution's activities, its development is divided into three periods: the Vienna Period – from 1920 to September 1921; the Prague Period – from October 1921 to mid-May 1945; and the Munich Period – from autumn 1945 to the present (Shafoval, 2011, pp. 1-2, 7-9).

An analysis of UFU's lecture programs in Prague (1922–1942) revealed that psychological disciplines appeared in the curriculum of the historical-philological section of the Faculty of Philosophy in 1930 ("Psychology," 1930–1931; "Fundamental Problems of Psychology," 1936–1937), while pedagogical disciplines emerged in 1935 ("Fundamental Problems of Pedagogy," summer semester of 1935; "Foundations of Pedagogy," 1937–1938). These courses were authored by Professor Ivan Mirchuk and were taught for 3 hours per week, though they were not included in the curriculum every academic year but rather appeared periodically. In 1939, pedagogy was distinguished as a separate block, developed by Professor Avgustin Voloshyn. This block consisted of two disciplines: "Pedagogical Methodology" (3 hours per week) and "Practical Exercises" (2 hours per week). By the 1942–1943 academic year, the course titles had changed to "Pedagogy. Pedagogical Ethics" and "School Administration." During this period, psychology was also separated into a distinct block comprising two disciplines ("Introduction to Characterology" and "Psychological Seminar"), developed by Associate Professor O. Ivanov (UFU Archive, Munich, Germany).

The figures of I. Mirchuk and A. Voloshyn merit particular attention. In 1921, I. Mirchuk became an associate professor at the UFU in Vienna, and from 1925, he served as a professor, teaching philosophy, ethics, psychology, and pedagogy. After World War II, in 1946, I. Mirchuk played an active role in reviving UFU's activities in Munich, where he served as rector during various periods. He advocated for the development of a national pedagogy that would account for the specifics of the Ukrainian mentality and history. His pedagogical approach significantly influenced the education of a new generation of intellectuals capable of advancing the Ukrainian nation in exile and on the international stage (Kokosh, pp. 139–154).

A. Voloshyn, the last rector of UFU in Prague, met a tragic end on July 19, 1945, in prison, a victim of Stalinist repression. As noted by T. Bednarzova in the article "Avgustin Voloshyn – The Last Rector of UFU in Prague" (1998), he was a prominent figure in the state-building efforts of Carpathian Ukraine (1938–1939), opposing Magyar-Russification policies and advocating for Ukrainian as the language of instruction in educational institutions. As a professor at UFU, A. Voloshyn taught psychology, logic, and pedagogical disciplines. His seminal pedagogical work, *Methodology of Teaching* (Voloshyn, 1943), remains relevant to this day for fostering pedagogical thought and teacher creativity.

The archive also provided insight into lecture programs from the early Munich Period. Specifically, in the 1946–1947 academic year, the pedagogical block included the disciplines "Teaching Methods" (2 hours per week) and "Practice" (1 hour per week), authored and taught by Professor H. Vashchenko (UFU Archive, Munich, Germany).

Archival materials from the collection of H. Vashchenko, a prominent Ukrainian educator who played a significant role in the development of the pedagogical discipline at the UFU in Munich, have been studied. The archive contains the manuscript of a seminal article for Ukrainian pedagogy titled "The Traditional Ukrainian Ideal of a Human Being," which begins with words that still demand profound reflection: "The foundation of pedagogical work, as its goal, rests upon the ideal of a human being accepted by the pedagogical system employed by a given nation. Due to harsh historical circumstances, the Ukrainian people currently lack their own clearly developed pedagogical system and, consequently, a clearly defined ideal of upbringing. The construction of such a system and the formulation of the human ideal as the goal of upbringing constitute the most critical tasks of contemporary pedagogy" (Vashchenko, 1957). The archival materials of H. Vashchenko also include manuscripts of articles such as "Bolshevik Distortions of Western Pedagogues' Ideas in the Field of Didactics" (in Ukrainian and

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German), "Psychology in the Soviet Union" (in German), newspaper articles "Notes on Aesthetics," "Socialism and Individualism in the Light of Christianity," "The Third Generation (Grandchildren)," and "Psychology in the Soviet Union" (in German), as well as the manuscript of the work "On the History of Spiritual Education in Pre-Revolutionary Russia" (UFU Archive, Munich, Germany).

Evidence of the focus on educational activities at UFU is provided by an analysis of the minutes of the meetings of the Professorial Council of the Philosophical Faculty of UFU. For instance, Minute No. 18 from July 10, 1948, highlights the need to strengthen the educational aspect of the learning process in the spirit of Christianity and national statehood (Minute No. 18, July 10, 1948, UFU Archive, Munich, Germany).

In the context of the development of pedagogical studies, documents from 1947–1948 – when the University continued its operations in Munich after World War II – were examined. These include the Statute (1947), Study Regulations of the Philosophical Faculty (1947), Study Regulations of the Faculty of Law and Socio-Economic Sciences (1948), and requirements for the ordination of associate professors and habilitation (1948). The adoption of these documents was driven by the need to regulate the educational process, which was a prerequisite for obtaining a decree from the Bavarian Ministry of Education and Religion recognizing UFU's activities, an event that occurred in 1950 (Kokosh, p. 100).

In A. Kokosh's publication "Institutional Formation of the UFU in Bavaria (1945–1950)," information is systematized regarding the establishment of the Department of Philosophy and Pedagogy within the Philosophical Faculty at the outset of the Munich period, during which the Chair of Pedagogy and Didactics began functioning. The author notes that students could earn a Master's degree in Philosophy, specializing in pedagogy and psychology, by successfully passing exams in Group A subjects (general), covering fundamental issues of philosophical sciences, general and pedagogical psychology, the history of world and Ukrainian pedagogy, and five Group B subjects (specific), namely pedagogical theory, didactics, school hygiene and school studies, methods of selected subjects, preschool pedagogy and methods, and extracurricular education. Additionally, they were required to attend two semesters of a pedagogical pro-seminar, three semesters of a pedagogical seminar, and complete a six-month school internship (8 hours per week) in their primary and supplementary disciplines. For students choosing pedagogy as a minor specialization, all subjects except fundamental issues of philosophical sciences, didactics, school hygiene, and school studies were mandatory, along with two semesters of a pedagogical pro-seminar (Kokosh, pp. 103–108).

Thus, the findings from work in the UFU library and archive affirm that the historical context is crucial for understanding the specifics of pedagogical studies at UFU. The development of pedagogy at the University has occurred and continues to occur within a cultural-educational environment shaped by progressive ideas: a general tradition of resisting dogmatism, intolerance, and restrictions on academic freedom, as well as the scholarly contributions of the faculty, such as O. Kolessa's methodology of folk studies, H. Vashchenko's justification of the Ukrainian people's educational ideal, A. Voloshyn's principles of Ukrainian school studies, I. Mirchuk's concepts of national pedagogy, V. Yaniv's establishment of the Pedagogical Institute, and B. Yerzhabkova's research in social pedagogy, among others.

The University's name is key to understanding both its free spirit and its sense of being a "territory of freedom," as well as the opportunities for autodidacticism – that is, the faculty's authorship in shaping the content, methods, forms, and technologies of education, and the proactive engagement of students in selecting courses, assignments, and implementing projects. Today, UFU students can pursue studies in 13 specialties, among which pedagogy remains one of the most popular.

The objective of the master's program is to provide students with the opportunity to deepen their knowledge in their chosen disciplines and to explore various issues within historical and contemporary contexts. The priority focus is on Ukraine in Europe, examining Ukrainian science, education, language, culture, literature, society, law, and economy in this light. Within the framework of the master's program, students can also obtain qualifications in specialized fields of knowledge, such as interdisciplinary programs in Ukrainian studies and international

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relations, including German-Ukrainian or Ukrainian-German relations within a broader European context.

Admission requirements for the program include possession of a bachelor's degree or an equivalent diploma from an accredited higher education institution; proficiency in the Ukrainian language sufficient for writing essays, understanding texts, lectures, questions, and discussions; knowledge of German or English at least at the level of text comprehension, though comprehension of lectures is desirable; two recommendation letters from the applicant's previous educational institution, with the option to include additional recommendation letters from an employer; and a motivation essay in which the applicant explains why they chose UFU, their long-term plans, what they intend to study, how studying at UFU will help them achieve their goals, what research they have completed, and what practical knowledge they have acquired thus far.

The requirements of the master's program (120 credits) for students with a four-year bachelor's degree (240 credits) typically entail six semesters of study (17 courses with additional requirements), culminating in a master's thesis and a final examination. In line with the Bologna Process, master's students follow a modular system of study units, which may consist of relevant and related courses and disciplines. For instance, students at the Faculty of Philosophy may choose pedagogy as a core module or as an additional one. Master's students select their modular courses independently, except for the mandatory introductory course in methodology. They must earn 60% of their total credit points in their "core module," with each module carrying 4 credits.

According to the regulations, instructors are required to inform master's students at the first lecture about the course requirements: mandatory literature; the scope and deadlines for essays; the format of oral seminar presentations; the type of exams (oral or written) and their timing (which must occur after the completion of all coursework). Oral exams at UFU last 15-30 minutes, while written exams last 45-60 minutes. It is noted that exams may be substituted with other assessment tools, and final essays and exams may not account for more than 40% of the course grade.

Students in the program fulfill additional program requirements, such as completing an individual project, an internship, or an additional course. The regulations of the master's program emphasize individualized learning, enabling students to independently prepare for academic work and deepen their knowledge in a specific field of study, though this is not mandatory. Master's students wishing to conduct independent research select their own topics. They are permitted a maximum of two individual courses and are encouraged to choose research topics aligned with their "core module" (primary discipline) or "additional module" (supplementary discipline).

Thus, the substantive components of the master's program include the course "Methodology of Academic Writing" (4 credits); 16 advanced courses (10 in the primary specialization, 4 in the supplementary specialization, 2 elective courses, and 1 course or internship, totaling 64 credits); the master's thesis (30 credits); and the defense and final examination (20 credits). Master's students may opt for two independent research projects in place of a proseminar or seminar course. Assessment is conducted according to the European Credit Transfer System (ECTS).

In terms of upholding academic integrity standards, it is emphasized that cheating during exams results in a failing grade (F) for the exam; a second instance of cheating leads to expulsion from the university; plagiarism or the use of unauthorized aids during essay writing or presentation preparation results in a failing grade (F) for those assignments. A second violation of the rules results in a failing grade (F) for the entire course. A repeated instance of plagiarism leads to expulsion from the university, while purchasing or verbatim copying of essays from the internet or other accessible sources results in immediate expulsion.

The master's program involves the defense of a master's thesis and the completion of a final master's examination, which concludes all ongoing exams and assessments. The master's thesis must demonstrate in-depth academic research on a chosen topic and consolidate the theoretical knowledge acquired during the program. Completing the thesis serves as evidence of the student's ability to select and analyze a scientific or practical problem, draw conclusions and generalizations, or substantiate specific recommendations of a theoretical or practical nature. The regulations stipulate that each master's thesis must contain at least a minor element of originality. Master's students may write their theses in Ukrainian, English, or German, with a summary required in Ukrainian (the chosen language must be one in which the thesis advisor, reviewers, and examiners are proficient).

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Regarding the thesis preparation process, the following key aspects are outlined:

• The master's student submits the thesis topic for approval only after earning 50% of the required credit points;

• The student independently selects a thesis advisor and topic, then completes and obtains approval for the "Master's Project Form" from the advisor and a representative of the Academic Degree Committee (the dean or deputy dean);

• The thesis must be completed within one semester, or two at most;

• The thesis typically ranges from 60 to 100 pages;

• The student must submit the final version of the thesis electronically to the dean or deputy dean for plagiarism checks, then to the advisor for review, and sign a declaration confirming that the thesis was written independently, using only the cited resources, and has not been submitted to another examination board or institution or previously published. Submission of false declarations results in the thesis being disqualified and the student's expulsion from the university.

The evaluation of a master's thesis is conducted by the academic supervisor, who confirms that the thesis is ready for further review. Following this, the dean or their deputy appoints a second reviewer. A period of six weeks is allocated for the evaluation of the thesis. In cases where the evaluations are highly divergent and one of them is unsatisfactory, the dean, as a representative of the Commission, or their deputy, appoints a third expert reviewer. Reviewers may include professors of the UFU, associate professors, emeritus professors (senior professors who continue their academic work), honorary professors, and lecturers holding a doctoral degree or a Candidate of Sciences degree. The regulations stipulate that, in exceptional cases, a professor, associate professor, or lecturer from another higher education institution may be appointed as a reviewer, provided the thesis topic aligns with their professional and academic qualifications and they have at least three years of teaching experience. If the final evaluation of the master's thesis is "unsatisfactory," the master's student is entitled to write a new thesis on a different topic. Failure to pass the master's thesis a second time results in expulsion from the master's program.

The thesis defense lasts 30 minutes and includes a concise and clear statement by the student of the research problem, justification of its relevance, definition of the thesis objectives, methods for achieving them, and presentation of conclusions, recommendations, and the novelty of the work. The student is required to answer the examiners' questions regarding the thesis, provide additional clarifications, and respond to the reviewers' critical remarks.

The content of the final master's examination pertains to the disciplines of the "core module" and the "supplementary module." The examination may be written or oral. Written exams take place prior to the thesis defense. The oral examination occurs immediately after the defense and is conducted by two examiners, one of whom is typically the academic supervisor; the dean or their deputy records the proceedings of the exam.

The overall grade for the master's examination is calculated as the sum of all grades received for the modular course exams (i.e., courses with four credit points), independent research, and the results of the master's examination and thesis.

The regulations for master's studies outline cases in which an examination may be declared invalid if the student deliberately engages in deceit, including falsification of documents or exam results, use of unauthorized aids during the exam, or plagiarism in the master's thesis. In such instances, the Commission has full authority to declare the exam failed. As a consequence, any prior certification of the exam is annulled, and the student is stripped of their diploma.

It is worth noting that certain provisions regarding the training of master's students at UFU are also applicable to doctoral students. This includes requirements for recommendation letters and the language of instruction for admission, opportunities for independent selection of core and supplementary specializations, research topics, and supervisors, the procedure for appointing reviewers, and the promotion of academic integrity policies. Further attention will be focused on the key features of doctoral studies at UFU.

The Doctoral Studies Regulations (Ukrainian Free University, 2024c) consist of the following sections: "Introductory Note"; "Academic Degrees"; "Commission for the Awarding of Academic Degrees"; "Admission Requirements for Doctoral Programs"; "Doctoral Program Requirements";

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"Dissertation"; "Dissertation Supervisors"; "Conditions for Admission to Promotion"; "Admission to Promotion"; "Reviewers and Examiners"; "Dissertation Evaluation"; "Dissertation Reviews"; "Third Reviewer and Overall Dissertation Grade"; "Oral Examination (Rigorosum or Defense)"; "Absence, Refusal, Deception, Breach of Procedure"; "Final Examination Result"; "Retaking the Examination"; "Submission of Required Dissertation Copies"; "Doctoral Diploma and Use of the Academic Degree"; "Non-Completion of Promotion and Revocation of the Academic Degree"; "Awarding of Honorary Degrees Dr.phil.h.c. and Dr.Oec.pol.h.c."; "Effective Date of Transitional Provisions." The academic component of training for Doctors of Philosophy, as outlined in the Doctoral Studies Regulations, is also governed by the "Procedure for Awarding a Doctoral Degree" (https://ufu-muenchen.de/program/pedahohika/).

At the Faculty of Philosophy, where a pedagogical specialization is obtained, UFU awards the degree of Doctor of Philosophy (Doctor philosophiae or Dr. phil. UFU). The regulations emphasize that the doctoral degree is both an educational and academic degree of the third level of higher education, building on a master's degree or a Candidate of Sciences degree. The doctoral degree signifies that the doctoral candidate has mastered a specific field of knowledge, thoroughly studied the topic or subject of their specialization, opened a new field of research, conducted an analysis, and provided an innovative interpretation or novel solutions to significant issues within their area of specialization.

It should be noted that eligibility for admission to the doctoral program is granted to individuals who have obtained a master's degree from the UFU, a German university, or a foreign university recognized in Germany, or a Candidate of Sciences degree from a recognized university in Ukraine; can demonstrate a high level of academic performance in their prior studies (80% or higher); and have received a high evaluation for their thesis and its defense (80% or higher).

The UFU doctoral program entails three years of study and includes the following components: coursework; doctoral research (dissertation); an examination in philosophy (for the Faculty of Philosophy and the Faculty of Ukrainian Studies); and an oral doctoral examination (defense or rigorosum). Doctoral students are required to complete a mandatory course in methodology, seven advanced courses in their primary specialization, and two courses in a supplementary specialization.

A doctoral candidate may begin preparing their dissertation project after successfully completing 60% of the coursework requirements of the doctoral program.

The doctoral candidate submits to the dean, as the representative of the Chair of the Commission, the topic of the doctoral dissertation and a dissertation project for approval. This project must include a hypothesis, an explanation of the significance and relevance of the dissertation topic, its novelty, the structure of the work, and a list of sources and bibliography.

During the writing of the dissertation, the doctoral candidate must demonstrate the ability to conduct independent scientific research, analyze material, delve deeply into their chosen topic, and present the novelty of their dissertation. The dissertation must be an original work that the doctoral candidate has neither previously published nor defended. It is desirable for the dissertation to have a comparative character. A scientific work lacking a significant element of novelty and analysis will be rejected. The dissertation must comprise at least 150 pages of main text.

Prerequisites for admission to the doctoral promotion include: completion of the coursework requirements of the doctoral program with grades in the candidate's primary specialization of at least "very good" / "B" (1.5 or better); study at the UFU for a minimum of three semesters, each involving the completion of three courses; selection of a dissertation topic aligned with the candidate's specialization; certification that the doctoral candidate is worthy of holding a doctoral degree and has not taken a doctoral examination at another institution of higher education.

For admission to the promotion, the doctoral candidate submits to the dean, as the representative of the Chair of the Commission, the dissertation text in electronic form for plagiarism checks; a review from the academic supervisor; a personally signed statement affirming that the work was completed independently and without external assistance; that all direct and indirect quotations or borrowings from additional

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materials and scientific works used during the dissertation writing are accurately and properly cited; confirmation that the candidate has not previously attempted to obtain a doctoral degree and that the submitted dissertation is an original work not defended at another institution of higher education; and a statement regarding the choice between a rigorosum examination or dissertation defense.

The evaluation of the dissertation's quality involves two reviewers, each of whom provides a separate review justifying the acceptance or rejection of the work. If the dissertation is accepted for consideration, it is evaluated according to the following grading system: *summa cum laude* ("excellent"), 0.5; *magna cum laude* ("very good"), 1; *cum laude* ("good"), 2; *rite* ("satisfactory"), 3. This grading system also applies to the evaluation of the rigorosum or defense.

The regulations stipulate that professors and associate professors of faculties with the right to conduct examinations should be given the opportunity to review the dissertation and the reviewers' reports. They are notified in advance of the start date for reviewing the work and reports, as well as the option to submit a written opinion.

If the doctoral candidate opts for a rigorosum, the dean, as the representative of the Chair of the Commission, invites the candidate in writing to the examination and informs them of the examiners. The candidate's preferences regarding examiners are taken into account but are not binding. Each of the two parts of the rigorosum is conducted by different examiners. Each examiner appoints a co-examiner from their specialization, who must be at least an associate professor or a defended research fellow. The rigorosum in the primary specialization lasts approximately 75 minutes, while the additional discipline and the history of philosophical doctrines each last 45 minutes. During the rigorosum, auditors, master's students, and doctoral candidates may be present. The final result consists of three equally weighted grades, which together form the overall rigorosum assessment.

If the doctoral candidate chooses a dissertation defense, it typically lasts 90–120 minutes and is public. The candidate presents the main theses of their work in a 15–20-minute report, followed by a discussion and consideration of substantive questions methodologically related to the dissertation topic. The dean, as the representative of the Chair of the Commission, appoints a defense committee, which includes the supervisor, reviewers, and 2–3 other experts, among them specialists representing the primary and additional specializations of the promotion. The committee members must agree on a joint evaluation; if no consensus is reached, the overall result is determined based on the grades proposed by all committee members.

The promotion is successfully completed if the dissertation is accepted for consideration and the doctoral candidate receives at least a "satisfactory" (*rite*) grade for the defense or each rigorosum subject. The overall examination result is determined by a grade that combines the individual assessments for the dissertation and the oral examination, following this grading scale: up to 0.6 – *summa cum laude* ("excellent"); 0.61 to 1.50 – *magna cum laude* ("very good"); 1.51 to 2.50 – *cum laude* ("satisfactory"); 2.51 to 3.15 – *rite* ("satisfactory").

Regulatory documents allow for the dissertation to be published in a periodical, as a monograph, or in electronic form, with the mandatory indication that it was defended at the UFU in Munich. The revised version of the work, incorporating feedback from the supervisor and reviewers, must be approved by them prior to publication.

Broadly speaking, regarding its content, the structure of pedagogical studies includes the following courses:

• A mandatory course, "Methodology of Writing Academic Papers";

• Profile-specific elective courses (10 courses for master's students, 7 advanced profile courses for doctoral students), offered within the program ("Philosophy of Education," "Features of the Development of Pedagogical Theories and Education in European Countries," "Comparative Pedagogy," "Strategies for Reforming General Secondary Education in Germany and Ukraine in the Second Half of the 20th Century – Early 21st Century (Comparative Context)," "Integration of Young Migrants and Refugees in German Educational Institutions: Challenges for Pedagogy," "Social Pedagogy and Social Work in Germany," "Inclusive Education," "Pedagogical Conflicts: Causes, Behavioral Strategies, and Resolution," "School Didactics," "Pedagogical

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Technologies," "Science of Learning: How to Teach Children and Learn Yourself?");

• Elective courses from other disciplines chosen by students (2 courses for master's students);

• Courses in an additional specialization (4 courses for master's students, 2 courses for doctoral students). Students select an additional specialization from the following options: "Psychology," "History," "Ukrainian Language and Literature," "Art Studies," "Comparative Cultural Studies," "Philosophy";

• Additional program requirements for master's students (writing an individual project, completing an internship, or selecting 1 additional course).

An analysis of the academic, informational, and methodological support for the courses in master's and doctoral pedagogy programs at the UFU indicates an international context, with literature available in Ukrainian, English, and German. It also reflects consideration of students' opportunities to independently search for useful and engaging publications, as well as a division of sources into mandatory and elective, similar to Ukrainian disciplinary programs. The recommended reading lists for psycho-pedagogical disciplines feature the scholarly contributions of researchers from the National Academy of Pedagogical Sciences of Ukraine, including V. Kremen, O. Liashenko, O. Lokshyna, S. Maksymenko, N. Nychkalo, S. Sysoieva, M. Sliusarevskyi, and others.

For instance, the source list for the course "Pedagogical Comparative Studies" (authored by T. Havrylenko) includes the scientific-analytical report by V. Kremen, O. Liashenko, and O. Lokshyna titled *General Secondary Education in Ukraine in the Context of Education in European Countries: Duration and Structure* (2020), the textbook by S. Sysoieva and T. Krystopchuk *Educational Systems of European Union Countries: General Characteristics* (2012), the article by S. Sysoieva "Global Research Infrastructure of Comparative Pedagogy" (2019), and monographs co-authored by O. Lokshyna, such as *Trends in School Education Development in EU Countries, the USA, and China* (2021) and *Transformational Processes in School Education in European Union Countries and the USA* (2018), among others. The study of the course "Adult Education" (authored by T. Havrylenko) involves referencing the monograph by N. Nychkalo and I. Prokopenko *Adult Education: Global Trends, Ukrainian Realities, and Prospects* (2020). The curriculum for the course "Fundamentals of General Psychology" (authored by O. Kuzio and L. Didkovska) includes the textbook *General Psychology* edited by S. Maksymenko (2004), while the course "Psychology of Migration (Emigration)" (authored by A. Didkovskyi) features the textbook *Psychology of Migration* by M. Sliusarevskyi and O. Blynova (2013).

The design of course curricula, annotations, and syllabi is characterized by authorial approaches: instructors adhere to general requirements regarding the need to present the relevance, objectives, tasks, learning outcomes, topics, independent student work, assessment methods, and grading policies, while there are no rigid templates dictating format, scope, or sequence of information presentation. Faculty members who simultaneously teach at Ukrainian higher education institutions (e.g., Professors T. Havrylenko, S. Kohut, D. Shulzhenko) introduce contemporary Ukrainian approaches to content presentation at UFU.

Key components of UFU's human-centered educational environment, which includes teacher training, are its library and archive. The main library collection contains over 600 pedagogical publications, while the archive holds approximately 200, many of which were published in Ukraine. L. Rudnytskyi (2011) notes that this is a true treasure trove for scholars interested in Ukrainian émigré life in Europe during the 20th century, particularly German-Ukrainian relations. Daily updates of relevant information and announcements are prepared for faculty and students worldwide. It is worth noting that, in line with modern educational demands, UFU's electronic library is undergoing significant development (Ukrainian Free University, n.d.).

The archive preserves dissertations and master's theses, including those in pedagogy, defended at UFU since 1946 (UFU Archive, Munich, Germany). An analysis of dissertation topics reveals the development of philosophical-educational, historical-pedagogical, comparative-pedagogical, and psycho-pedagogical discourses, such as *The School of the Future* (O. Oryshkevych, 1948), *Behaviorism and Its Critique* (I. Fizer, 1949), *Critical Analysis of the Foundations of the Soviet Educational-Upbringing*

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System (K. Kokhno, 1950), *Psychology and Pedagogy of Inner Balance* (P. Barvinov, 1950), *Ushynsky as a Pedagogue* (H. Zub, 1954), *Experiments in Family Upbringing in the USSR* (V. Kalynnyk, 1961), *Philosophy of Education in American Culture* (Ch. Sobolevskyi, 1962), *Teaching Slavic Languages (Ukrainian, Russian, and Polish) in American Schools* (A. Samofal, 1968), *Comparison of Foreign Language Teaching Methods in the USA and the Soviet Union After World War II* (D. Polutnyk, 1972), *Comparison of Russian Language Teaching Methodology in the USA and Ukrainian Language Teaching in Canada* (M. Smit, 1972), and *The Influence of Schopenhauer on Pedagogical Trends* (A. Zhyvotenko-Piachkov, 1985).

The subject-process perspective of the study focuses on examining approaches to the educational process, its characteristics, the interaction of participants, as well as the forms, methods, and technologies of teacher training. To this end, an analysis of reporting documentation was conducted (specifically, rector's reports for the academic years 2019–2020, 2020–2021, autumn 2022–2023, and the 2022–2023 academic year), teaching experiences were studied through classroom observations, and in-depth interviews were held with participants of the educational process.

According to the reporting data from 2019 to 2023, there was a significant increase in the number of students, by 43.1%, attributed to an effective informational campaign. Quarantine restrictions, prompted by the global pandemic that began in 2020, necessitated a shift to remote learning, as was the case in educational institutions across Ukraine. Under these conditions, a substantial effort was made to reformat the educational process without interruptions, maintaining the full scope of courses, exams, and defenses. Initially, ZOOM was employed as the simplest platform, followed by a transition to Microsoft Teams, a more professional tool designed specifically for online teaching. At UFU, training sessions and methodological seminars were introduced for instructors to master Teams, prepare materials for remote courses, monitor and evaluate student work, and organize online discussions. UFU staff also conducted individual training sessions for students. During this period, under the leadership of the Head of the Pedagogy Department, S. Kohut, the curricula of pedagogy disciplines were updated (see Table 1).

Being at UFU provided an opportunity to directly engage in the educational process, including attending Professor L. Didkovska's lecture "Theoretical Models and Empirical Studies of Post-Traumatic Stress Disorder (PTSD)" (4 hours) from the course "Psychological Assistance – Post-Traumatic Stress Disorders," Professor S. Kohut's lecture "Assessment of Learning Achievements" (4 hours) from the course "Active Learning Methods," and participating extensively in P. Hiltes's seminar classes from the course "Teaching and Upbringing Styles in the Modern School: Challenges Not Only for Didactics" (20 hours).

Participation in the learning process allows for the observation that the engagement of students – both those attending in person and online – is exceptionally high. The interaction between instructors and students can be characterized by key terms such as "friendliness," "mutual respect," "subjectivity," "dialogue," "personality-developmental space," "practice-oriented approach," "free and relaxed atmosphere," "interactive engagement," and "teamwork." Overall, the learning process is predominantly exploratory in nature, with instructors emphasizing the practical application of information, drawing on students' experiences, providing relevant examples, posing thought-provoking questions, encouraging discussions, and guiding them tolerantly toward critical thinking, conclusions, and generalizations. At the same time, it should be noted that each class is unique and distinctive, a result of the instructor's authorship and proactivity, as well as the group synergy with students.

A key advantage of being at UFU was the opportunity to apply the method of interviewing participants in the educational process. In-depth interviews regarding teacher training at UFU were semi-standardized, allowing for a consistent structure to compare responses across participants while also accommodating the unique characteristics of each interviewee. The target group, "participants in the educational process of teacher training at UFU," included representatives of the administration and leadership, instructors, students, and library and archive staff, totaling 10 individuals (UFU Rector Larysa Didkovska, Head of the Pedagogy Department

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Svitlana Kohut, Pedagogy Department instructors Dina Shulzhenko and Peter Hiltes, Head of the Library and UFU graduate Ivan Zarytskyi, archivist and UFU student Yuliia Chernomor, project manager and UFU graduate Liliia Bondarenko, academic and student affairs officer and UFU graduate Roman Tiutenko, Master's student in pedagogy Anna Higl, and doctoral student in psychology Viktoriia Danylevska, who is pursuing pedagogy as a second specialization). For each respondent, an individualized guide was prepared, incorporating common questions about methodology, educational management, content, methods, forms, and technologies of teaching, as well as quality assurance, while also accounting for their unique involvement with UFU. Consideration was also given to the fact that some participants fulfill multiple roles, such as being simultaneously administrators and instructors, graduates and staff, or staff and students. Table 1 presents the results of a content analysis of the characteristics of the educational process for teacher training at UFU.

Table 1.

Results of the Content Analysis of Key Features of Teacher Training at UFU Through the Perspective of Educational Process Participants

Parameters	Characteristics
Goals	The training of educators capable of effectively working in a modern educational environment, responding to current challenges – particularly those caused by the full-scale war in Ukraine and the demands of inclusive education – while providing psychosocial support and ensuring quality education under various conditions. This involves: • Development of professional competencies (ensuring deep knowledge and practical skills necessary for effective pedagogical activities); • Cultivation of critical thinking and innovation skills (promoting the ability to analyze, evaluate, and implement innovative methods and technologies in the educational process); • Preparation for work in a multicultural environment (developing skills for interacting with representatives of diverse cultures and adapting to various educational contexts); • Support for psychosocial well-being (training in methods to work with students who have experienced traumatic events and creating a safe, supportive learning environment).
Methodological Approaches	Synergetic*:* Openness of education, spontaneity, flexibility, innovative learning, recognition of students' individual needs and capabilities, and non-directive management of the educational process.
	Competency-Based: Development of educators' abilities to address professional pedagogical tasks through acquired values, attitudes, professional knowledge, skills, and professionally significant personal qualities.
	Environmental: Indirect management of the educational process with a primary focus on the proactivity of the learner, fostering self-learning, self-education, and professional self-development.
	Person-Centered: Development of individual abilities, creative potential, and professional competencies of future educators, taking into account their personal needs, values, and motivations.
	Personological: Engagement of experienced, highly professional, and talented scholars with strong reputations in teaching; creation of conditions and support for instructors' professional autonomy; influence of their original approaches, individual teaching styles, pedagogical experience, and the scientific

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	legacy of prominent figures in the institution's history (e.g., for UFU – I. Mirchuk, A. Voloshyn, H. Vashchenko, and others) on the formation and development of future teachers' professional agency.
	Andragogical: Focus on adult education, considering learners' life experiences, motivation for self-development, and need for practical application of knowledge.
	Interdisciplinary: Integration of knowledge from various academic fields such as pedagogy, psychology, history, sociology, cultural studies, Ukrainian studies, etc., to form a comprehensive understanding of the educational process and enhance the agency of future teachers.
	Social-Constructivist: Active interaction with the social environment and collaborative activities, emphasizing cooperation, discussion, reflection, and joint problem-solving to foster critical thinking and professional competence in future educators.
	Trauma-Informed: Development of competencies in future teachers to understand the impact of psychological trauma on students' emotional states, behavior, and learning abilities; fostering empathy, supporting mental health, addressing the individual needs of students who have experienced stress or trauma, and creating a safe and supportive educational environment.
Teacher's Role	A facilitator, mentor, moderator, and consultant who creates conditions for students' independent learning and development, supports and motivates them, fosters personal growth, assists in solving educational and practical tasks, and employs a democratic teaching style.
Student's Role	An active and proactive participant in the educational process, taking responsibility for their own learning and development, independently seeking, analyzing, and critically evaluating information, collaborating with instructors and peers to address tasks, and reflecting on their own learning experiences and outcomes.
Interaction Between Teachers and Students, and Among Students	Subject-to-subject, partnership-based relationships with well-established communication facilitated by modern management tools and social platforms. A distinctive feature is the absence of fixed study groups, which does not hinder effective communication, further supported by a designated academic and student affairs coordinator. The university involves students in various events and organizes informal gatherings.
Learning Motivation	Creation of a supportive educational environment that considers students' individual needs and interests, ensures respect, encourages achievements, and fosters open communication. Motivational factors include: Professional development: Students aspire to gain quality education that enhances career growth and professional fulfillment; Cognitive interest: The desire to deepen understanding of their chosen field and acquire new knowledge stimulates active participation in the learning process; Self-affirmation: Students seek to demonstrate their abilities and achievements, boosting their self-confidence; Social interaction: University education provides opportunities to build new connections, exchange experiences, and expand professional networks.
Organization of the Educational Process	A blended format combining online and offline learning; a flexible system allowing students to create their own schedules by selecting courses from a proposed list in line with program requirements; diverse forms of class delivery;

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	prioritization of creative, productive tasks; provision of conditions for individual and group educational projects; use of active learning methods; variety in task selection; and opportunities for participation in research and practical events, including annual student academic conferences.
Internal Quality Assurance in Education	Monitoring the needs and demands of applicants based on the analysis of motivation letters, with results informing updates to educational content (e.g., introduction of courses such as "Transformational Pedagogy (Pedagogy of Change)," "Adult Education," and "Trauma Pedagogy"); continuous improvement of curricula and programs with rapid responses to contemporary challenges; engagement of leading experts with international experience in teaching; ongoing professional development for instructors; adherence to Study Regulations for monitoring and assessing academic achievements; operation of a system to prevent and detect academic plagiarism; provision of necessary resources for the educational process; and development of information systems for effective management, methodological support, and transparency of UFU activities.
Social and Humanitarian Activities	Involvement of teachers and students in volunteer projects, community initiatives, and cultural-educational events.
Support for Graduate Employment	Conducting career training, coaching, and providing information on job opportunities. Engaging talented graduates in work at UFU serves as an example of effective personnel policy.
Uniqueness of UFU Pedagogical Studies	Preservation of pedagogical traditions established by distinguished UFU instructors who laid the foundations of Ukrainian pedagogy rooted in national values and Christian ethics, combined with support for innovations by modern instructors who create a space for transformational pedagogy. This fosters the agency of future educators, their self-reliance, creativity, social responsibility, and professional autonomy. The training focuses on inclusive education and psychological-pedagogical support for working with children who have experienced trauma, particularly in wartime conditions. Opportunities to acquire an additional specialization enhance interdisciplinarity and multifaceted learning. A sense of community preserves Ukrainian identity and culture, providing students with a "sense of home." Multiculturalism is both a feature of the educational environment and an integral part of teacher training content.

A separate focus in the interview was given to the digitization of education and its impact on the quality of teacher training, which enabled the conduction of a corresponding SWOT analysis (Table 2).

Table 2.

SWOT Analysis of Teacher Training in the Context of Digitization

Strengs –Advantages, Positive Aspects	**Weaknesses** – Challenges, Disadvantages
• Ensuring the continuity of the educational process during the COVID-19 pandemic, war, and other crisis situations; • Opportunities for remote access for instructors and students;	• Digital divides (between instructors, between students, and between instructors and students); • Overburdening of instructors; • Unstable internet connectivity;

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• Implementation of blended learning possibilities; • Provision of individualized learning; • Continuous open access to educational and methodological resources; • Development and enhancement of digital competence among learners; • Promotion of inclusivity, ensuring access to education for individuals with disabilities and those in remote regions; • Greater opportunities for career guidance activities; • Increased efficiency in managing the educational process.	• Lack of face-to-face interaction, leading to a reduced level of emotional connection between instructors and students; • Fatigue, psychological discomfort, and isolation of participants in the educational process.
Opportunities – Prospects, Reserves, Solutions for Future Challenges	**Threats** – Risks, Dangers, Potential Future Challenges
• Creation of a safe and comfortable digital educational environment; • Continuous professional development of instructors in the field of digital technologies; • Ensuring adherence to the principles and rules of academic integrity, including plagiarism checks for master's theses and dissertations, and written confirmation of independent work by graduates; • Training learners to use artificial intelligence (AI) as a tool for environmentally responsible information handling; • Implementation of modern interactive pedagogical technologies, such as gamification and augmented reality; • Formative assessment of students' academic achievements, focusing not only on final outcomes but also on the process of achieving them; • Achieving a balance between online and offline learning; • Introduction of modern online platforms, such as "Knowledge Academy" for UFU (Ukrainian Virtual University).	• Cyberattacks and information leaks; • Insufficient level of digital security; • Decreased student motivation and poorer assimilation of material; • Misuse of AI by students in completing assignments and writing papers; • Difficulty in monitoring students' independent completion of tasks in an online environment; • Decline in students' critical thinking and creativity; • Predominance of globalized content, posing a risk of losing national identity.

Since 9 of the interviewees have experience obtaining higher education in Ukraine, 3 of them teach at Ukrainian higher education institutions (HEIs), and one participant is an expert on Ukrainian education, their opinions on the similarities and differences between studying at Ukrainian institutions and UFU are considered significant. Thus, the following common features have been identified: adherence to the requirements of the Bologna education system, the application of a competency-based approach, a blended learning format, a general orientation toward the use of innovative pedagogical technologies, the digitalization of education, and measures for internal quality assurance in education. Key distinctions of the

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UFU include a high level of academic freedom; rapid response to external challenges and the demands of learners; a preference for unconventional forms and methods of teaching; a flexible, individualized learning trajectory for students; an emphasis on creativity and innovation in independent work; greater autonomy for learners, described as "greater freedom and greater responsibility"; the absence of fixed study groups; openness of instructors to communication and their support; psychological comfort; high variability in the choice of academic disciplines; the opportunity to obtain a second specialization; and a different procedure for the preparation and defense of doctoral dissertations in philosophy.

The research findings have enabled the formulation of the following recommendations for Ukrainian higher pedagogical education institutions regarding the implementation of positive experiences from the UFU in fostering the agency of educators:

• Strengthen cooperation with European, particularly German, higher education institutions and research organizations to exchange experiences, publications, conduct scientific and practical events, and promote academic mobility for students and educators in the context of teacher training.

• Combine pedagogical traditions and innovations, drawing on the history of the higher education institution, supporting and encouraging progressive educators who are respected and recognized among students and colleagues and demonstrate high professional activity.

• Provide greater academic freedom for educators in choosing teaching methods and approaches to assessment.

• Ensure rapid updates to the content of academic disciplines, flexibility in curricula and programs, taking into account the needs and demands of applicants based on monitoring.

• Prevent duplication of content in disciplines both within higher education programs and with school subjects.

• Introduce courses on pedagogical ethics and the formation and development of teachers' professional agency based on Ukrainian pedagogical traditions.

• Ensure comprehensive and systematic preparation of future educators to foster national identity in children.

• Train educators to work in multicultural environments, developing skills for interacting with representatives of different cultures and adapting to diverse educational contexts.

• Ensure transparent and genuine choices for students in selecting academic disciplines.

• Strengthen the comparative context of foreign, particularly European, pedagogical experiences within the content of academic disciplines and promote relevant student research.

• Integrate psychological and pedagogical support into teacher training, relevant to wartime and post-war recovery, to work with students experiencing stress or traumatic experiences.

• Ensure an interdisciplinary approach to preparing educators for creating inclusive environments by developing programs that combine modern positive practices from pedagogy, psychology, and social work, and include in teacher training the study of experiences working with Ukrainian migrant and refugee children in European countries, particularly Germany.

• Foster the readiness of future teachers to implement transformative pedagogy for deep learning and the development of critical thinking in students.

• Create opportunities for students to obtain a second specialization in related fields, enhancing the interdisciplinarity of pedagogical training and increasing graduates' competitiveness in the labor market.

• Incorporate modern scientific-informational and methodological resources into the educational process, promoting the achievements of domestic and foreign pedagogical science.

• Systematically and comprehensively utilize the potential of the higher education institution's library and archives in teacher training.

Conclusions. The UFU is a unique higher education institution that combines Ukrainian pedagogical traditions with European standards. Its historical journey underscores the importance of preserving academic freedom and national identity in the context of emigration. Prominent figures such as Ivan Mirchuk, Avgustyn Voloshyn, Hryhoriy Vashchenko, and others laid the foundation for the development of pedagogical studies focused on humanistic values and the formation of the Ukrainian educational ideal.

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The training of educators at UFU addresses contemporary challenges, such as inclusive education, teaching migrant and refugee children, and modern approaches to instruction in schools and extracurricular educational institutions. The content of pedagogical studies includes a mandatory course on "Methodology of Writing Academic Papers"; profile-specific elective courses (10 courses for master's students, 7 advanced profile courses for doctoral students) offered within the program ("Philosophy of Education," "Features of the Development of Pedagogical Theories and Education in European Countries," "Comparative Pedagogy," "Strategies for Reforming General Secondary Education in Germany and Ukraine in the Second Half of the 20th Century – Early 21st Century (Comparative Context)," "Integration of Young Migrants and Refugees in German Educational Institutions: Challenges for Pedagogy," "Social Pedagogy and Social Work in Germany," "Inclusive Education," "Pedagogical Conflicts: Causes, Behavioral Strategies, Resolution," "School Didactics," "Pedagogical Technologies," "Learning Science: How to Teach Children and Learn Yourself?"); elective courses from other disciplines chosen by students (2 courses for master's students); courses for an additional specialization (4 courses for master's students, 2 courses for doctoral students); additional program requirements for master's students (writing an individual project, completing an internship, or choosing 1 course).

The distinctive features of the academic component of the studies include the fact that master's and doctoral students independently choose their research topic and supervisor; their preferences regarding the composition of the examination committee are taken into account; a comparative context is emphasized in research; both master's theses and doctoral dissertations are quantitatively evaluated, with the academic supervisor participating in the assessment; doctoral students have the option to choose the form of promotion (rigorosum or defense); there are no requirements for publications or preliminary result validation, but there is an opportunity to publish the work after defense, provided it references the place of defense and is approved by the academic supervisor and reviewers after revisions.

An analysis of the scientific-informational and educational-methodological support for master's and doctoral pedagogy programs at UFU confirms an international context, with literature available in Ukrainian, English, and German, consideration of students' opportunities for independent search for useful and interesting publications, and a division of sources into mandatory and elective, similar to Ukrainian programs. Evidence of attention to the results of contemporary Ukrainian pedagogical research is the inclusion of works by scholars from the National Academy of Pedagogical Sciences of Ukraine in the recommended literature lists for psychological and pedagogical disciplines. The design of course curricula, their annotations, and syllabi is characterized by authorial approaches.

Key components of UFU's person-centered educational environment, which includes teacher training, are the library and archive, which provide daily information services to faculty and students worldwide; an electronic library is also operational. An analysis of dissertation topics stored in the archive indicates the development of philosophical-educational, historical-pedagogical, comparative-pedagogical, and psychological-pedagogical discourses.

A study of the specifics of the educational process for teacher training reveals that student engagement in classes is very high, with a predominant focus on exploratory learning. Instructors emphasize the applied aspects of using information, draw on students' experiences, provide relevant examples, pose problematic questions, encourage discussions, and tactfully guide them toward critical thinking, conclusions, and generalizations.

Content analysis of interviews with participants in the educational process allowed for the specification of learning objectives in light of contemporary challenges; identification of methodological approaches to teacher training (synergetic, competency-based, environmental, person-oriented, personological, andragogical, interdisciplinary, socio-constructivist, trauma-informed); characterization of: the instructor's role (facilitator, mentor, moderator, consultant), the student's role (active and proactive participant in the educational process), the nature of their interaction (subject-subject, partnership-based), learning motivation (creating a supportive educational environment that considers individual needs and

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interests), organization of the educational process (flexible system, blended learning, variability in independent work, interactivity, project-based learning); internal quality assurance of education (monitoring the needs and demands of applicants and incorporating the results; continuous improvement of curricula and programs; rapid response to modern challenges; involvement of leading specialists with international experience in teaching; ongoing professional development for instructors; adherence to Study Regulations regarding the control and evaluation of academic achievements; operation of a system for preventing and detecting academic plagiarism, etc.), socio-humanitarian activities (involvement of faculty and students in volunteer projects, community initiatives, and cultural-educational events), and support for graduate employment (conducting career training, coaching, informing about job opportunities, and engaging talented graduates to work at UFU).

The results of the content analysis allowed identifying the following features of UFU's uniqueness: preservation of pedagogical traditions established by distinguished UFU educators and support for innovations by modern educators who create a space for transformative pedagogy; a focus on preparing for inclusive education, psychological-pedagogical support in working with children who have experienced traumatic events, particularly in wartime conditions; acquisition of an additional specialization, which fosters interdisciplinarity and multifaceted learning; a sense of community that helps preserve Ukrainian identity and culture, providing students with a "sense of home"; and multiculturalism.

Based on the SWOT analysis, the strengths, challenges, opportunities, and risks of teacher training in the context of digitalization were identified. Emphasis is placed on the following ways to address challenges in the future: creating a safe and comfortable digital educational environment; continuous professional development of educators in the field of digital technologies; ensuring adherence to the principles and rules of academic integrity; training students to use AI as a tool for environmentally responsible information handling; implementing modern interactive pedagogical technologies, including gamification and augmented reality; formative assessment of students' academic achievements; balancing online and offline learning; and introducing modern online platforms.

The results of the research project under the DAAD program "Analysis of Pedagogical Studies at the Ukrainian Free University" indicate the formation of self-reliant educators capable of supporting national identity, critical thinking, implementing innovative approaches, and working in a multicultural environment. This underscores the significance of UFU's experience for the development of Ukrainian pedagogy amid global challenges and European integration, as reflected in the formulated recommendations.

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АНАЛІЗ ПЕДАГОГІЧНИХ СТУДІЙ УКРАЇНСЬКОГО ВІЛЬНОГО УНІВЕРСИТЕТУ В НІМЕЧЧИНІ

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Реферат:

Актуальність дослідження зумовлена потребою в самозарадних педагогах, які вміють працювати з дітьми і молоддю із різним ступенем травмованості і стресу, та важливістю вивчення позитивного досвіду підготовки таких педагогів Українському вільному університеті (Мюнхен, Німеччина) з метою його імплементації в систему освіти України.

Мета: дослідити особливості освітнього дизайну підготовки педагогів за магістерською і докторською програмами Українського вільного університету (далі: УВУ), сформулювати рекомендації для українських закладів вищої педагогічної освіти щодо імплементації позитивного досвіду розвитку суб'єктності педагогів в УВУ.

Методи: аналіз наукових джерел з проблеми дослідження, змісту відповідних документів, навчально-методичного забезпечення, контент-аналіз, SWOT-аналіз, спостереження, інтерв'ювання, систематизація та узагальнення – для визначення особливостей структури педагогічної освіти та формулювання рекомендацій щодо урахування позитивних практик УВУ у підготовці педагогів в Україні за магістерськими та докторськими програмами.

Результати: у культурно-історичному ракурсі визначено, що УВУ є першим і єдиним українським закладом вищої освіти за кордоном, одним із найстаріших приватних університетів Німеччини, відповідає вимогам до німецьких університетів щодо поєднання наукових досліджень з освітою, залучення студентів до наукової діяльності, дотримується принципів західної університетської освіти, особливості педагогічних студій УВУ визначаються історією їх становлення та розвитку; в інформаційно-змістовому ракурсі проаналізовано освітню і наукову складові педагогічних студій, науково-інформаційне та навчально-методичне забезпечення курсів магістерської та докторської підготовки з педагогіки, роль бібліотеки і архіву для розвитку освітнього середовища; у суб'єктно-процесуальному ракурсі досліджено властивості освітнього процесу підготовки педагогів, здійснено контент-аналіз його ключових особливостей, SWOT-аналіз підготовки педагогів в умовах цифровізації.

Висновки. Український Вільний Університет є унікальним закладом освіти, що поєднує українські педагогічні традиції з європейськими стандартами. Його історичний шлях демонструє важливість збереження академічної свободи та національної ідентичності в умовах еміграції, а його видатні постаті заклали фундамент для розвитку педагогічних студій, орієнтованих на гуманістичні цінності та формування українського виховного ідеалу. Ознаками унікальності УВУ є збереження педагогічних традицій та підтримка інновацій сучасних викладачів, які створюють простір трансформаційної педагогіки; спрямованість підготовки на інклюзивну освіту, психолого-педагогічну підтримку у роботі з дітьми, які зазнали травматичного досвіду, особливо в умовах війни; отримання додаткової спеціальності; мультикультурність. Результати дослідницького проєкту за програмою DAAD «Аналіз педагогічних студій Українського вільного університету» свідчать про формування самозарадних педагогів, здатних до підтримки національної ідентичності, критичного мислення, запровадження інноваційних підходів та роботи в мультикультурному середовищі, що підтверджує значущість досвіду УВУ для розвитку української педагогіки в умовах глобальних викликів та європейської інтеграції та відображено у сформульованих рекомендаціях.

Ключові слова: *Український вільний університет, педагогічні студії, трансформаційна педагогіка, позитивний досвід, розвиток суб'єктності педагога.*

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FEATURES OF THE SELECTION FOR THE PROFESSIONAL ACTIVITIES OF INSTRUCTORS IN THE VOCATIONAL MILITARY EDUCATION SYSTEM

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Abstract

Relevance: The issues of selection and training of instructors for professional activities within the system of professional military education remain insufficiently developed. The introduction of a new model for training Ukrainian citizens and the establishment of corresponding structural units in higher education institutions and educational institutions with specific learning conditions further underscores the urgency of this matter.

Objective: To identify tasks aimed at improving the selection of instructors for professional activities in training military specialists within the system of professional military education.

Methods: To achieve the stated objective, methods of systemic and comparative analysis of scientific sources were employed to determine the specifics of training military specialists within the system of professional military education under conditions of martial law in the country. Methods of systematization and generalization were used to identify the main directions for implementing the task of selecting instructors for professional activities within the system of professional military education, in the context of implementing the Concept of Transformation of the Military Education System.

Results: An analysis of scientific sources was conducted, highlighting the issue of selection and training of instructors for professional activities within the system of professional military education as an insufficiently developed area. The specifics of modern training of military specialists were identified, taking into account the full-scale invasion of the Russian Federation's army into Ukrainian territory. Relevant characteristics of military specialists who can be involved in the professional training of military personnel within the system of professional military education were proposed, in the context of three main stages of their selection for instructor positions. A conceptual vision and prospective directions for implementing the task of selecting instructors for professional activities within the system of professional military education were outlined, enabling high-quality selection of instructional staff for training military personnel within the military education system.

Conclusions: It was established that to improve the selection of instructors for professional activities in training military specialists within the system of professional military education, the following measures are necessary: establish a career monitoring system for sergeants in higher military educational institutions of the Ministry of Defense of Ukraine, military training units of higher education institutions, and institutions of professional pre-higher military education; develop methodological recommendations for the procedure of selecting and training instructors within the system of professional military education; apply a comprehensive approach to selecting sergeants as candidates for instructor roles; develop standard requirements for instructors and a methodology for their evaluation; provide for and organize annual external evaluations of instructors at higher military educational institutions of the Ministry of Defense of Ukraine, military training units of higher education institutions, and institutions of professional pre-higher military education; ensure proper individual development of sergeants by offering choices for advanced training courses and preparing them through advanced-level training courses for sergeant-instructor duties; establish a model of an instructor-leader and provide motivational factors at their workplace to support career advancement prospects.

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Keywords: *military education, higher military educational institutions, instructor, training of military specialists, professional military education.*

Introduction. The current stage of transformation in military education under the conditions of a state of war necessitates well-considered decisions, forward-looking plans, and the rigorous selection of military professionals for pedagogical and instructional roles within the system of professional military education. One of the key tools for the qualified training of military specialists in the Armed Forces of Ukraine is the need for reforms and improvements in the existing professional education system, taking into account the specifics of wartime conditions and the requirement to train military personnel in a short timeframe to fulfill their designated roles within the forces.

In countering the armed aggression of the Russian invasion on Ukrainian territory, the state leadership, Ukrainian military, and international partners are deeply concerned about the issue of training military specialists for Ukraine's defense forces. Currently, various measures are being implemented to enhance the effectiveness of mobilization in Ukraine, the training of military specialists, and the social protection of service members and their families. This is evidenced by a series of amendments to legislative drafts and internal regulatory documents of Ukraine's defense forces. However, critical challenges in training qualified military specialists persist, including not only their readiness to actively counter the aggressor and effectively coordinate between defense force units during active combat operations but also their ability to undergo high-quality training in a short period, retraining on new weaponry, and recognizing the need for changes in tactical approaches and the application of new forms of military operations. These challenges necessitate not only amendments to legislative acts and regulatory documents but also the establishment of a purposeful and comprehensive system for selecting academic and instructional staff in higher military educational institutions under the Ministry of Defense of Ukraine, military training units of higher education institutions, and institutions of professional pre-higher military education. Additionally, an equally pressing issue arises regarding the level of training and combat experience required for academic and instructional staff during the preparation of military personnel. This article places particular emphasis on the stages of selecting candidates for instructor positions in higher military educational institutions under the Ministry of Defense of Ukraine, military training units of higher education institutions, and institutions of professional pre-higher military education, as an unresolved issue in the training of military specialists within the system of professional military education.

Sources. Ukrainian researchers continuously address issues related to the specifics of training military specialists (S. Biela, V. Heorhiev, A. Zelnytskyi, O. Mityahin, et al.); professionally oriented training of military specialists (V. Babak, S. Melnychenko, D. Olenev, I. Semenyako, V. Yahupov, et al.); ensuring the quality of military specialist training (O. Zabolotnyi, V. Oliferuk, V. Rakhmanov, et al.); and the development of necessary competencies for military specialists (M. Aristarkhova, D. Kyslenko, V. Svystun, R. Shostak, Y. Shchavinskyi, et al.). However, limited attention has been paid to the development of professional competence among academic staff in higher military educational institutions, with notable exceptions including A. Vitchenko, S. Illyushchenko, L. Oliinyk, et al. Furthermore, only a small number of studies focus on the specifics of training pedagogical and instructional staff for professional activities in military training units of higher education institutions and institutions of professional pre-higher military education (Pikus D., Bondarenko A., 2023, p. 213). Additionally, researchers have outlined a list of competencies required for instructors in training centers preparing intelligence officers for professional interaction (Pikus D., Bondarenko A., 2023, p. 217).

In their work, I. Zelenyi and A. Voronin (2022, p. 99) objectively highlight the necessity of intellectual development for officers and the key elements of self-development throughout a military career. Based on the authors' proposed elements of a concept for officers' personal self-development as researchers, this study attempts to examine these elements in the context of the selection and preparation of instructors for professional activities within the system of professional military education.

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Particularly relevant to this study is the work dedicated to improving the effectiveness of professional training for future officers in wartime conditions by Y. Chernovol and P. Slyvenko (2023, pp. 6–8). The authors analyzed foreign experiences in shaping the system of professional military education in certain NATO member states. An indisputable conclusion by Y. Chernovol and P. Slyvenko is that, in the context of modern warfare against the Russian Federation's army, the development of officers' professional competencies is of paramount importance. This study concurs with the authors' view that the components of training should include: fostering flexible thinking; analyzing external and internal threats; predicting enemy actions; adapting responses to changing conditions; comprehensive oversight of subordinates' actions and conditions; and skills in psychological support and motivation (Chernovol & Slyvenko, 2023, p. 10).

As evident from the analyzed scientific sources, the issues of selection and preparation of instructors for professional activities within the system of professional military education remain insufficiently developed. Meanwhile, the introduction of a new model for training Ukrainian citizens and the establishment of relevant structural units in higher education institutions and institutions with specific training conditions (Cabinet of Ministers Resolution No. 734, June 21, 2024) only heightens the urgency of this matter.

Purpose of the Article. The purpose of this article is to identify tasks for improving the selection of instructors for professional activities in training military specialists within the system of professional military education.

Research Methods. To achieve the stated purpose, methods of systemic and comparative analysis of scientific sources were employed to identify the specifics of training military specialists within the system of professional military education under wartime conditions. To determine the main directions for addressing the task of selecting instructors for professional activities within the system of professional military education in the context of implementing the Concept of Transformation of the Military Education System, methods of systematization and generalization were used.

Results and Discussion. The education of officers and sergeants of the Armed Forces of Ukraine, with the implementation of professional military education, has reached a new level, the results of which were already noticeable in the army by early 2021 (New Training Methodologies, 2021). However, the onset of the full-scale invasion by the Russian Federation into Ukrainian territory, aimed at seizing new territories and realizing its Soviet-era ambitions, has imposed new requirements on the training of military specialists for Ukraine's defense forces.

Addressing the issue of transforming the state and quality of the military education system, Y. Prykhodko (2022, p. 179) emphasizes the need for changes to ensure high-quality training and professional development of military specialists. Overall, the training of military specialists should enhance their professionalism, competence, intellectual development, leadership qualities, and more. As one of the factors contributing to Ukraine's success in defending its territories against the Russian Federation's aggressive actions, education and combat training aligned with NATO standards (Figure 1) remain highly relevant for Ukraine's defense forces.

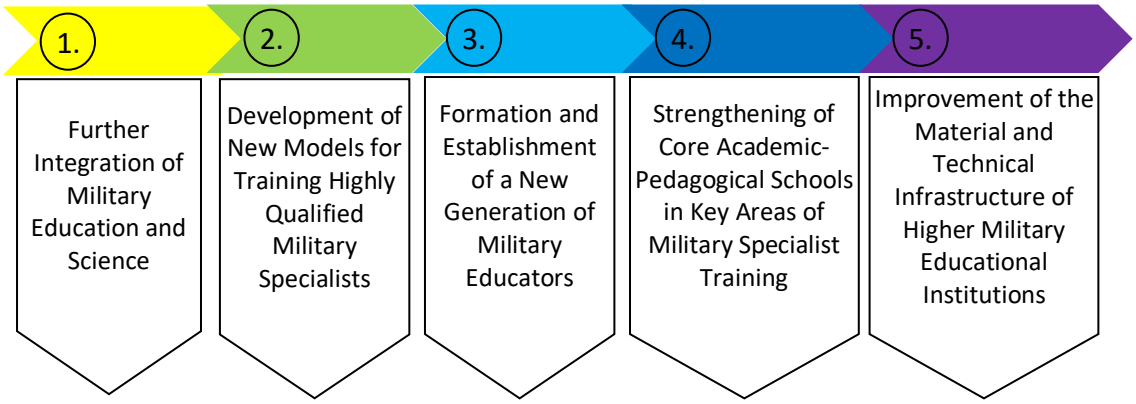

Figure 1. Five Key Directions for Improving the System of Higher Military Education
Source: Ukraine to NATO Journal. Official Website.

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In this context, military education is regarded as an instrument for army reform, with five primary directions for its improvement identified (Main Directions for Effective Development, 2022). Currently, the preparation of military specialists is characterized not only by their readiness to perform designated tasks and the incorporation of combat experience from the period of 2022–2024. Additional features include:

• Constant dispersal of personnel due to missile strikes and the adversary's use of unmanned aerial vehicles (UAVs) at various ranges;
• Limitations in the use of the material and technical infrastructure of higher military educational institutions and training centers for specific branches (types) of the Armed Forces of Ukraine (hereinafter – AFU);
• An increase in the number of trainees due to the need for personnel mobilization and the creation of new military formations within Ukraine's defense forces;
• Reduced duration of training and practical preparation of personnel;
• Temporary detachment of academic and teaching staff to gain combat experience;
• The necessity to account for the use of modern and foreign weaponry;
• Consideration of changes in the adversary's warfare tactics, their new weaponry, and the potential use of weapons and military equipment from other countries, among other factors.

Despite challenges related to personnel mobilization for the AFU and the insufficient practical training of soldiers before their deployment to combat units, the need to continuously update military training programs raises significant concerns regarding the qualified preparation of academic, pedagogical, and instructor staff.

In his study, D. Pikus (2024, p. 328) established the need to train instructors through specialized programs, including the involvement of foreign specialists, which is deemed highly relevant for acquiring experience from international partners in the forms and methods of conducting training.

Scholars such as A. Derevianchuk and D. Chopa (2019, p. 153) emphasize the need to train military specialists using the case-study method.

A considerable number of scientific studies have addressed the necessity of incorporating experience from the Anti-Terrorist Operation (ATO) and Joint Forces Operation (JFO), as well as the effectiveness of changes in the methodology for training future AFU officers. For instance, O. Skriabin, O. Chernykh, and Yu. Chernykh (2021, p. 26) note that the level of training and practical competence of future officers has become more effective due to the teaching of professional disciplines by officers who directly participated in combat operations in the ATO/JFO zone in the Donetsk and Luhansk regions of Ukraine.

In light of the above, it is deemed necessary to define the specific characteristics of military specialists who can be involved in the professional training of servicemen within the system of professional military education. These characteristics can be divided into several stages:

Stage of Selection for Instructor Candidates

First, the professional level of the candidate must be assessed before their admission to instructor duties in higher military educational institutions under the Ministry of Defense of Ukraine, military training units of higher education institutions (hereinafter – MTU HEI), and institutions of professional pre-higher military education. For example, if a sergeant's last position in the troops was deputy platoon commander, such a serviceman may be involved in training squad commanders and deputy platoon commanders but not in roles exceeding the functional scope of their previous professional experience.

Second, combat experience gained by the serviceman since the onset of Russia's full-scale invasion of Ukraine is critical. It should be noted that the serviceman must have combat experience relevant to the specialty they will teach. For instance, if a serviceman participated solely in a defensive operation on a specific section of the front, it would be inappropriate to involve them in teaching practical classes on the topic of "offensive operations."

Thirdly – completion of an advanced training course for the duties of a sergeant-instructor. This is currently a highly contentious issue due to the lack of a sufficient number of adequately trained instructors. However, the quality of trained military specialists, who have the opportunity to undergo training under the guidance of an instructor who has not received the appropriate level of professional education within the military education system but is already performing the duties of the position, should not be overlooked.

Stage of Individual Selection of Instructor Candidates

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1. Possession of certificates confirming the level of individual training obtained through advanced qualification courses.

2. The serviceman's knowledge of extensive professional terminology and familiarity with the procedures for maintaining technical (official) documentation related to their prior professional activities.

3. The individual level of the serviceman's expertise in military affairs, particularly in the context of their future professional specialization.

4. Knowledge of the forms and methods of conducting classes within the system of professional military education.

5. Familiarity with abbreviations and the translation of military terminology from foreign languages.

Stage of Assuming the Instructor Position

1. Knowledge of military-professional and military-specialized competencies that trainees must acquire during their professional military education course in the instructor's area of teaching.

2. The ability to transfer combat experience during classes by conducting practical tasks (tactical exercises). For example, on any terrain, map, diagram, or photograph, the instructor can simulate a combat situation in which they personally participated, allowing trainees to make decisions based on the scenario. Subsequently, the instructor should guide the trainees by discussing the decision made in the actual combat situation and its consequences.

3. Engaging in communication with servicemen in the context of their professional specialization and collecting real combat situations from them orally. These situations should be developed into practical tasks (tactical exercises) for other servicemen. This approach enhances the instructor's awareness of the specifics of performing combat tasks in other units. Additionally, it allows other servicemen to assume the role of a unit commander in a simulated "combat" situation. This form of information exchange can be described as the mutual transfer of combat experience. Discussing various types of combat tasks with the involvement of trainees provides greater insight into possible solutions and facilitates the dissemination of this experience. It is critical to note that training should not only highlight positive decisions. Many commanders of military units, in certain situations, are unaware of the potential consequences of "template" task execution. Therefore, it is more effective to focus on discussing decisions that led to negative outcomes in the execution of combat tasks.

4. Providing moral-psychological support and boosting the morale and motivation of trainees to learn and perform their designated tasks.

The ability to transfer combat experience, communicate effectively within the training unit, boost morale, and maintain the moral-psychological state of the unit embodies the qualities of a leader. In this regard, it is evident that an instructor in the system of professional military education must be prepared for successful performance and meet the criteria required of academic and pedagogical staff in the military education system, as outlined by V. Oliferuk (2019, p. 138). The author notes that the competence of an instructor in higher military educational institutions is defined as a complex interplay of relationships and elements that constitute benchmark criteria for professionalism. Furthermore, the scholar emphasizes the need to consider both theoretical and practical readiness for professional activities within the structure of an instructor's professional skills in the military education system (Oliferuk, 2019, pp. 142–144).

It is evident that the successful performance of instructors in the system of professional military education directly depends on key indicators of the serviceman's individual and professional development, their ability to conduct teaching activities, and their motivation for continuous improvement within the system of professional military education (see Figure 2).

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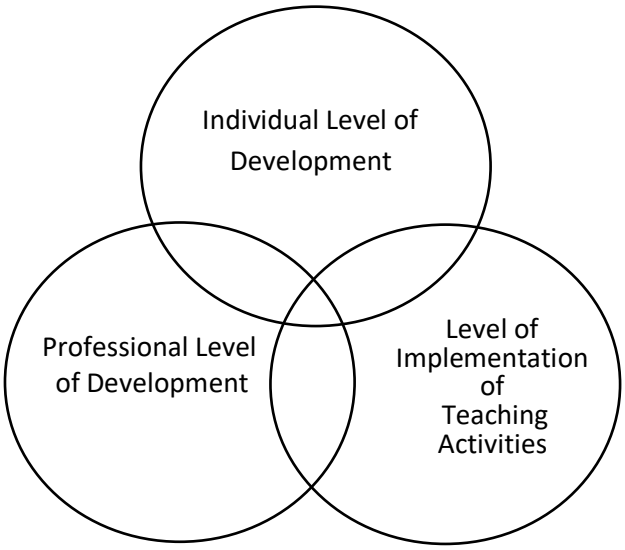

Figure 2. Key Indicators of Successful Performance of Instructors in the System of Professional Military Education

It is posited that the individual level of personality is a significant factor in the professional activities of instructors, irrespective of the level of educational activity. In this regard, all individual qualities of the instructional staff of higher military educational institutions under the Ministry of Defense of Ukraine (MoD), military training units of higher education institutions, and institutions of professional pre-higher military education should be considered alongside the established indicators of the academic-pedagogical (pedagogical) staff.

Conclusions. Based on the above, it has been determined that to improve the selection of instructors for professional activities in training military specialists within the system of professional military education, a series of tasks must be implemented, namely: establishing a career monitoring system for sergeants in higher military educational institutions under the MoD, military training units of higher education institutions, and institutions of professional pre-higher military education; developing methodological guidelines for the selection and preparation of instructors for professional activities within the system of professional military education; applying a comprehensive approach to the selection of sergeants as candidates for instructor roles; developing standard requirements for instructors and a methodology for their evaluation; providing for and organizing annual external evaluations of instructors in higher military educational institutions under the MoD, military training units of higher education institutions, and institutions of professional pre-higher military education; ensuring proper individual development of sergeants by offering choices for professional development courses and preparing them through advanced training courses for the duties of a sergeant-instructor; establishing a model of an instructor-leader and providing motivational factors at their workplace to support career advancement prospects.

Among the prospects for further research, it is envisaged to conduct a comprehensive analysis of the level of professional competence of instructors within the system of professional military education, to determine the competence level of academic-pedagogical and pedagogical staff in structural units of higher education institutions and educational institutions with specific learning conditions to ensure high-quality basic general military training for Ukrainian citizens, and to identify the necessary conditions that will facilitate the comprehensive evaluation of instructors' professional competence.

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ОСОБЛИВОСТІ ВІДБОРУ ДО ПРОФЕСІЙНОЇ ДІЯЛЬНОСТІ ІНСТРУКТОРІВ У СИСТЕМІ ПРОФЕСІЙНОЇ ВІЙСЬКОВОЇ ОСВІТИ

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Реферат:

Актуальність: питання відбору та підготовки до професійної діяльності інструкторів у системі професійної військової освіти залишаються не достатньо розробленими; при цьому, запровадження нової моделі підготовки громадян України та утворення відповідних структурних підрозділів у закладах вищої освіти та закладах освіти із специфічними умовами навчання тільки підвищує актуальність зазначеного питання.

Мета: визначити завдання для вдосконалення відбору інструкторів до професійної діяльності з підготовки військових фахівців у системі професійної військової освіти.

Методи: задля реалізації поставленої мети застосовано методи системного і порівняльного аналізу наукових джерел для визначення особливостей підготовки військових фахівців у системі професійної військової в мовах воєнного стану в державі; задля визначення основних напрямів реалізації завдання з відбору до професійної діяльності інструкторів у системі професійної військової освіти у контексті реалізації Концепції трансформації системи військової освіти використано методи систематизації та узагальнення.

*Результати: п*роведено аналіз наукових джерел та виокремлено актуальне питання щодо відбору та підготовки до професійної діяльності інструкторів у системі професійної військової освіти як таке, що не достатньо розроблене; визначено особливості сучасної підготовки військових фахівців з урахуванням повномасштабного вторгнення армії російської федерації на території України; запропоновано відповідні характеристики військових фахівців, які можуть бути залучені до професійної підготовки військовослужбовців у системі професійної військової освіти у контексті трьох основних етапів відбору їх до діяльності на посадах інструкторів; розкрито концептуальне бачення та перспективні напрями реалізації завдання з відбору до професійної діяльності інструкторів у системі професійної військової освіти, що дасть змогу здійснювати якісний відбір інструкторського складу для підготовку військовослужбовців у системі військової освіти.

Висновки: встановлено, що для вдосконалення відбору інструкторів до професійної діяльності з підготовки військових фахівців у системі професійної військової освіти необхідно: налагодити систему моніторингу кар'єри сержантів вищими військовими навчальними закладами МОУ, військовими навчальними підрозділами закладів вищої освіти, закладами фахової передвищої військової освіти; розробити методичні рекомендації щодо порядку відбору та підготовки до професійної діяльності інструкторів у системі професійної військової освіти; застосувати комплексний підхід у відборі сержантів в кандидати на інструктора; розробити еталонні вимоги до інструкторів та методику їх оцінювання; передбачити та організовувати щорічне зовнішнє оцінювання інструкторів вищих військових навчальних закладів МОУ, військових навчальних підрозділів закладів вищої освіти, закладів фахової передвищої військової освіти; забезпечити належним чином індивідуальний розвиток сержантів з вибором курсів підвищення кваліфікації та підготовки їх на курсі підвищеного рівня підготовки для виконання обов'язків сержанта-інструктора; сформувати еталон інструктора-лідера та забезпечити їм на службовому місці мотиваційні чинники для перспектив у службовій кар'єрі).

Ключові слова: *військова освіта, вищі військові навчальні заклади, інструктор, підготовка військових фахівців, професійна військова освіта.*

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN INCREASING THE OBJECTIVITY OF ASSESSING THE PROFESSIONAL ACTIVITIES OF TEACHERS IN GENERAL SECONDARY EDUCATION INSTITUTIONS

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Abstract

Relevance. The objectivity of assessing the professional activities of teachers is an urgent task in modern education. This is due to dynamic changes in the organization of the educational process and increasing demands on the professional competence of teachers. Traditional methods of assessing teachers' professional activities are often subjective and do not fully reveal the level of their knowledge, skills, and abilities. In this context, artificial intelligence (AI) offers tools for more accurate, transparent, and comprehensive assessment of teachers' professional activities based on the analysis of data on teaching quality, their interaction with general secondary education students, and learning outcomes.

*Purpose***.** This article aims to investigate the role of artificial intelligence in increasing the objectivity of assessing the professional activities of teachers in general secondary education institutions.

*Methods***.** The research employed the following methods: analysis of scientific sources and regulatory documents concerning the use of artificial intelligence technologies in education to identify the current state of research on the problem; theoretical analysis, synthesis, and generalization of views to substantiate the role of artificial intelligence in the objective assessment of the professional activities of teachers in general secondary education institutions; and generalization of conclusions.

*Results***.** The study substantiates the role of artificial intelligence in enhancing the objectivity of assessing the professional activities of teachers in general secondary education institutions. This is achieved through the use of big data processing algorithms and comprehensive analytics, automation of the collection and analysis of quantitative and qualitative indicators of teachers' professional activities, analysis of their interaction with students, analysis of the dynamics of competence development, learning materials (through natural language processing), and student learning outcomes. The research also reveals the features of using artificial intelligence in assessing teachers' professional activities by personalizing tasks and providing individual recommendations for their further professional development. Furthermore, it identifies the key advantages and challenges associated with using artificial intelligence in assessing the professional activities of teachers in general secondary education institutions.

*Conclusions***.** The use of artificial intelligence significantly increases the **objectivity, effectiveness, and transparency** of assessing the professional activities of teachers in general secondary education institutions. It enables a shift from quantitative assessment criteria to comprehensive analysis and facilitates the formation of individual trajectories for their professional growth. Successful implementation of artificial intelligence in assessing teachers' professional activities is based on considering unified methodological approaches and standards, as well as the availability of appropriate technical infrastructure.

Keywords: *artificial intelligence, assessment, professional activity, teachers, objectivity, digital technologies, personalization, assessment standards.*

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Introduction. The objectivity of assessing the professional activities of teachers is one of the most pressing issues in the field of general secondary education (Malá, Gadušová, & Pavliková, 2020). In a context of dynamic changes and increasing demands on teachers' professional competence, there is a growing need for a comprehensive approach to evaluating their work. Traditional methods of assessing the quality of teachers' professional activities are often influenced by subjective factors and fail to reveal all their aspects. In this regard, artificial intelligence (hereinafter referred to as AI) offers modern tools for data collection and analytics that contribute to more accurate and transparent assessment (Cardona, Rodríguez, & Ishmael, 2023). The implementation of AI in the assessment of teachers' professional activities is based on the use of big data processing algorithms and comprehensive analytics. This enables the collection of detailed information on teaching indicators, communication with students, and their learning outcomes. The application of such tools allows for a more prompt response to identified competency gaps and the determination of individual professional development pathways for each teacher. This increases the transparency of the assessment process, as quantitative and qualitative parameters of their activity are aligned with the actual learning success indicators of students.

To enhance the objectivity of assessing teachers' professional activities, evaluation based on interactive platforms that include personal accounts for storing methodological materials and completed assignments is effective (Dornisch, & McLoughlin, 2006). While such platforms are user-friendly, there is a risk of focusing unilaterally on quantitative indicators that do not always reflect the full depth of teaching activity. In most cases, there is a lack of algorithms capable of identifying specific features of teaching style and the level of interaction with students. This leads to a significant discrepancy between formal indicators and the actual level of a teacher's professional activity. The limitations of traditional assessment stem from the use of insufficiently effective methodologies that do not account for disciplinary differences and personal characteristics of teachers. The absence of common standards for analyzing digital indicators complicates inter-school comparison and data exchange. Moreover, individual approaches of different educational institutions are not always consistent with common quality criteria, creating difficulties in formulating unified conclusions. Another challenge is maintaining the confidentiality of personal data and the need to build a reliable digital infrastructure.

Against these challenges, the need to define the role of AI in improving the traditional assessment of teachers' professional activities becomes critical. Compared to humans, machine learning algorithms and neural networks are capable of analyzing a much wider range of indicators, including the dynamics of a teacher's competence development and the structure of their interaction with students, in the shortest possible time (Cardona, Rodríguez, & Ishmael, 2023). AI enables the accumulation and systematization of information covering both quantitative and qualitative aspects of a teacher's professional activity. In the future, this approach will contribute to increasing the objectivity of assessing teachers' professional activities, focusing on their real contribution to student learning progress. Ultimately, defining the role of AI in teacher professional activity assessment systems focuses on creating conditions to reduce subjective influences and deepen analytical capabilities. It is through technological innovations that tools emerge, designed to more accurately track teaching quality, supporting teachers in the process of improving their pedagogical skills.

Sources. The use of AI in all areas of national importance is based on the provisions of the Concept and National Strategy for AI Development in Ukraine (On Approval of the Concept for the Development of Artificial Intelligence in Ukraine, 2020), as well as the corresponding Action Plan for their implementation (Order of the Cabinet of Ministers of Ukraine, 2021, May 12). Specifically, the Concept defines the principles for increasing Ukraine's competitiveness through the use of AI technologies (human-centeredness, adherence to the rule of law, respect for fundamental human rights

and freedoms, transparency, security, and accountability of AI systems). Among the priority areas for the Concept's implementation are education and human capital development, scientific research, etc. The Concept also identifies a number of problems that need to be addressed. In the educational sector, these include: a low level of digital literacy among the population, imperfect legal regulation of the AI sphere, a low level of investment in research and development, and certain shortcomings in the system of specialist training. To address these in general secondary education, the conceptual provisions foresee tasks such as: improving the educational and methodological base; organizing courses for teachers on working with analytical data; promoting digital literacy among schoolchildren (using digital tools to solve applied problems, searching for information on the Internet, personal data protection, media literacy, digital hygiene, etc.) (Order of the Cabinet of Ministers of Ukraine, 2020, December 02).

The National AI Development Strategy in Ukraine, with a perspective up to 2030 (OECD.AI Policy Observatory, 2021), outlines ambitious goals, such as ensuring sustainable economic development and bringing Ukraine to a leading position in the world in the field of information and communication technologies through the effective implementation of AI. Its key tasks include: organizational and financial support for scientific research, software development, increasing data accessibility and computing infrastructure, training qualified personnel, and creating a national AI ecosystem. The Ministry of Digital Transformation of Ukraine and the Ministry of Education and Science of Ukraine are actively involved in the development of the educational sector based on the use of AI technologies. An example of this is the launch of a national project to provide Ukrainian schools with access to ChatGPT Edu starting from 2025 (Ministry of Digital Transformation of Ukraine, n.d.), as well as supporting the development of educational courses for citizens to increase digital literacy. In addition, instructional and methodological recommendations developed by employees of these ministries regarding the introduction and use of AI technologies in general secondary education institutions are valuable (Ministry of Education and Science of Ukraine, 2024, May 22; Pinchuk, 2024). These recommendations are based on the principles of fairness and inclusivity, legality and transparency, as well as confidentiality and security. They emphasize the importance of forming AI competence in teachers as a component of their professional competence.

In shaping its national policy and legislation in the field of AI, Ukraine actively aligns with international and European standards. In this context, the European Union's Artificial Intelligence Act (EU AI Act) (AI Act enters into force, 2024), adopted by the European Parliament on March 13, 2024, holds significant importance. This document introduces a risk-based approach to AI regulation, classifying systems by risk levels: unacceptable, high, limited, and minimal. The Act establishes strict requirements for transparency, accountability, and security of AI systems, especially those categorized as high-risk. It also explicitly prohibits certain types of AI systems, such as social scoring systems used by public authorities, or emotion recognition systems in educational institutions and workplaces (with some exceptions). Ukraine has expressed its intention to implement the provisions of this Act into its legislation, which will require significant work on adaptation and the development of new legal norms.

The theoretical foundations of assessing teachers' professional activities, including with the use of AI, have been explored in the works of domestic and foreign scholars. Specifically, S. V. Berezhna and S. O. Dotsenko (2025) identified and substantiated key areas of professional training for teachers in the field of AI: technical, methodological, ethical, and practical. The authors highlighted key components of a teacher professional training system, namely: modularity and flexibility of educational programs; a practice-oriented approach; collaborative learning; continuous monitoring and updating of program content; and the integration of formal and non-formal education through participation in master classes, webinars, conferences, trainings, etc. H. Yu. Kravchenko (2012) substantiated the specifics of assessing the level of teachers' professional competence, which the researcher includes: accounting for teachers' needs according to their professional interests and level of professional training, creating conditions for systematic self-education throughout the entire inter-certification

period, and ensuring continuity of professional development.

O. Hrytsenchuk's (2024) research on modern AI technologies already partially used in education is of scientific interest. The researcher includes expert systems, chatbots, intelligent tutors, personalized learning systems, visualizations and virtual learning environments, machine learning technologies, etc., among these technologies. She proposed key directions for using AI in education, the essence of which lies in supporting the educational sector, namely: personalization of learning, use of intelligent assistant systems, learning analytics, automation of routine tasks, and innovative teaching methods using AI systems. I. V. Bubnov (2023) proposed practical approaches to implementing VR tools based on AI technologies in the domestic educational sphere, identifying that these are: first, software developed to support teachers, not replace them; and second, they require educators to have a certain level of knowledge and skills to use such projects. Regarding technological solutions based on AI technologies that can help organize the educational process, researchers recommend various assessment tools, the production of personalized comments and feedback, and, for example, systems for creating and coordinating schedules (Pasichnyk, 2023).

O. M. Spirin and M. P. Shyshkina (2025) paid special attention to the problem of natural language processing (NLP) in communication. According to the researchers, NLP technology enables the analysis of written and oral statements by students, identifying linguistic patterns and improving teaching methods. For example, chatbots based on NLP can assist in learning, answer questions, and evaluate responses. This is extremely important in the aspect of assessing the professional activities of teachers in general secondary education institutions. O. P. Radkevych (2024) substantiated the prospects of integrating AI into the assessment of teachers' professional activities in general secondary education institutions, as well as the sequence of creating an AI-based assessment model that includes goals, data collection and processing, trial, testing, and actual assessment. Regarding the impact of AI on the formation of an open educational environment of an educational institution, the research results of N. I. Vodop'yan (2023) are important, as she substantiated approaches to using cloud services and AI technologies in educational processes. The results of scientific research on the use of electronic portfolios in the teacher certification process (Electronic teacher portfolio, 2024) deserve attention. For example, AI-based platforms and resources are recommended in materials supporting teacher certification (McFarland, 2025).

The works of American researchers Derrington, M. L. and Campbell J. W. (2018) are of scientific interest. Over a five-year period, they analyzed the implementation of new teacher professional activity evaluation policies by school principals in suburban and rural southeastern regions of the United States. They concluded that mandatory strict evaluation policies do not sufficiently account for teacher effectiveness and can complicate school principals' leadership. The authors argue that policies should consider the long-term consequences of implementation before yielding significant results in teacher evaluation. José Felipe Martínez, Jonathan Schweig, and Pete Goldschmidt (Martínez et al., 2016) substantiated approaches to combining several indicators of teacher performance: accuracy, reliability, validity, and consequences for evaluation policy. They found that, for example, accuracy varies across different models and truncated scores, and that models with the same accuracy can yield different teacher classifications. The specifics of teacher evaluation and self-evaluation during the educational process were studied by Bajrami V. and Kurejsepi E. (2024). The authors concluded the importance for teachers to learn from their own practice. At the same time, experimental and reflective approaches to learning involve a change in the role of teachers, and only in the second stage, the application of specific methods and techniques suitable for encouraging experimental learning.

Purpose: To investigate the role of artificial intelligence in increasing the objectivity of assessing the professional activities of teachers in general secondary education institutions.

Methods: The research employed the following methods: analysis of scientific sources, legislative, and regulatory documents concerning the use of artificial intelligence technologies in education to identify the current state of the research problem; theoretical analysis and synthesis,

generalization of views on the investigated problem to substantiate the role of artificial intelligence in the objective assessment of the professional activities of teachers in general secondary education institutions; and generalization of conclusions.

Results and Discussion. Assessing the professional activities of teachers is a crucial factor in improving the quality of education, as it determines their level of competence, teaching effectiveness, and ability to adapt to modern challenges. Traditional assessment methods, based on observations, expert opinions, and self-assessment, have a number of limitations, including subjectivity and insufficient systematic analysis of results (Na urok, 2021). Modern approaches to assessing professional activity are evolving towards the integration of digital technologies, which allows for a more detailed analysis of pedagogical effectiveness and the formulation of personalized recommendations for improving teaching skills (Kovalskyi & Kyslenko, 2024). The implementation of AI-based electronic assessment is grounded in various conceptual approaches that ensure a comprehensive study of teaching quality, contributing to the creation of transparent and objective mechanisms for evaluating professional activity. In this context, the competency-based, activity-based, and axiological approaches are of particular importance, forming the basis for analyzing and improving the professional activities of teachers. Specifically, the **competency-based approach** involves assessing a teacher's knowledge, skills, and abilities in accordance with modern educational standards. The **activity-based approach** focuses on the teaching process, including teaching methods, organization of the educational process, and ways of interacting with students. The **axiological approach**, in turn, focuses on the moral, ethical, and value orientations of the teacher, which influence the formation of their professional culture and the ability to educate students in accordance with societal norms (Sikora, 2011).

The assessment of teachers' professional activities is traditionally carried out using methods that include expert evaluation, self-assessment, student surveys, and administrative control. These methods have certain advantages, such as the ability to consider the experience and professional judgments of experts, but at the same time, they are subjective, poorly representative, and dependent on external factors. Consequently, modern educational practice increasingly employs **digital technologies** for assessing teachers' professional activities, which allow for obtaining more accurate and objective data, excluding human influence and ensuring greater transparency of the assessment process.

The advantages of AI-powered assessment compared to traditional methods include the speed of data processing, the possibility of long-term monitoring of teachers' professional development dynamics, the objectivity of analyzing professional activity effectiveness indicators, and personalization of educational recommendations (Euro Osvita, 2011). Through the implementation of digital platforms, assessment is carried out not only based on students' final learning outcomes but also on the quality of methodological support, the level of interaction with them, and the teacher's innovative activity. In this context, AI plays a key role, enabling the automation of data collection, analysis, and interpretation, which significantly enhances the objectivity of assessing the professional activities of teachers in general secondary education institutions amidst dynamic changes and increasing demands for pedagogical mastery (Ministry of Education and Science of Ukraine, 2024).

Modern approaches to using AI in assessing the professional activities of teachers in general secondary education institutions are based on interactive platforms that include personal accounts for storing methodological materials and results of completed assignments.

The concept of AI in the field of teacher professional activity assessment characterizes technology that uses algorithms to process information and formulate substantiated conclusions. AI implies the system's ability to imitate human cognitive functions and autonomously improve based on received data (Ministry of Education and Science of Ukraine, 2024). By virtue of its ability to analyze large volumes of information, AI opens new prospects for increasing the accuracy and objectivity of assessment. This technology allows for avoiding subjective factors and forming a more transparent system for evaluating pedagogical activity indicators. The focus on AI in the context of

educational assessment highlights the possibility of remote control of professional competence based on the use of digital tools. AI-based educational systems are capable of analyzing the dynamics of student success, the level of teacher involvement in joint activities, and the impact of innovative teaching methods. The key element becomes **automated data processing**, which reduces the level of errors and minimizes the human factor.

The central AI method is **machine learning**, which is capable of identifying patterns in data arrays and predicting future trends. The application of this approach enables the creation of automated assessment models that adapt to changing educational environment conditions. Big data analysis using machine learning algorithms involves identifying correlations between pedagogical strategies and student learning outcomes. Such methods demonstrate high effectiveness in determining individual pathways for teachers' professional development. **Neural networks** represent a deeper variety of machine learning, as they mimic the work of the human brain and learn through multiple iterations (Machine learning, 2024). This leads to the formation of complex models capable of distinguishing non-obvious patterns in the professional activities of teachers. Within the assessment of teachers' professional activities, neural networks analyze information about the dynamics of class attendance, the level of student work completion, and the characteristics of interactive interaction. The synthesis of the obtained data allows for identifying specific aspects for improving a teacher's competencies.

In assessing teachers' professional activities, **adaptive testing algorithms** play an important role, enabling the selection of individualized tasks depending on the results demonstrated by the teacher during the assessment (Computerized adaptive testing, 2023). This approach helps avoid "leveling" and obtain quality results regarding the teacher's actual level of competence. Each subsequent test block is formed based on the analysis of previous answers. This contributes to a more detailed identification of the strengths and weaknesses of teachers' professional activities. The use of adaptive testing positively affects the monitoring of their professional activity and stimulates professional self-improvement (Radkevych, 2023a). Thus, the use of AI in the context of assessing the professional activities of teachers in general secondary education institutions is considered an effective way to increase the objectivity and transparency of this process (Radkevych, 2023b).

Adaptive assessment systems are based on continuous updating of test and methodological tasks, focusing on the individual characteristics of the teacher. They take into account the level of knowledge, work experience, and formed professional profile, gradually adjusting the complexity of the testing. This approach allows for choosing assessment content oriented towards the optimal vector for competence improvement (Topuzov, Malykhin, & Opaliuk, 2018). The result is a targeted assessment of teachers' professional activities that reflects not only the totality of formal indicators but also real progress in professional development.

Automated analysis of professional activity includes **Natural Language Processing (NLP) algorithms** that can analyze educational materials, methodological recommendations, and communication between teachers and students. This technology focuses on recognizing lexical and semantic features, allowing for determining the compliance of digital resources with modern educational standards (AkademProstir, 2024). Algorithms can identify complex topics or problematic fragments of explanations, indicating areas that need refinement. This forms a more objective picture of professional competence, as the assessment is carried out based on the real content of didactic materials.

The use of AI makes assessment systems flexible and maximally aligned with the real needs of general secondary education. Automated analysis simplifies the data collection procedure, while adaptive approaches emphasize the teacher's personal specificity, and in-depth analysis of big data creates the foundation for long-term forecasting of results (Radkevych, 2023a). Such interaction of digital tools allows for reducing the influence of the human factor on assessment and significantly increasing its objectivity. Thus, AI offers a structured yet flexible mechanism aimed at improving the professional activities of teachers in the digital age.

The application of AI eliminates most human errors that arise during traditional assessment. The analysis of professional activity is carried out based on the correspondence of a teacher's actual actions to established criteria, which significantly reduces any bias (Radkevych, 2024). The possibilities of **personalizing** the assessment of teachers' professional activities reveal the potential of an individual approach to developing their professional competencies. By analyzing various components of professional activity, algorithms form a teacher's profile and correlate it with the dynamics of changes in student learning outcomes. On this basis, personalized recommendations are provided to teachers, covering methodological, psychological, and communicative aspects of improving their professional activities. Such flexibility of digital systems increases teachers' motivation and creates additional incentives for creative search for new teaching forms. Further deepening of personalization becomes possible by taking into account the specific circumstances of the educational environment and specific pedagogical goals. AI systematizes data on emotional involvement, methodological diversity, and the effectiveness of applied approaches, thereby ensuring more detailed monitoring of a teacher's actions. This information allows for developing individual self-development trajectories and adjusting recommendations according to the goals of the subject. As a result, every teacher can compare their own achievements with benchmarks that correspond to national and international standards (Radkevych, 2024).

The **speed and accuracy of analysis** lie in AI's ability to process a huge amount of data in minimal time. Automated algorithms extract digital traces left after each educational interaction and convert them into understandable analytical indicators. This allows for real-time response to challenges, promptly assessing the level of professional activity and the effectiveness of pedagogical decisions. Simultaneously, a clear picture of the current needs of educational practice is ensured, which prevents stagnation and promotes dynamic improvement of the teaching staff. The combination of such approaches in assessment systems enhances the effectiveness of quality management in general secondary education. Educators receive detailed profiles of their activities with specific tips for areas of development, and leaders can make informed decisions regarding personnel policy.

The use of AI in assessing teachers' professional activities raises the issue of **ethical and legal challenges**. The application of algorithms for collecting and storing large volumes of information about teachers requires strict confidentiality rules. Teachers want to be sure that personal information will not become subject to abuse or manipulation. Achieving transparency and compliance with legal norms requires the development of special mechanisms for adhering to ethical principles. Low trust in decisions made by automated systems is due to a lack of clarity in explaining the work of algorithms. Teachers often feel skeptical when they do not understand on what indicators AI determines their professional achievements. Openness and explainability of decisions are critically important to avoid stress and alienation from educators. That is why algorithm developers are increasingly implementing additional modules that allow users to track the logic of the analysis process. The need to adapt AI methods to national educational contexts is explained by the diversity of curricula and cultural and educational traditions (Ministry of Education and Science of Ukraine, 2024).

AI technologies open a new level of integration with digital tools in educational management, creating a unified space for analyzing teachers' professional activities. The synergy of such technologies includes administration tools, distance learning platforms, and electronic journals, which increases the speed and accuracy of data collection. This approach allows for forming a comprehensive vision of teaching quality, as information about academic performance, interaction, and work methods is processed centrally (Dmytruk, 2025). The study of **social skills** that create a trusting atmosphere of cooperation between teachers and students is particularly relevant. AI can track the frequency of verbal and non-verbal contacts, the level of friendly interaction, and partnership forms of group work. Such data determine the dynamics of communicative competence development by analyzing feedback from students. This ensures a broader coverage of factors influencing the educational component of the educational

environment (Pashchenko, 2024). The use of **augmented reality and virtual environments** creates new opportunities for a comprehensive analysis of teachers' professional activities. Virtual reality platforms create simulated classrooms where a teacher can practice complex pedagogical situations, considering the individual needs of students. Augmented reality, in turn, allows for observing the lesson in real time, receiving additional information about student reactions and lesson structure. The combination of these technologies with AI deepens the analysis, focusing on precise indicators of interaction and the results of the created educational environment (Peven, Pletenytska, & Doronina, 2024).

Conclusions. The use of AI in assessing the professional activities of teachers in the context of educational digitalization demonstrates high effectiveness and transparency, contributing to the improvement of general secondary education quality. The results of the study showed that the integration of digital platforms, machine learning algorithms, and big data analytics creates a stable foundation for objective recording of pedagogical activity indicators. Automated mechanisms have simplified the procedure for collecting and analyzing factual information about a teacher's professional activity, eliminating subjective human influence. This approach ensures an increased level of trust among all participants in the educational process and creates new prerequisites for improving the assessment of teachers' professional activities.

An important conclusion of the study is the necessity of transitioning from traditional assessment approaches, which often prioritize quantitative criteria, to a **comprehensive analysis** that includes qualitative indicators. This approach should consider both the content of lessons and methodological diversity, the level of communication with students, and the effectiveness of pedagogical strategies. The role of **digital platforms** capable of synthesizing a large amount of information about a teacher's specific professional activity in dynamics is of particular importance. The obtained data allow for determining individual development vectors and forming clear strategies for professional growth. In such a paradigm, the teacher's role transforms, becoming a partner in a unified assessment ecosystem.

An essential factor for the successful implementation of AI in the educational sphere is the **transparency and ethics of algorithmic decisions**. The protection of teachers' personal data and the ability to track the logic of decision-making are integral conditions for trust and openness. Developers of electronic platforms must ensure a clear interface and mechanisms for explaining results so that users understand the principles of analysis. Such clarity of methods contributes to the formation of a positive attitude towards innovations and strengthens partnership interaction among all subjects of the educational process.

Based on the research results, it is recommended to deepen the integration of AI into professional activity assessment, focusing on adaptation to national standards and preserving an individual approach. The introduction of a unified methodological base will help standardize quality criteria, and the development of special analytical tools will allow for a systematic approach to formulating recommendations. It is expedient to expand cooperation between scientific institutions, the private sector, and government bodies to create an effective ecosystem where AI ensures modern monitoring of teachers' professional activities. This vector of development strengthens the potential of traditional assessment and forms future prospects for improving teachers' professional activities.

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РОЛЬ ШТУЧНОГО ІНТЕЛЕКТУ У ПІДВИЩЕННІ ОБ'ЄКТИВНОСТІ ОЦІНЮВАННЯ ПРОФЕСІЙНОЇ ДІЯЛЬНОСТІ ПЕДАГОГІЧНИХ ПРАЦІВНИКІВ ЗАКЛАДІВ ЗАГАЛЬНОЇ СЕРЕДНЬОЇ ОСВІТИ

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Реферат:

Актуальність. Об'єктивність оцінювання професійної діяльності педагогічних працівників є нагальним завданням сучасної освіти. Це зумовлено динамічними змінами в організації освітнього процесу та зростаючими вимогами до професійної компетентності педагогічних працівників. Традиційні методи оцінювання професійної діяльності педагогічних працівників часто є суб'єктивними та не розкривають повною мірою рівня їхніх знань, умінь та навичок. У цьому контексті штучний інтелект пропонує інструменти для більш точного, прозорого та комплексного оцінювання професійної діяльності педагогічних працівників на основі аналізу даних про якість викладання, їхню взаємодію зі здобувачами загальної середньої освіти та результати навчання.

Мета статті полягає у дослідженні ролі штучного інтелекту у підвищенні об'єктивності оцінювання професійної діяльності педагогічних працівників закладів загальної середньої освіти.

Методи дослідження: вивчення наукових джерел та нормативно-правових документів щодо використання технологій штучного інтелекту в освіті – для виявлення стану дослідження проблеми; теоретичний аналіз, синтез та узагальнення поглядів – для обґрунтування ролі штучного інтелекту в об'єктивному оцінюванні професійної діяльності педагогічних працівників закладів загальної середньої освіти; узагальнення висновків.

Результати: обґрунтовано роль штучного інтелекту в об'єктивності оцінювання професійної діяльності педагогічних працівників закладів загальної середньої освіти на основі використання алгоритмів обробки великих

даних і комплексної аналітики, автоматизації збору та аналізу кількісних і якісних показників професійної діяльності педагогічних працівників, структури взаємодії зі здобувачами освіти, аналізу динаміки розвитку компетентностей, навчальних матеріалів (шляхом обробки природної мови) та результатів навчання здобувачів освіти; розкрито особливості використання штучного інтелекту в оцінюванні професійної діяльності педагогічних працівників шляхом персоналізації завдань та надання індивідуальних рекомендацій для їхнього подальшого професійного розвитку; визначено ключові переваги та виклики, пов'язані з використанням штучного інтелекту в оцінюванні професійної діяльності педагогічних працівників закладів загальної середньої освіти.

Висновки: використання штучного інтелекту суттєво підвищує об'єктивність, ефективність та прозорість оцінювання професійної діяльності педагогічних працівників закладів загальної середньої освіти, адже дає змогу перейти від кількісних критеріїв оцінювання до комплексного аналізу та сприяє формуванню індивідуальних траєкторій їхнього професійного зростання; успішне впровадження штучного інтелекту в оцінювання професійної діяльності педагогічних працівників базується на врахуванні єдиних методологічних підходів і стандартів, а також наявності відповідної технічної інфраструктури.

Ключові слова: *штучний інтелект, оцінювання, професійна діяльність, педагогічні працівники, об'єктивність, цифрові технології, персоналізація, стандарти оцінювання.*

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THE DEVELOPMENT OF DUAL EDUCATION IN THE SYSTEM OF VOCATIONAL (VOCATIONAL-TECHNICAL) EDUCATION IN UKRAINE

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Abstract

The relevance of the article is determined by the necessity of finding optimal forms of professional education acquisition in times of war and socio-economic instability, and improving approaches to organizing professional training for future specialists, considering the tasks of Ukraine's economic recovery.

Aim: To summarize the experience of implementing elements of dual education in the educational process of Ukrainian vocational (vocational-technical) education institutions, and to determine the stages and prospects for the development of full-fledged dual education in Ukraine.

Methods: Study of legislative and regulatory documents, scientific and journalistic sources - for systematizing the experience of dual education functioning in Ukraine; theoretical analysis and synthesis, generalization of scientific views on the investigated problem - for determining the conditions necessary for the development of full-fledged dual education in Ukraine.

Results: The experience of implementing elements of dual education in vocational (vocational-technical) education institutions has been identified, analyzed, and systematized (pilot projects; all-Ukrainian and regional experiments; developments of the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine, activities of the Directorate of Vocational Education of the Ministry of Education and Science of Ukraine, etc.); a theoretical analysis of the legislative, regulatory, and scientific-methodological support for dual education in vocational (vocational-technical) education institutions has been carried out; conditions necessary for the implementation of full-fledged dual education in Ukraine have been determined.

Conclusions: Three main vectors for the development of dual education in the system of vocational (vocational-technical) education in Ukraine have been identified (formation, generalization, and dissemination of practical experience; formation of a regulatory framework for coordinating cooperation between educational and industrial institutions; provision of scientific and methodological support); the main stages of its development have been singled out (theoretical-informational, normative-legal/experimental, practical, generalizing-prognostic); features of implementing elements of dual education in vocational (vocational-technical) education institutions have been identified (regional, sectoral); the educational and methodological base facilitating the implementation of dual education has been characterized (monographs, textbooks, teaching and methodological manuals, methodological recommendations, electronic resources, etc.); forms of popularizing the experience of implementing dual vocational education in Ukraine have been highlighted (conducting mass events, publication activity, mass media, social networks, etc.); the conditions necessary for the development of full-fledged dual education in Ukraine have been outlined (improvement of the legislative framework; development of public-private partnership; intensification of innovative educational activities at various levels; strengthening cooperation between educational institutions and scientific institutions; creation of open information and educational environments for organizing distance learning; development and implementation of a multi-level system of incentive measures to support dual education in the context of enterprise relocation and educational institution displacement).

Keywords: *vocational education, vocational (vocational-technical) education institutions, dual education, dual education system, dual training, public-private partnership.*

Introduction. The implementation of dual education in Ukraine's vocational education system has a specific history and experience, which has demonstrated significant advantages over traditional training of future specialists in vocational (vocational-technical) education institutions (hereinafter: VET institutions). Studying this experience will help clarify the threats, opportunities, and prospects for training future specialists for career building in wartime conditions and during Ukraine's recovery. Despite the successful experience of dual education in EU countries and its achievements in domestic VET institutions, only elements of this form of training are currently used in Ukraine. In view of this, the introduction of full-fledged dual education remains a promising direction for reforming the Ukrainian VET system.

The aim is to generalize the experience of implementing elements of dual education in the educational process of domestic vocational (vocational-technical) education institutions, and to define the stages and prospects for the development of full-fledged dual education in Ukraine.

Methods: Study of legislative and regulatory documents, scientific and journalistic sources – for systematizing the experience of dual education functioning in Ukraine; theoretical analysis and synthesis, generalization of scientific views on the investigated problem – for determining the conditions necessary for the development of full-fledged dual education in Ukraine.

Sources: The research was based on the analysis of: Laws of Ukraine ("On Education" (2017), "On Vocational (Vocational-Technical) Education" (1998)); regulatory legal documents ensuring the development of dual education in Ukraine (Orders of the Ministry of Education and Science of Ukraine "On the Introduction of Elements of Dual System Training in the Professional Training of Skilled Workers" (2015), "On the Introduction of Elements of Dual Form Training in the Professional Training of Skilled Workers" (2017), "On Expanding the List of Vocational (Vocational-Technical) Education Institutions for the Introduction of Elements of Dual Form Training" (2018), "On Approval of the Regulation on the Dual Form of Obtaining Vocational (Vocational-Technical) Education" (2019)); Resolution of the Cabinet of Ministers of Ukraine "On Approval of the Concept of Training Specialists in the Dual Form of Education" (2018), Medium-Term Plan of Priority Actions of the Government for 2017–2020, Action Plan for the Implementation of the Concept of Training Specialists in the Dual Form of Education (2019), etc.; scientific and industrial-practical publications for the vocational education system (Kulalaieva et al., 2019; Kulalaieva, ed., 2023; Haiduk et al., 2020; Haiduk et al., 2021; Homeniuk et al., 2021); websites of institutions, organizations, educational institutions (Ministry of Education and Science of Ukraine, official portal of the Verkhovna Rada, USAID "Economic Support to Ukraine" Project, Ukrainian Center for Dual Education, etc.).

Results and Discussion: The development of dual education in Ukrainian VET institutions proceeded along three main vectors: establishment, generalization, and dissemination of practical experience; formation of a regulatory framework for coordinating cooperation between educational and industrial institutions; and provision of scientific and methodological support. The introduction of elements of dual education in VET institutions was preceded by a study of foreign experience in dual education, particularly in Germany, which allowed for characterizing the main advantages of this form of professional education (improving the quality of personnel training; increasing employers' responsibility for the quality of skilled worker training; overcoming the gap between theory and practice, education and production; accounting for employers' requirements regarding the content and quality of vocational education; increasing graduates' employment rates; training vocational education seekers in the process of work activity; involving qualified personnel from production in pedagogical activities as instructors and teachers; strengthening cooperation between the public and private sectors of the economy; developing social partnership; increasing additional financial inflows to the budgets of vocational (vocational-technical) education institutions) (Miroshnychenko, n.d., p. 4). It is known that in Germany, Austria, and Switzerland, where the dual system of vocational training is applied, on average approximately 40-50% of young people of the same age cohort study under the dual system. As of 2015, German enterprises concluded about half a million agreements on vocational education and invested over 30 billion euros in the educational sphere

(Savchenko, 2015, p. 4). Characteristics of dual education in EU countries include: concluding tripartite agreements (student, enterprise, educational institution); a significant amount of time (70-80%) allocated to on-the-job training, averaging 3-4 days a week; payment to vocational education seekers of remuneration amounting to 80% of a skilled worker's salary; organization of final knowledge control by independent commissions of chambers of commerce and industry (Savchenko, 2015, p. 5).

The fundamental document that initiated the advancement of dual education in Ukraine was the Law of Ukraine "On Education" (2017), which legally recognized the possibility of implementing this form of training (Section 1, Article 9; Section VII, Article 59). The main regulatory framework for the implementation of the dual form in Ukraine is fixed by Resolution of the Cabinet of Ministers of Ukraine No. 275-r of April 3, 2017, which approved two important documents: the Government's Priority Action Plan for 2017 (step 63 "Implementation of public-private partnership in education") and the Medium-Term Plan of Priority Actions of the Government until 2020 (Section III "Human Capital Development", subsection 8: "Modernization of vocational and technical education"), which provided for dual education in 30 VET institutions.

Of significant importance for the development of dual vocational education was also a series of orders from the Ministry of Education and Science of Ukraine regarding the conduct of all-Ukrainian experiments, which initiated the acquisition of the first practical experience in implementing elements of dual education in the professional training of skilled workers.

Specifically, in 2015, pilot and experimental work at the all-Ukrainian level began on the topic "Professional training of skilled workers using elements of a dual training system" (Order of the Ministry of Education and Science of Ukraine, 2015). The experiment was conducted at: the Educational and Methodological Office of Vocational and Technical Education in Kyiv, the Educational and Methodological Center of Vocational and Technical Education in Lviv Oblast, the Scientific and Methodological Center of Vocational and Technical Education in Zaporizhzhia Oblast, Higher Vocational School No. 33 in Kyiv (profession "cook"), Lviv Higher Vocational Art School (profession "painter"), and State Educational Institution "Zaporizhzhia Machine-Building Higher Vocational School" (profession "lathe operator") (Ministry of Education and Science of Ukraine, Dual Education). The participants in the experiment were granted the status of experimental institutions at the all-Ukrainian level, and basic enterprises for the experiment were identified (TOV BK "Dobrobud", PP "Architectural Workshop "Renaissance", KP "CenterKompleks", PJSC "Lviv-Restoration", PJSC "Firm "Naftogazbud", PJSC "Lviv-Restoration"). Foreign partners were also involved in the project (Eberhard Schöck Foundation, Germany; H. Rogush Foundation, Germany; GmbH "German Society for International Cooperation (GIZ)) (Professional Training of Skilled Workers Using Elements of Dual Education, n.d., p. 5).

Within the framework of the experiment, a SWOT analysis was conducted, which allowed to identify: strengths of dual education implementation (higher quality staffing of the educational process, alignment of curricula with production needs, increased participation of employers in organizing professional training of specialists), weaknesses (insufficient funding for updating the material and technical base, undeveloped system of effective stimulation of participants in innovative educational activities), opportunities (increased interest in using modern production technologies, creation of conditions for internships for pedagogical staff at innovative enterprises, reduced time for graduates' adaptation to production conditions), and threats (lack of funds for long-term monitoring of the domestic labor market; cessation of operations of enterprises participating in the experiment due to military actions and creeping occupation of territories; intensification of migration processes negatively affecting the analysis of graduate employment at enterprises providing professional and practical training) (Professional Training of Skilled Workers Using Elements of Dual Education, n.d., p. 7).

In 2017–2020, the list of VET institutions for implementing elements of dual education was expanded to 260, where training was conducted in over 100 professions (Order of the Ministry of Education and Science of Ukraine, 2017; Order of

the Ministry of Education and Science of Ukraine, 2018). The 2017 Order of the Ministry of Education and Science of Ukraine aimed to enhance the quality of training competitive skilled workers, meet the demands of national and regional labor markets, ensure flexibility and mobility of the educational and production process, and update the content of vocational education by introducing elements of dual education. It also approved the Action Plan (road map) for implementing elements of dual education in the professional training of skilled workers in VET institutions in Ukraine. The 2018 Order of the Ministry of Education and Science of Ukraine further expanded the list of VET institutions.

During 2017-2018, thanks to these experiments, 61 educational standards were developed and approved, contributing to the implementation of dual education elements in VET institutions in 25 regions of Ukraine (Miroshnychenko, n.d., p. 11).

In 2018, the "Concept of Training Specialists in the Dual Form of Education" was approved (Resolution of the Cabinet of Ministers of Ukraine, 2018), which is based on the German experience of dual education. The concept outlined a number of problems and tasks whose resolution is expected to overcome negative trends that have arisen in the field of professional training of future specialists, including the devaluation of practical training traditions for students and the refusal of organizations to work with students due to "commercial secrecy" or "difficult competitive circumstances." The main problem requiring resolution was recognized as the insufficient readiness of graduates for independent professional activity in their first jobs in their specialty. The Concept also defined the main manifestations of this problem, including: graduates' unpreparedness to work in their acquired specialty; employers' dissatisfaction with the quality of graduates' education; low level of funding and material and technical support for many educational institutions; isolation of most state-funded educational institutions from modern market relations, undeveloped mechanisms of public-private partnership; ineffective use of budget funds for training specialists who do not want or cannot work in their specialty. The Concept predicted the solution of all these problems in three stages: Stage I (2018–2019) – development of a regulatory framework for the introduction of a full-fledged dual form of education; Stage II (2019–2020) – development of typical models of dual education, implementation of pilot projects, evaluation of their effectiveness; Stage III (2020–2023) – creation of dual education clusters based on competitive educational institutions with the participation of motivated employers.

The Concept of Training Specialists in the Dual Form of Education (approved by Resolution of the Cabinet of Ministers of Ukraine of April 3, 2019 No. 214-r) developed an exemplary agreement on dual training (letter of the Ministry of Education and Science No. 1/11-9361 of September 3, 2018), but it does not reflect all aspects of the Concept of Training Specialists in the Dual Form of Education and changes in the requirements and interests of educational institutions, enterprises, institutions, and organizations, as well as students of vocational (vocational-technical) education.

The Regulatory Impact Analysis of the draft order of the Ministry of Education and Science of Ukraine "On approval of the Regulation on the dual form of obtaining vocational (vocational-technical) education" (2019) noted that there is a problem that cannot be resolved within the framework of existing regulatory acts. This problem lies in the weak coordination and lack of unification of approaches among employers, educational institutions, and students regarding the procedure for obtaining VET in the dual form. To eliminate this problem, the most effective way was deemed to be the adoption of a special regulation that would harmonize the interests of all parties. In view of this, in 2019, the Regulation on the dual form of obtaining vocational (vocational-technical) education was approved, which defined the grounds, conditions, and procedure for obtaining VET in the dual form (Order of the Ministry of Education and Science of Ukraine, 2019, December 12).

Experimental projects and the widespread dissemination of their results within the VET system have made it possible to identify the needs of educational institutions for appropriate scientific and methodological support. It is worth noting the scientific achievements of the Institute of Vocational Education of the National Academy of Educational

Sciences of Ukraine in developing pedagogical innovations for organizing the educational process in VET institutions using elements of dual education. Scientists at the institute conducted a scientific study "Methodological principles of introducing elements of dual education into the professional training of future skilled workers in the construction, machine-building, service, and catering industries" (2019-2021), and supervised an all-Ukrainian experiment "Organization of professional training of future skilled workers through dual education" (2019-2022) and two regional ones: "Development of teaching aids for professional training of skilled workers in the professions of 'General Machinist', 'Cook', 'Confectioner' in the context of dual education" (2020-2022) and "Designing the educational and production environment of a vocational (vocational-technical) education institution in the context of dual education" (2019-2021) (Haiduk, Herliand, Homeniuk, Kulalaieva, Piatnychuk, & Shymanovskyi, 2021, pp. 63-74). In the course of these experiments, the methodological foundations for implementing elements of dual education in the professional training of future skilled workers in the construction, machine-building, service, and catering industries were substantiated, as well as the methodological basis for professional training of future skilled workers with elements of dual education. The specific features of the dual education system in Ukraine for different specialties were determined: construction (establishing cooperation with contractors; challenging working conditions for construction workers), machine-building (necessity of creating training centers on the premises of partner enterprises); service and catering (dependence of catering enterprises' operations on satisfying consumer needs; mandatory adherence to sanitary and hygienic conditions). To improve the educational process carried out under the dual education system, a number of innovations have been developed, including: a methodical system for professional training of future skilled workers with elements of dual education; a methodology for organizing dual education for professional training of future skilled workers; development of social partnership in VET institutions in the context of dual education; a roadmap for employers on implementing dual education; an algorithm for designing the educational and production environment of a VET institution in the context of dual education (Haiduk, Herliand, Homeniuk, Kulalaieva, Piatnychuk, & Shymanovskyi, 2021, pp. 9-35).

It is worth noting that scientists from the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine have also developed a roadmap for employers on the implementation of dual education (Kulalaieva, 2020), which contains the main measures and procedures that should be carried out at each of its four implementation stages (planning, execution, control, adjustment), as well as their possible executors. This roadmap presents an algorithm of actions for representatives of economic entities involved in the practical training of future skilled workers directly at enterprise workplaces. This roadmap provides employers with tools for quality management of the professional training process for future specialists (Kulalaieva, 2020, p. 8).

Particular attention of scientists was paid to the problems of mentorship in the dual training system. Thus, in 2023, at the initiative of the Federation of Employers' Organizations of Dnipropetrovsk region, the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine held a special round table with employers. The purpose of the event was to discuss Germany's experience with dual education, gained during the implementation of Ukrainian-German projects "EXAM - Dnipro" and "SEKWA," which were carried out at enterprises and VET institutions in Dnipropetrovsk, Zaporizhzhia, and Lviv regions. Special emphasis was also placed on analyzing the results of distance learning for organizers and mentors in production (Mentorship in the dual training system: round table with employers, 2023).

Of particular importance for the further development of dual education in the domestic VET system is the SWOT analysis conducted by scientists on the implementation of its elements in the professional training of future skilled workers (Kulalaieva, 2018; Haiduk, Herliand, Homeniuk, Kulalaieva, Piatnychuk, & Shymanovskyi, 2021, pp. 11-12). The conducted SWOT analysis allowed to identify: strengths of dual education (regulation of vocational training by market economy principles; increasing labor market demand for graduates

trained in the dual form; closer alignment of the quality of graduates' professional training with employer requirements; strengthening cooperation between government, education, and business; increasing students' motivation to learn; enhancing the prestige of vocational education), weaknesses (imperfect regulatory support for dual education; outdated material and technical base of VET institutions; insufficient readiness of pedagogical staff; low motivation of employers and their reluctance to conclude agreements with first-year students; significant costs for updating the technological park of VET institutions, etc.). At the same time, certain opportunities revealed by the application of dual education elements were identified (overcoming the qualification gap; improving the material and technical base of educational institutions; increasing school students' awareness of career choice; reducing youth unemployment; increasing the competitiveness of VET institutions; using distance vocational training in theoretical preparation; using innovative educational technologies, methods, and techniques). Of paramount importance for the development of dual education are also the formulated threats (reduction in the number of students in VET institutions; disappearance of training in certain professions that are leaving the labor market; reluctance of enterprises to pay for the professional training of skilled workers; reduction of state funding for the Ukrainian VET system; gradual reduction of time for general education, etc.). Most of these threats remain relevant today. In addition, others have emerged, related to the prolonged war and the need to relocate enterprises to other, safer regions of Ukraine, which has destroyed many partnership teams involved in dual system training and negatively affected the statistics of VET institutions that train specialists using elements of dual education.

The work carried out by the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine has enabled the preparation of a number of educational and practical publications for organizing the educational process in a dual form, which are of significant interest in the VET system. These include: textbooks with the approval of the Ministry of Education and Science of Ukraine ("Modern Technologies of Confectionery Production" (Haiduk, Herliand, Drozich, Kulalaieva, & Romanova, 2020), "Technologies for Insulating Building Facades" (Haiduk, Herliand, Kulalaieva, Pivtoratska, & Piatnychuk, 2021), "Technologies of Machine Tool Operations" (Homeniuk, Romanov, & Shymanovskyi, 2021), a practical guide "Organization of Dual Training in Vocational (Vocational-Technical) Education Institutions" (Herliand, Kulalaieva, Romanova, Shymanovskyi, & Drozich, 2019); a training course for pedagogical staff "Organization of Professional Training of Future Skilled Workers through Dual Education" (Haiduk, Herliand, Homeniuk, Kulalaieva, Piatnychuk, & Shymanovskyi, pp. 59, 67).

Since 2019, the Ukrainian Center for Dual Education (2024) has been working to generalize the experience of dual education in Ukraine: web pages "Regulatory Framework" and "Experience of Dual Education Implementation" have been developed, a group of consultants on dual education development has been created to assist in updating the content of educational programs for training educators to organize the educational process using dual education.

A significant role in the development of dual education in VET institutions is played by the Directorate of Vocational Education of the Ministry of Education and Science of Ukraine, which actively works on improving the regulatory support for dual education. This includes, in particular, the preparation of the draft Law of Ukraine "On Vocational Education," which takes into account the most important tasks regarding the development of dual education. The Directorate promotes cooperation between educational institutions and employers. The official portal of the Ministry of Education and Science of Ukraine provides information on the mechanisms for implementing dual education, including contract заключення, organization of the educational process, and the role of mentors. The Directorate participates in international projects and conferences aimed at exchanging experience and implementing European standards of dual education in Ukraine. Specifically, in cooperation with the European Training Foundation (ETF), a study on the implementation of dual education in Ukraine was conducted. According to the Directorate's conclusions, for

example, in 2020, elements of dual education were already implemented by 327 educational institutions for 393 professions and with the participation of 837 enterprises. The war changed the pace of development of dual vocational education. According to the Institute of Educational Analytics, in 2022, 240 VET institutions used elements of dual training, and according to the "Report on the Results of Monitoring the VET System within the Turin Process in Ukraine" (2023, p. 32) – only 210 for 316 professions. At the same time, the number of enterprises involved in training specialists in the dual form of education increased to 1371. In the same academic year, 12,030 students benefited from this form, and 5930 of them were able to complete their studies. Their employment rate was 70% (Report on the Results of Monitoring the VET System..., 2023, p. 36).

The intensified cooperation between businesses and educational institutions that use elements of dual education is due to several reasons, including: a shortage of personnel in all regional labor markets caused by the forced emigration of Ukrainian citizens; an increasing trend of "aging personnel" at manufacturing enterprises and a depleted personnel reserve due to war and mobilization; improved mechanisms for ensuring a real impact of entrepreneurs on the content of specialists' professional training; and the business's awareness of the importance of providing future specialists with high-quality theoretical fundamental knowledge (Savchuk, 2024, p. 86). To evaluate and recognize learning outcomes in Ukraine, qualification centers have been established, and certain steps have been taken to harmonize the national qualifications system with international standards (Report on the Results of Monitoring the VET System within the Turin Process in Ukraine, 2023, p. 5).

The reform of the VET system in Ukraine involves its "reboot" to address the country's urgent needs and the tasks of its future reconstruction. This reform is based on the Conceptual Principles for the Development of Human Capital in Vocational Education and Training, approved by the Collegium of the Ministry of Education and Science of Ukraine on December 19, 2022. This document is aimed at implementing Ukraine's Recovery Plan, approved by the Government of Ukraine and presented at the International Conference on Ukraine's Recovery (Lugano, Switzerland, July 4–5, 2022). The document extends the validity of the Concept for the Implementation of State Policy in the Field of Vocational (Vocational-Technical) Education "Modern Vocational (Vocational-Technical) Education" until 2027 and, among the tasks for ensuring the compliance of the content and quality of vocational education with the needs of regional labor markets, includes the requirement to involve businesses in the process of training specialists in VET institutions through dual education (Report on the Results of Monitoring the VET System…, 2023, p. 42).

Generalization of the experience of implementing elements of dual education in VET institutions provides grounds to identify several stages of its development in Ukraine, namely: 2012–2014 (theoretical-informational) – studying foreign experience and conducting an information campaign to popularize dual education in Ukraine; 2015–2019 (normative-legal/experimental) – adoption of the first normative-legal documents that initiated the implementation of dual education elements in Ukraine; implementation of pilot projects for the introduction of dual vocational education; 2020–2023 (practical) – dissemination of domestic experience in training specialists using dual education in VET institutions across all regions of Ukraine; 2023–present (generalizing-prognostic) – analysis of domestic experience in training specialists using elements of dual education, identification of its functioning features in wartime conditions, and determination of prospects for further development.

Conclusions: Three main vectors for the development of dual education in the VET system of Ukraine have been identified: establishment, generalization, and dissemination of practical experience; formation of a regulatory framework for coordinating cooperation between educational and industrial institutions; and provision of scientific and methodological support. The main stages of its development have been determined: theoretical-informational, normative-legal/experimental, practical, and generalizing-prognostic. Regional and sectoral peculiarities of implementing dual education elements in VET institutions have been identified. It has been found that the experience of

implementing elements of dual vocational education in Ukraine has enabled the formation of a sufficient educational and methodological base (monographs, textbooks, teaching and methodological manuals, methodological recommendations, electronic resources, etc.). Forms of popularizing the experience of dual vocational education development in Ukraine have been highlighted (conducting mass events, publication activity, mass media, social networks, etc.). The conditions necessary for the development of full-fledged dual education in Ukraine have been outlined: adoption of the Law of Ukraine "On Dual Education"; legislative support for the development of public-private partnership; increased motivation of educational process participants to engage in innovative educational activities at various levels; strengthened cooperation between educational institutions and scientific institutions; creation of open information and educational environments for organizing distance learning; creation of a multi-level system of incentive measures to support dual education in the context of enterprise relocation and war-induced displacement of VET institutions.

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РОЗВИТОК ДУАЛЬНОЇ ФОРМИ НАВЧАННЯ В СИСТЕМІ ПРОФЕСІЙНОЇ (ПРОФЕСІЙНО-ТЕХНІЧНОЇ) ОСВІТИ УКРАЇНИ

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Реферат:

Актуальність статті визначається необхідністю пошуку оптимальних форм здобуття професійної освіти в умовах війни й соціально-економічної нестабільності та вдосконалення підходів до організації професійної підготовки майбутніх фахівців з урахуванням завдань відновлення економіки України.

Мета: узагальнити досвід упровадження в освітній процес вітчизняних закладів професійної (професійно-технічної) освіти елементів дуальної форми здобуття освіти, визначити етапи і перспективи розвитку в Україні повноцінної дуальної освіти.

Методи: вивчення законодавчих і нормативно-правових документів, наукових і публіцистичних джерел – для систематизації досвіду функціонування в Україні дуальної форми здобуття освіти; теоретичний аналіз і

синтез, узагальнення наукових поглядів на досліджувану проблему – для визначення умов, необхідних для розвитку в Україні повноцінної дуальної освіти.

Результати: виявлено, проаналізовано й систематизовано досвід запровадження елементів дуальної форми навчання в закладах професійної (професійно-технічної) освіти (пілотні проєкти; експерименти всеукраїнського та регіонального рівнів; напрацювання Інституту професійної освіти НАПН України, діяльність Директорату професійної освіти МОН України тощо); здійснено теоретичний аналіз законодавчого, нормативно-правового і науково-методичного забезпечення дуальної форми навчання у закладах професійної (професійно-технічної) освіти; визначено умови, необхідні для впровадження в Україні повноцінної дуальної освіти.

Висновки: визначено три основні вектори розвитку дуальної форми навчання в системі професійної (професійно-технічної) освіти України (становлення, узагальнення та поширення практичного досвіду; формування нормативно-правової бази щодо узгодження співпраці між освітніми та виробничими інституціями; забезпечення науково-методичного супроводу); виокремлено основні етапи її розвитку (теоретико-інформаційний, нормативно-правовий/експериментальний, практичний, узагальнювально-прогностичний); виявлено особливості впровадження елементів дуальної освіти у закладах професійної (професійно-технічної) освіти (регіональні, галузеві); охарактеризовано навчально-методичну базу, що сприяє реалізації дуальної освіти (монографії, підручники, навчальні й методичні посібники, методичні рекомендації, електронні ресурси тощо); висвітлено форми популяризації досвіду запровадження в Україні дуальної форми здобуття професійної освіти (проведення масових заходів, публікаційна активність, мас-медіа, соціальні мережі, тощо); окреслено умови, необхідні для розвитку в Україні повноцінної дуальної освіти (удосконалення законодавчої бази; розвиток державно-приватного партнерства; активізація інноваційної освітньої діяльності різних рівнів; посилення співпраці закладів освіти з науковими установами; створення відкритих інформаційно-освітніх середовищ для організації навчання в дистанційному режимі; розроблення й упровадження різнорівневої системи заохочувальних заходів з підтримки дуальної форми здобуття освіти в умовах релокації підприємств та переміщення закладів освіти).

Ключові слова: *професійна освіта, заклади професійної (професійно-технічної) освіти, дуальна форма здобуття освіти, дуальна освіта, дуальне навчання, державно-приватне партнерство.*

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ENERGY-EFFICIENT RECONSTRUCTION OF UKRAINE: ECOLOGICALLY-ORIENTED TRAINING OF CONSTRUCTION INDUSTRY SPECIALISTS

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Abstract:

Relevance: Determined by the need for Ukraine's reconstruction based on principles of energy efficiency and sustainable development, which aligns with both internal economic challenges and international environmental standards.

Aim: To analyze the challenges and prospects of training construction industry specialists in the context of energy-efficient construction, to identify key competencies of future builders, and to outline directions for improving educational programs in accordance with modern environmental requirements.

Methods: Theoretical methods of analysis, systematization, and generalization of scientific sources and regulatory documents, comparative analysis of global experience in training builders in the context of energy efficiency, and forecasting methods for developing recommendations on improving educational policy in the construction sector.

Results: Modern trends in the development of the construction industry in sustainable construction and specialist training have been investigated. Key competencies necessary for future builders to work in energy-efficient construction have been identified, including technical, cognitive, behavioral-activity, and social competencies. Special attention has been paid to the principles of eco-oriented education, teaching methods, and global experience in training specialists in sustainable construction. Successful educational practices that integrate ecological principles into curricula have been analyzed, and directions for improving the professional training of future builders in accordance with international standards have been proposed.

Conclusions: Eco-oriented training of construction industry specialists in energy efficiency is an important condition for ensuring the country's sustainable development and its integration into the European economic space; the introduction of modern teaching methods, the use of renewable energy sources, and the adaptation of international standards will contribute to the creation of highly qualified specialists capable of working in the face of new environmental challenges.

Keywords: *energy efficiency, energy-efficient competence, construction, eco-oriented training, future builders.*

Introduction. The full-scale war ongoing in Ukraine has caused significant destruction to residential, social, and industrial infrastructure. According to estimates by the Kyiv School of Economics (KSE) and Forbes Ukraine magazine, damages in the construction industry amount to hundreds of billions of dollars and continue to grow (Kyiv School of Economics, 2025; Antoniuk, 2025). However, the country's reconstruction must not merely be the restoration of destroyed objects, but a modernization of the entire infrastructure in accordance with the principles of energy efficiency and environmental sustainability. This aligns with both national interests and global trends, particularly the European Green Deal (European Commission, 2019), which defines the direction of development for the

construction sector in EU countries, focusing on reducing energy consumption and decarbonizing construction.

The training of construction industry specialists plays a significant role in this process. These specialists must not only possess traditional skills in designing and erecting structures but also understand the principles of energy-efficient construction, circular economy, the use of environmentally friendly materials, and modern digital technologies. Therefore, the issue of reforming educational programs and personnel training in accordance with new challenges is extremely urgent.

The war has changed Ukraine's construction sector not only in terms of physical destruction but also in its approaches to reconstruction. One of the key problems is the personnel deficit caused by the mobilization of a significant portion of the working-age population and the forced migration of qualified specialists. At the same time, the construction industry faces serious challenges related to the destruction of energy infrastructure, requiring the implementation of autonomous and resource-saving technologies. The rising cost of construction materials and the need to harmonize Ukrainian standards with European norms further complicate the situation, but also open up opportunities for industry modernization.

The transition to energy-efficient construction is not just a forced response to energy challenges, but a strategic decision that will enable reduced energy consumption and decreased reliance on fossil fuels. Implementing modern insulation technologies, using renewable energy sources such as solar panels or heat pumps, and intelligent planning of ventilation and heat recovery systems – all this will contribute to creating a comfortable and safe living environment, as well as optimizing operating costs.

At the same time, the issue of adapting construction education to new realities remains important. Specialists must be prepared not only to use modern construction materials but also to integrate digital technologies such as BIM modeling (Building Information Modeling), big data analytics in construction, automation of design, and energy consumption management. It is the digitalization of the construction industry, along with the use of environmentally safe technologies, that will allow Ukraine not only to recover but also to become a leading country in sustainable construction.

Furthermore, high-quality training of construction personnel is a necessary condition for Ukraine's integration into the European economic space. Compliance with international standards, such as the Energy Performance of Buildings Directive (EPBD), and the ability to attract investments from international financial institutions (World Bank, EBRD, EIB) will largely depend on how well specialists master modern construction methods and sustainable development principles.

Under such conditions, the necessity of forming and developing energy-efficient competence in future builders becomes especially important. It not only contributes to improving professional training but also ensures compliance with the requirements of the modern labor market and global environmental challenges. That is why the key guiding principle for modernizing the vocational education system should be the development of "the specialist's personality as the highest value of the state and the main driver of renewing production relations" (Yershova, 2018, p. 162).

Thus, the formation of energy-efficient competence in future skilled workers of the construction industry is not only relevant but also a necessary step in training highly qualified specialists. This process is crucial for implementing a strategy of sustainable (balanced) societal development, which provides for the rational use of natural resources, reduction of energy consumption, integration of energy-efficient technologies into construction, and the formation of environmental responsibility among construction industry specialists.

The introduction of innovative educational programs focused on energy efficiency and environmental safety will ensure the creation of an economically sustainable and comfortable infrastructure that meets the requirements of the 21st century.

Research Sources. The theoretical analysis of the problem was conducted based on scientific works concerning energy efficiency in the construction industry and the formation of relevant competencies in future specialists (V. Bezyazychnyi, O. Hlushchenko, O. Kovalenko, N.

Kulalaieva, N. Maistrenko, A. Mandryka, V. Radkevych, et al.). Ukrainian scholars have investigated various aspects of forming energy-efficient competence in future specialists. Specifically, V. Radkevych emphasizes that the rational use of energy resources at state, regional, and personal levels requires the formation of energy-efficient awareness among all citizens, including both management structures and production personnel of enterprises. An important aspect is involving students and pupils in studying energy efficiency issues, as they will become direct participants in the processes of developing high-tech products and providing quality services to the population in the future (Radkevych, 2013).

N. Kulalaieva, while researching the methodology for forming energy-efficient competence in future builders through project-based learning, notes that "energy efficiency, comfortable stay in buildings, and reduction of negative environmental impact are the main aspects of 'sustainable,' 'green' construction" (Kulalaieva, 2018).

O. Zakharova and D. Kozyriev, in defining approaches to infrastructure reconstruction in the post-war period, emphasize "the use of ecological construction technologies and ensuring the reliability of buildings for all types of purposes, building a safe and reliable energy infrastructure of the city based on the creation of 'smart' grids and the use of alternative energy sources" (Zakharova, Kozyriev, 2022, p. 7).

Foreign authors associate energy saving with emissions reduction, which forms the basis for satisfying people's desire for a better life. It is improved energy efficiency that is "a practical way to reduce emissions and save energy, implying improved energy efficiency planning in smart cities" (Wang et al., 2021; Cui & Cao, 2024).

A significant number of studies address energy efficiency in the context of determining the energy potential of renewable energy sources, the application of solar, hydro, hydrogen, geothermal energy, bioenergy, wind energy, building energy efficiency, and rational energy use, among others. Despite numerous publications on energy efficiency, researchers still state insufficient coverage of "energy efficiency, as well as the economic, environmental, and social benefits of energy saving among vocational students" (Hlushchenko, 2017, p. 42).

The results of the scientific search confirm the necessity and expediency of researching eco-oriented training of construction industry specialists for Ukraine's energy-efficient reconstruction.

The aim of this study is to analyze the challenges and prospects of training construction industry specialists, considering the requirements of energy efficiency and environmental orientation. The research tasks include defining key components of training, examining existing methodologies, and developing recommendations for their improvement. Primary attention is given to analyzing the experience gained in domestic and foreign educational institutions, as well as studying examples of successful implementation of energy-efficient technologies in construction practice.

Research Methods. A complex of scientific methods was used in the study of environmentally oriented training of construction industry specialists for the energy-efficient reconstruction of Ukraine. Theoretical methods include analysis, systematization, and generalization of scientific literature, regulatory documents, and international experience in the formation of energy-efficient competence in future builders. Comparative analysis allowed for the identification of modern trends in the training of builders in countries successfully implementing environmental standards in construction. Practical methods, particularly forecasting, were used to develop recommendations for improving the vocational education system in the context of sustainable development of Ukraine's construction industry.

Results and Discussion. The modern world faces global environmental challenges that demand radical changes in all spheres of human activity. The construction industry, one of the most resource-intensive and environmentally impactful sectors, requires special attention, as its development is closely linked not only to environmental challenges but also to the country's overall economic state. Foreign researchers emphasize that a state's economic prosperity often coincides with the active development of its construction sector (Osuizugbo et al., 2023). As a fundamental driver of economic growth, the construction sector not only provides society with necessary infrastructure but also

stimulates production in interconnected industries, creating additional jobs and enhancing the country's investment attractiveness (Su et al., 2022). The transition to sustainable development and minimization of negative environmental impact is impossible without training specialists capable of designing, building, and operating buildings according to ecological principles. Therefore, eco-oriented training of construction industry specialists becomes a key task of modern education and a strategic element in ensuring Ukraine's energy-efficient reconstruction.

Eco-oriented training of construction industry specialists in the context of energy efficiency is a process of forming energy-efficient competence, knowledge, skills, and beliefs aimed at mitigating the negative impact of construction activities on the environment "throughout the entire life cycle of a building: from design and construction to operation and disposal" (Borovyk, Yelagin, Polyakova, 2021).

The modern construction industry demands that specialists not only possess traditional professional skills but also the ability to implement energy-efficient technologies, which is a key factor in sustainable development and rational resource use. The competencies necessary for future builders to work with modern energy-saving approaches can be divided into technical, cognitive, behavioral-activity, and social.

Technical competencies include: proficiency in energy-efficient construction technologies (e.g., "passive house" concept, "green" standards (LEED, BREEAM, DGNB), innovative thermal insulation materials and recovery technologies); ability to work with software for designing and modeling energy-efficient buildings (AutoCAD, Revit, EnergyPlus, DesignBuilder) to optimize energy costs; understanding of physical processes in construction (heat transfer, ventilation, influence of climatic conditions on building operational characteristics); practical skills in implementing energy-saving technologies (use of renewable energy sources, integration of "smart" building management systems, etc.).

Cognitive competencies ensure: analytical thinking (ability to evaluate technical solutions from the perspective of energy efficiency and their economic feasibility); critical thinking (evaluation and comparison of alternative construction solutions to minimize energy consumption); innovative thinking (generation of new ideas for energy saving, adaptation of global practices to local conditions); understanding of norms and standards (knowledge of legislative requirements for energy efficiency and ecological construction, etc.).

Behavioral-activity competencies include: teamwork (ability to interact with architects, engineers, clients, and environmentalists during project development and implementation); organizational skills (planning construction stages with consideration of energy saving and cost optimization); decision-making ability (choosing the best materials and technologies for energy-efficient construction in specific conditions).

Social competencies: environmental responsibility (awareness of the need for rational use of natural resources and reduction of carbon footprint); communication skills (ability to effectively explain the benefits of energy-efficient solutions to clients, contractors, and employees); self-learning skills (continuous updating of knowledge in technological innovations, participation in trainings and professional courses).

The implementation of energy-efficient construction requires a comprehensive approach to competence acquisition for future specialists. The combination of technical knowledge, analytical skills, organizational effectiveness, and environmental awareness will enable builders to develop and implement effective, economically viable, and environmentally safe solutions. Therefore, educational institutions must adapt their educational programs to modern requirements of energy saving and sustainable development in the construction industry.

Eco-oriented education for the energy-efficient construction industry is based on several fundamental principles:

- *Holistic systemic approach* – viewing a building as a complex ecosystem interacting with the environment to ensure consideration of all stages of the building's life cycle, from design and construction to operation and use;
- *Sustainable development* (ensuring the needs of the modern generation without harming possible future generations) – rational use of resources, minimization of waste and pollution, and ensuring

the durability and adaptability of buildings (example: use of local building materials, which reduces transport costs and emissions, supports the local economy, and reduces negative environmental impact);

- *Integration of knowledge* (combining knowledge from various disciplines such as architecture, building materials, ecology, economics, and social sciences), which enables the development of comprehensive solutions that consider all aspects of sustainable construction;
- *Practical orientation* – equipping students with practical skills and knowledge necessary for the implementation of energy-efficient and environmentally safe projects. Students should have the opportunity to model scenarios and evaluate the impact of various parameters (e.g., thermal insulation, orientation, different types of windows) on a building's energy consumption.

In the professional training of future skilled workers in the construction industry, it is appropriate to apply the following directions of eco-oriented training for specialists in energy efficiency: Fundamentals of energy saving and energy efficiency: studying principles of heat transfer, heating, ventilation, and air conditioning systems, familiarization with various types of thermal insulation materials and their properties, knowledge of methods for assessing the energy efficiency of buildings, etc. Renewable energy sources: familiarization with technologies for using solar, wind, geothermal energy, etc., to meet building energy needs. Ecological building materials: studying the characteristics of environmentally friendly building materials such as wood, natural stone materials, straw, production waste, and methods of their use in construction. Designing energy-efficient buildings: concepts of "passive house," "zero-energy house," "active house" construction (Radkevych, 2015, pp. 55-62), optimization of building orientation, use of natural lighting and ventilation, and selection of energy-efficient equipment and systems. Building energy consumption management: studying methods for monitoring and controlling building energy consumption, as well as developing strategies for energy saving and optimizing energy efficiency.

Effective eco-oriented training of construction industry specialists requires the application of diverse teaching methods that activate students' cognitive activity and contribute to the formation of practical skills: interactive lectures and seminars (ensuring active student participation in discussions of current issues of energy efficiency and ecological construction); problem-based learning (considering real ecological problems related to construction activities and finding ways to solve them); project activities (development and implementation of projects for energy-efficient modernization of buildings, green building, use of renewable energy sources, processing of construction waste) (Kulalaieva, 2018); case method (solving real-life situations – examples of applying energy-efficient technologies) (Hlushchenko, 2017); practical classes and laboratory works (conducting experiments and measurements to assess the ecological characteristics of building materials, energy efficiency of buildings, etc.); business games and simulations (modeling real situations related to the design, construction, and operation of energy-efficient buildings); excursions to ecologically oriented construction sites (familiarization with advanced experience in ecological construction); involvement of experts (conducting lectures and seminars with the participation of specialists in ecological construction, representatives of construction companies and organizations involved in building certification).

Globally, more and more educational institutions are integrating ecological principles into their educational programs, preparing future specialists for work in the context of sustainable development and energy-efficient construction. Below are examples of successful eco-oriented training practices in foreign educational institutions.

German universities and colleges offer a wide range of energy-efficient construction programs that include theoretical training, practical classes, and internships at construction companies. Special attention is paid to the use of renewable energy sources and environmentally friendly building materials, for example, the Technical University of Munich (TUM, 2025) has a "Resource Efficient and Sustainable Building" program.

Swiss educational institutions actively offer interactive teaching methods such as case studies and project-based learning. Students have the

opportunity to develop their own energy-efficient building projects and present them at competitions and conferences. For example, the ENBau initiative, founded by Swiss universities, offers advanced training programs in sustainable construction, energy efficiency, and renewable energy sources. These programs include modules on designing passive solar buildings and managing the energy efficiency of real estate, which contributes to the development of practical skills in students.

Conclusions. It is evident that, being a complex, multifaceted, and multilevel construct, energy-efficient competence cannot be formed solely through the acquisition of predominantly theoretical knowledge. Its development requires the comprehensive implementation of educational and upbringing, classroom and extracurricular pedagogical tools within a holistic educational process. Eco-oriented training of construction industry specialists in energy efficiency is a key factor for ensuring the sustainable development of society. It requires a comprehensive approach that includes the integration of knowledge from various disciplines, practical orientation, and the use of modern teaching methods and tools. The implementation of eco-oriented approaches into the curricula of construction specialties makes it possible to prepare a generation of specialists who will design, build, and operate energy-efficient and environmentally safe buildings, contributing to the sustainable development of Ukraine.

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ЕНЕРГОЕФЕКТИВНА ВІДБУДОВА УКРАЇНИ: ЕКООРІЄНТОВАНА ПІДГОТОВКА ФАХІВЦІВ БУДІВЕЛЬНОЇ ГАЛУЗІ

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Реферат:

Актуальність: зумовлена потребою у відбудові України на принципах енергоефективності та сталого розвитку, що відповідає як внутрішнім економічним викликам, так і міжнародним екологічним стандартам.

Мета: проаналізувати виклики та перспективи підготовки фахівців будівельної галузі в умовах енергоефективного будівництва, визначити ключові компетентності майбутніх будівельників та окреслити напрями вдосконалення освітніх програм у відповідності до сучасних екологічних вимог.

Методи: теоретичні методи аналізу, систематизації та узагальнення наукових джерел і нормативно-правових документів, порівняльний аналіз світового досвіду підготовки будівельників у контексті енергоефективності, а також методи прогнозування для розроблення рекомендацій щодо вдосконалення освітньої політики у сфері будівництва.

Результати: досліджено сучасні тенденції розвитку будівельної галузі у сфері сталого будівництва та підготовки фахівців. Визначено основні компетентності, необхідні майбутнім будівельникам для роботи в умовах енергоефективного будівництва, зокрема технічні, когнітивні, поведінково-діяльнісні та соціальні. Окрема увага приділена принципам екоорієнтованої освіти, методам навчання та світовому досвіду підготовки фахівців у сфері сталого будівництва. Проаналізовано успішні освітні практики, що інтегрують екологічні

принципи в навчальні програми, та запропоновано напрями вдосконалення професійної підготовки майбутніх будівельників відповідно до міжнародних стандартів.

Висновки: екоорієнтована підготовка фахівців будівельної галузі з питань енергетичної ефективності є важливою умовою забезпечення сталого розвитку країни та її інтеграції в європейський економічний простір; упровадження сучасних методів навчання, використання відновлюваних джерел енергії та адаптація міжнародних стандартів сприятиме створенню висококваліфікованих спеціалістів, здатних працювати в умовах нових екологічних викликів.

Ключові слова: *енергетична ефективність, енергоефективна компетентність, будівництво, екоорієнтована підготовка, майбутні будівельники.*

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ENTREPRENEURIAL COMPETENCE IN THE PROFESSIONAL DEVELOPMENT OF RENEWABLE ENERGY SYSTEMS SPECIALISTS: CONTENT AND STRUCTURAL COMPONENTS

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Abstract

Relevance. The relevance of the study is determined by the need to overcome key contradictions in the professional training of renewable energy systems specialists; there is a dissonance between the growing demands of the energy market for the comprehensive competence of specialists and a certain fragmentation of entrepreneurial activity training; the dynamic development of the renewable energy sector enhances the topicality of the problem, requiring continuous improvement of vocational education to ensure the compliance of graduates' competencies with new technological and market realities; the need to expand methodological approaches to forming entrepreneurial thinking in technical specialists remains relevant, which will correspond to the innovative nature of renewable energy technologies; global challenges of energy security, decarbonization of the economy, and the need for accelerated implementation of renewable energy technologies actualize the formation of a fundamentally new type of professional – a specialist capable not only of performing certain technological processes but also of successfully commercializing innovative projects in a highly competitive environment; the transformative processes of the modern energy sector require an in-depth analysis of the content and structural components of entrepreneurial competence, which will allow for the creation of a theoretical and methodological basis for anticipatory professional training that will correspond to current trends in industry development, technological shifts, and dynamic changes in the energy market.

The purpose of the article is to highlight conceptual approaches to defining the essence of entrepreneurial competence and its structural components in the context of the professional development of renewable energy systems specialists, to reveal the substantive characteristics of entrepreneurial competence in the energy sector, and to substantiate the methodological foundations for integrating technical and entrepreneurial components in the professional training of renewable energy specialists, considering current trends in its development and transformative processes in the energy sector of the economy.

Methods: studying the scientific source base for systematizing conceptual approaches to studying the content and structure of entrepreneurial competence, identifying theoretical and methodological foundations for researching its structural components; theoretical analysis and synthesis, systematic review of the investigated problem – to define and substantiate the main components, content, and structure of the defined competence of renewable energy specialists, determining the interrelationships between its components; generalization and systematization – to substantiate the methodological foundations of its formation, determining promising directions of development.

Results: the theoretical and methodological foundations for the formation of entrepreneurial competence in renewable energy systems specialists have been substantiated, revealing its essential characteristics, substantive dominants, and functional structure in the context of systemic transformations of vocational education and sectoral features of alternative energy sources; the critical importance of developing entrepreneurial competence in future specialists for ensuring sustainable development in conditions of constant transformations of the energy sector has been proven; approaches to understanding the nature of entrepreneurial competence as one of the tools for professional self-realization have been defined.

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Conclusions: entrepreneurial competence of renewable energy systems specialists is a dynamic formation that develops both during professional training and in the process of direct professional activity; it is characterized by a complex structure that integrates individual-personal and professional qualities into a holistic system of interconnected components; the results of the study confirm that this competence is one of the main components of professional development, which transforms a technical specialist into an active participant in economic processes in energy, as it involves the ability to analyze market opportunities, assess one's own potential, and develop business strategies and plans; the specificity of professional activity in the energy sector requires the simultaneous application of technical knowledge, economic literacy, legal awareness, readiness for risk, and innovation; two main approaches to understanding entrepreneurial competence have been identified: as a system of professional characteristics and as a complex of personal qualities, the combination of which provides a holistic understanding of its importance for the professional development of a specialist; a specialist with developed entrepreneurial competence contributes to the implementation of environmentally friendly technologies, ensuring both technological and socio-economic transformations of the energy sector.

Keywords: *entrepreneurial competence, renewable energy, professional training, structural components, systemic approach.*

Introduction. The modern state of vocational education in Ukraine is characterized by significant transformations, driven by the modernization of socio-economic relations and the reform of the educational sector. The updating of vocational training content is influenced by integration processes, technological changes, and labor market needs, which necessitates a re-evaluation of the essence of professional competencies of skilled workers.

Of particular importance is the training of skilled workers for the renewable energy sector, which is recognized as one of the key areas of economic development and strengthening of Ukraine's energy independence in modern conditions (Timashov & Hubii, 2024). The expansion of enterprises for the production, installation, and maintenance of renewable energy systems leads to an increased demand for qualified specialists capable of working effectively in the dynamic changes of the industry. The intensification of technological innovations in solar, wind, bioenergy, and other areas of renewable energy sources is accompanied by a diversification of professional functions of workers and increased demands on their professional competence. The accelerated implementation of technological innovations in the field of "green" energy supply is accompanied by a diversification of professional functions of workers and increased demands on their professional competence (Humenyuk & Novak, 2020).

European integration processes in Ukraine's vocational education system actualize the issue of aligning the training of skilled workers with European standards, where entrepreneurial competence is considered one of the key competencies for specialists in various economic sectors. Its formation becomes critically important for ensuring the competitiveness of graduates of vocational (vocational-technical) education institutions in the dynamic labor market related to renewable energy systems. The ability to engage in entrepreneurial activity for such specialists gains particular importance in the context of the decentralization of the energy system in Ukraine, the development of small and medium-sized enterprises in the industry, and the increase in the volume of service and consulting services in energy efficiency and environmentally friendly technologies. The entrepreneurial aspect of professional training becomes especially relevant in the context of Ukraine's post-war recovery, when skilled workers with developed entrepreneurial competencies should become key agents in rebuilding damaged or destroyed energy infrastructure. The ability to quickly make decisions regarding the choice of optimal technological operations, effectively use limited resources, interact with various stakeholders, and implement innovative approaches to restoring energy supply in affected regions makes such specialists indispensable participants in the reconstruction processes and ensuring the country's

energy stability in crisis conditions (Melnychenko, 2022).

Structural changes in the energy sector significantly transform the requirements for the professional profile of a modern renewable energy systems specialist. There is a gradual transition from training highly specialized technical specialists to forming multifunctional specialists with an expanded range of professional tasks. A specialist who is limited to only basic functionality does not meet the demands of the labor market and is unable to fully realize their potential. The synergy of technological, economic, and managerial skills creates a fundamentally new quality of professional readiness – the ability to act not only as an executor but also as an active subject of innovative energy solutions, a generator of added value in the industry, and a catalyst for its modernization. In such conditions, entrepreneurial competence transforms from an additional element into a system-forming factor of professional development for skilled workers, ensuring their adaptability to rapidly changing technological trends and the ability to turn industry challenges into opportunities for professional self-realization and self-reliance.

In this context, the issue of forming entrepreneurial competence as a necessary component of the professional development of energy sector specialists is actualized. The practical significance of researching the content and structural components of entrepreneurial competence is due to the need to modernize the system of professional training for renewable energy systems specialists in accordance with modern technological and economic trends in the development of this economic sector.

Sources of Research. A comprehensive analysis of the scientific literature on the problem of forming entrepreneurial competence in vocational education indicates the multifaceted nature of research into this phenomenon. The theoretical and methodological foundations of entrepreneurial competence are thoroughly developed in the works of H. Matukova (2016), V. Maykovska (2021), and R. Pryma (2021), who consider it as an integrative quality of personality that combines knowledge, skills, experience, and personal qualities necessary for effective entrepreneurial activity.

Of fundamental importance for our research are the scientific investigations of V. Radkevych, O. Radkevych, and M. Pryhodiia (2022) regarding practice-oriented training of specialists in the field of renewable energy, which create a methodological basis for understanding the specifics of professional activity in this sector. In particular, the authors substantiate the need for implementing project technologies in the training of skilled workers, which directly correlates with the formation of entrepreneurial competence. This understanding is complemented by the research of L. Markina, O. Savina, S. Ushkats, and N. Zholobenko (2021) on forming human potential in resource-saving technologies and alternative energy sources. The authors emphasize that to ensure innovative development in the context of resource-saving technologies and alternative energy sources, highly qualified specialists are needed who integrate general and professional competencies necessary for solving issues of development, implementation, and improvement of resource and energy-saving technologies, methods, and mechanisms in combination with the possibility of entrepreneurial activity. An important conceptual basis for understanding the industry context of entrepreneurial competence formation is also the scientific research of Yu. Bashynska (2017), dedicated to the organizational and economic foundations of regional utilization of renewable energy potential. The researcher defines, in particular, ways of developing public-private partnerships in the field of renewable energy, and also emphasizes the staffing of such partnerships with appropriate, including entrepreneurial, training.

Didactic and methodological aspects of integrating the entrepreneurial component into vocational training in vocational (vocational-technical) education institutions are revealed in the works of L. Bazyl, I. Hrytsenok, D. Zakhatnov, L. Yershova, V. Orlov, and others. Researchers analyze various institutional, socio-economic, and pedagogical factors in the formation of entrepreneurial competence in the vocational education system, emphasizing its actualization in modern socio-economic conditions: perspectives of

preparing youth for entrepreneurial activity in the post-war period are considered, and the influence of the country's youth policy on preparing vocational education seekers for entrepreneurial activity is analyzed, which creates a methodological basis for understanding the socio-economic context of entrepreneurial competence formation (Yershova, 2022, 2023); realities and prospects of preparing future specialists for entrepreneurial activity are highlighted, as well as features of youth entrepreneurship development and vocational education in Ukraine in conditions of martial law, which expands the understanding of institutional mechanisms for ensuring the entrepreneurial component of vocational training (Bazyl, 2021, 2023); the methodology for developing entrepreneurial activity of students by means of project activities is substantiated, which allows conceptualizing practice-oriented approaches to forming entrepreneurial competence (Hrytsenok, 2022).

However, despite the significance of these studies for the methodological understanding of the problem of forming entrepreneurial competence in students, particularly in vocational (vocational-technical) education, the issues of the sectoral specificity of renewable energy open up additional prospects for scientific analysis, taking into account the innovative nature of the industry and the peculiarities of the professional activities of skilled workers. At the same time, the analysis of scientific sources reveals a lack of systemic research on the content and structural components of entrepreneurial competence in the context of the professional development of alternative energy specialists, which confirms the relevance of our study.

The aim of the article is to theoretically analyze conceptual approaches to the essence of entrepreneurial competence in the professional development of renewable energy systems specialists, to substantiate its structural-component composition taking into account industry specifics, to identify the substantive features of entrepreneurial activity in the energy sector, and to develop methodological foundations for integrating vocational-technical and entrepreneurial training in the context of transformative processes of the modern energy market.

Research Methods: studying the scientific literature to systematize conceptual approaches to studying the content and structure of entrepreneurial competence, identifying theoretical and methodological foundations for researching its structural components; theoretical analysis and synthesis, systematic review of the researched problem – to define and substantiate the main components, content, and structure of the defined competence of renewable energy specialists, determining the interconnections between its components; generalization and systematization – to substantiate the methodological foundations of its formation, determining promising directions of development.

Results and Discussion. Regulatory documents at European and national levels in the field of education clearly define the importance of forming key competencies in students, where entrepreneurial competence occupies a special place alongside career competence. These documents emphasize their crucial role in the development of a successful individual ready to work effectively in modern economic conditions and contribute to strengthening the country's competitiveness in the global market.

At the same time, in the Ukrainian system of vocational (vocational-technical) education (hereinafter: V(VT)E), there is a significant gap between the declared goals regarding the development of entrepreneurial competence and the real conditions for its formation, especially for specialists in the field of renewable energy. The issue of effective training of future skilled workers for the rational use of their own resources and economic planning in the dynamic development of the modern energy sector, which requires new approaches to the structure and content of vocational training, needs to be resolved.

The primary challenge in vocational education remains the development of students' ability for strategic management of their own potential – personal resources (creative abilities, self-organization, emotional intelligence, leadership qualities) and time opportunities. Studies of educational practice demonstrate that the integration of effective use of individual abilities with rational time management forms the basis of professional success and the development of

entrepreneurial potential of future specialists in the dynamic conditions of the modern labor market (Yershova, 2019).

European and domestic scientific sources offer a wide range of interpretations of entrepreneurial competence, reflecting the multifaceted nature of this phenomenon and the variety of methodological approaches to its conceptualization. A review of these interpretations allows for the identification of both common features and differences in understanding the key characteristics of the entrepreneurial component in various educational systems and scientific schools.

The European Reference Framework of Key Competences for Lifelong Learning defines entrepreneurial competence as one of the key educational priorities. In the European tradition, this component is interpreted as a holistic set of knowledge, skills, and attitudes necessary for transforming ideas into practical action and developing an entrepreneurial mindset. Importantly, such an interpretation goes beyond the purely economic plane of creating and conducting business and acquires the meaning of a universal life skill that contributes to personal growth, professional development, and the formation of an active civic position. The European conceptual model of entrepreneurial competence emphasizes the importance of initiative, creativity, confidence, and the ability to implement one's own ideas as fundamental qualities of a modern specialist. The multidimensionality of this concept is manifested in the integration of various knowledge, skills, and attitudes necessary for the successful implementation of entrepreneurial initiatives, promoting innovative processes, and adapting to dynamic market conditions. Such an understanding of entrepreneurial competence reflects its key role in forming a competitive and dynamic economy, as well as its significance for the personal development of a professional (Ovcharuk, 2025).

Entrepreneurship acts as one of the fundamental characteristics of a modern specialist, including in the field of renewable energy, combining a complex of interconnected qualities – from creativity and innovation to risk orientation, analytical thinking, and leadership skills. Despite the recognition of the critical importance of this multifactorial competence for effective professional activity and the detailed study of its structural components, there is a lack of a systemic approach to its formation in the V(VT)E system (Popova & Zolotukhina, 2020). Educational programs for various professions demonstrate fragmentation and unsystematic inclusion of entrepreneurial components, and a single conceptual framework that would define the goals, content, methods, and forms of learning aimed at developing entrepreneurial competencies remains unformed, which significantly limits the possibilities of their purposeful development.

Studies by domestic scholars consider entrepreneurial competence as: a level of readiness to solve real business problems based on economic, legal, and managerial knowledge and practical experience; the ability to consciously take risks, assume responsibility, analyze problems, and make informed decisions; a set of individual-personal qualities and behavioral models that ensure the effective execution of business tasks; an integrated formation that combines goal-setting, a positive attitude towards entrepreneurial activity, the ability to plan activities and forecast results, and to apply innovative approaches in entrepreneurship.

In her research, Yu. Bilova (2015) defines entrepreneurial competence as a complex psychological characteristic of an individual, manifested through the ability to creatively seek and implement new economic ideas for solving various life, professional, and social problems. The researcher focuses on leadership qualities, the ability to resolve conflict situations, make decisions, work effectively in a team, motivate personnel, and form effective organizational structures. The proposed interpretation reflects the multidimensional essence of entrepreneurial competence, which combines personal qualities, professional skills, and organizational abilities. Such an understanding emphasizes the significance of entrepreneurial competence for overcoming diverse challenges and lays a theoretical foundation for further scientific inquiries.

M. Strelnikov (2016) considers entrepreneurial competence as an integrative combination of personal and business qualities, practical skills, theoretical knowledge, and a specific behavior model that together ensure the effective solution of business problems. The

researcher attributes the following key components to this competence: personal qualities (initiative, perseverance, willingness to take risks, creativity); business qualities (strategic thinking, managerial and communication skills, financial literacy); practical skills in implementing ideas and making decisions; theoretical knowledge in economics, management, and law; and an appropriate behavior model. This approach demonstrates the comprehensive nature of entrepreneurial competence and creates a theoretical basis for studying methods of its formation in the educational environment.

According to H. Nazarenko (2014), the formation of entrepreneurial competence is a complex and contradictory process of personal development that goes beyond the mere acquisition of theoretical knowledge. The researcher identifies three interconnected components of this process: entrepreneurial knowledge (economics, management, marketing, finance, law), entrepreneurial consciousness (a specific worldview, values, and motivations characterized by initiative, innovativeness, and willingness to take risks), and entrepreneurial behavior (the ability to act effectively in a business environment, make decisions under uncertainty, establish communications, and manage resources). Importantly, these components function as a single system, where the presence of theoretical knowledge alone without appropriate consciousness and behavioral models does not ensure the formation of full-fledged entrepreneurial competence.

These theoretical approaches allow us to state that for masters in the installation and maintenance of renewable energy systems, entrepreneurial competence is not an additional advantage but an important component of their professional training. The formation of entrepreneurial skills in such specialists creates double value: on the one hand, it opens opportunities for independent entrepreneurial activity and ensuring their own economic well-being, and on the other hand, it significantly strengthens the potential of industry enterprises by increasing the efficiency of employees' professional activities in the energy sector of the economy.

A defining specific feature of the entrepreneurial competence of masters in the installation and maintenance of renewable energy systems is the integration of knowledge components from various fields. Research into this phenomenon indicates the need for a comprehensive approach to forming the professional profile of such a specialist, which is due to the diverse nature of professional tasks requiring the simultaneous application of technical, economic, legal, and managerial approaches (Institute of Renewable Energy of the National Academy of Sciences of Ukraine [IRE NASU], 2020).

Technical training forms the basis of professional activity and includes knowledge of the principles of operation, installation methods, and operating rules for various types of energy systems – from solar power plants to bioenergy installations. Ensuring the technical reliability and safety of renewable energy systems requires a thorough understanding of technological processes and the specifics of the equipment used. At the same time, economic knowledge allows specialists to analyze the market situation, plan business processes, and rationally use available resources. Understanding pricing mechanisms and methods for evaluating the investment attractiveness of projects is a necessary condition for making informed decisions in entrepreneurial activity. Legal awareness includes knowledge of regulatory documents governing the renewable energy sector, peculiarities of contract conclusion, and ways to protect the rights of all project participants. Knowledge of environmental legislation and principles of sustainable development ensures the environmental safety of entrepreneurial activity. The managerial component of competence involves mastering methods of organizing work processes, coordinating personnel activities, and controlling project implementation. Effective team management and the ability to resolve conflict situations contribute to the productivity and effectiveness of entrepreneurial activity. Additional components of professional training include knowledge of computer science, mathematical statistics, and strategic planning. The use of digital tools and analytical methods, the ability to forecast risks, and adherence to principles

of professional ethics create a basis for successful entrepreneurship development in the renewable energy sector.

Structural and substantive design of entrepreneurial competence for future specialists in the installation and maintenance of renewable energy systems should be based on the results of comprehensive scientific research aimed at analyzing the individual and personal characteristics of successful entrepreneurs in the energy sector. A systematic approach to forming the specified competence involves integrating theoretical and practical components, taking into account current trends in renewable energy development.

At the same time, a set of individual-personal characteristics inherent in representatives of the entrepreneurial environment can be identified. Among the leading qualities, it is worth noting the ability to act effectively in situations of uncertainty and show resistance to physical and psycho-emotional loads. Successful entrepreneurs are characterized by a tendency towards calculated risk and a willingness to take responsibility for management decisions, combined with optimistic expectations regarding the results of activities and a desire to minimize the probability of failure as motivational determinants. Defining personal traits include perseverance in achieving goals, adaptability to changing conditions, energy, and a developed sense of personal responsibility. Essential components of an entrepreneur's psychological profile are confidence in one's own potential and competencies, based on continuous professional development, communication skills, the ability to form business networks and convincingly argue one's position, as well as rational thinking, the ability to make informed decisions under various circumstances combined with purposefulness and unwavering determination in implementing set tasks. It is precisely the integration of these characteristics that forms the psychological profile of an effective entrepreneur, the development of which is a prerequisite for the successful implementation of business initiatives and the sustainable functioning of entrepreneurial structures.

At the same time, a complex of individual-personal characteristics inherent in representatives of the entrepreneurial field can be identified. Among the key qualities, it is worth noting the ability to work effectively and show resilience to physical and psychological stress. Successful entrepreneurs are characterized by a tendency towards reasonable risk and a willingness to take responsibility for their decisions, combined with an optimistic outlook on the results of their work and a desire to avoid failure as key motivators. Important personal traits include perseverance in achieving goals, flexibility in changing conditions, energy, and a strong sense of personal responsibility. Important components of an entrepreneur's psychological portrait are confidence in their abilities and skills, based on continuous learning, the ability to communicate, build business contacts, and convincingly convey their opinion, as well as practical thinking, the ability to make informed decisions in various situations along with purposefulness and strong determination to achieve set goals. It is the combination of these qualities that creates the psychological profile of a successful entrepreneur, the development of which is the basis for effective implementation of business projects and ensuring stable entrepreneurial activity (Tanklevska & Tanasiychuk, 2024).

The formation of entrepreneurial competence in energy sector specialists involves the systematic development of specific and professional abilities necessary for the effective implementation of entrepreneurial initiatives. This approach ensures the integration of specialized technical knowledge with entrepreneurial thinking, which is a prerequisite for professional autonomy and self-reliance in modern economic conditions. The design of a competence model for an energy sector specialist requires a comprehensive approach that harmoniously combines the development of professional tools with the formation of personal qualities that determine the success of entrepreneurial activity. It should be noted that the quantitative composition of the structural elements of entrepreneurial competence varies depending on the scale of professional tasks faced by specialists in the installation and maintenance of renewable energy systems. However, regardless of this variability, the formed entrepreneurial component is characterized by the

presence of an integrated set of qualities and skills, including: the ability to harmonize economic interests with available resource opportunities and societal needs; the application of resource monitoring methods to ensure environmental sustainability; analytical assessment of professional potential in the context of market demands; project skills (development, implementation, and evaluation of business projects); algorithmic processes of making economically sound decisions; organizational and managerial skills in the context of collective activity; legal awareness regarding labor relations; communication skills for presenting the results of economic activity (Moldavan, 2020). A deficit of any of these components in the structure of a specialist's personal and business qualities significantly reduces the overall level of entrepreneurial competence. Conversely, the comprehensive formation of all structural elements increases the specialist's potential for effectively solving diverse professional tasks in the energy sector.

In modern scientific research on the problem of entrepreneurial competence, two main approaches to its study can be traced. The first approach considers it as a component of professional competence, borrowing its structural elements from a more general model of professional development. The second approach focuses on the specific features of entrepreneurial activity, considering its unique requirements and characteristics. Researchers are unanimous that entrepreneurial competence is a complex formation that combines professional knowledge, practical skills, motivational orientation, and personal qualities necessary for successful entrepreneurial activity.

In the modern world, the profession of a master in the installation and maintenance of renewable energy systems is becoming increasingly in demand and promising. This is due to several determining factors: the need to reduce harmful environmental impact, the desire to ensure the country's energy security, and the rapid development of "green" technologies. The labor market needs specialists capable of comprehensively solving problems in the field of alternative energy: from design to installation and maintenance of solar, wind, geothermal, and other types of energy systems. Given the global trends of decarbonization of the economy and the transition to a sustainable energy consumption model, the importance of this profession will only grow. Ukraine has significant potential for the development of renewable energy sources. The main advantages of such sources are their inexhaustibility, environmental friendliness, and compliance with modern technological standards (Dobryanska et al., 2020). Especially promising areas are solar energy, wind energy, and biogas production, which open up wide opportunities for the professional realization of future specialists.

The uniqueness of entrepreneurial competence of masters in the installation and maintenance of renewable energy systems lies in the exceptionally close interrelationship between diverse professional components that cannot be considered in isolation. Each component of such competence is in constant dynamic interaction, complementing and reinforcing each other. The specificity of the structure is determined by the multifaceted nature of professional tasks in the field of renewable energy, which requires the specialist to be able to quickly integrate knowledge from different fields, making a traditional approach to structuring professional competence by clearly defined separate components impossible. The formation of such a component requires a comprehensive approach that ensures: flexibility in adapting to market changes, the ability to generate innovative ideas, the possibility of creating and developing one's own business, and a focus on sustainable industry development. The ultimate goal of training is to educate specialists capable not only of professionally performing technical tasks but also of actively influencing the development of renewable energy as a promising economic link. This involves forming entrepreneurs who understand the complex challenges of the industry, can independently generate business solutions, and contribute to the country's environmental safety.

The study of the entrepreneurial component of masters in the installation and maintenance of renewable energy systems reveals a complex scientific problem of training relevant specialists, as we have two fundamentally different approaches to understanding the nature of this competence,

each of which has its own methodological features and explanatory potential. The first approach considers this competence as a holistic system of professionally important characteristics. The focus is on diverse knowledge, skills, abilities, and personal qualities necessary for successful activity in the field of renewable energy. This approach combines technical, economic, legal, and environmental components of professional activity, creating a multidimensional model of competence. An alternative approach focuses on the individual psychological characteristics of the personality. It emphasizes the master's internal reserves, their ability for innovative and risky activities. Key elements are motivation, individual attitude towards entrepreneurship, and personal qualities that ensure the overcoming of professional challenges. Both approaches are not mutually exclusive but, on the contrary, complement each other. They reveal different facets of entrepreneurial competence, demonstrating its complex, multi-layered nature. Technical skills, economic thinking, and legal literacy are combined with personal dynamics, the ability to innovate, and overcome barriers. The practical significance of such a comprehensive approach lies in understanding entrepreneurial competence as a dynamic system of professional development. This involves forming a specialist capable not only of performing professional tasks but also of actively influencing the development of the energy sector.

Conclusions. Transformational processes in the energy sector of Ukraine, associated with the development of alternative energy sources, necessitate specialists who possess a complex of diverse knowledge, skills, and abilities (Radkevych, Kravets, Salii, & Radkevych, 2023). This issue gains particular relevance for the post-war reconstruction of the country, where such specialists become key participants in the restoration of energy infrastructure. The intensive development of various areas of renewable energy – solar, wind, bioenergy – creates diverse niches for entrepreneurial initiatives, and decentralization of energy supply opens up opportunities for creating local energy projects, the implementation of which requires a combination of technical expertise with entrepreneurial abilities.

The entrepreneurial competence of renewable energy systems specialists is a dynamic formation that develops both during professional training and in the process of direct professional activity. It ensures readiness to effectively solve professional tasks, adapt to changing labor market conditions, and choose optimal strategies for conducting entrepreneurial activity, taking into account specific situations. In the conditions of the transforming energy sector of Ukraine, this adaptability gains special significance, as it allows for prompt reaction to technological innovations and changes in industry legal regulation.

Analysis showed that the entrepreneurial competence of masters in the installation and maintenance of renewable energy systems is characterized by a complex structure that integrates individual-personal and professional qualities. These components are not a mechanical merger of separate elements but constitute a holistic system of interconnected components. Only their comprehensive integration ensures the effectiveness of the specialist's entrepreneurial activity. The importance of such a systemic approach is confirmed by the practice of successful enterprises in the industry, where technical excellence is combined with business strategies and innovative approaches to organizing work processes.

The essence of entrepreneurial competence of future specialists in alternative energy sources lies in the integration of personal and professional qualities, inextricably linked with socio-economic and psychological characteristics. It is concretized by the specialists' value orientations, specific ways of their activity, models of entrepreneurial behavior, and a set of professionally significant personal qualities. The synergy of these elements creates a unique professional profile that meets the requirements of the modern labor market in the energy sector and contributes to the formation of competitive advantages both at the individual level and at the enterprise level.

The research results confirm that entrepreneurial competence in the context of renewable energy is not an additional but one of the main components of professional development, which transforms a technical specialist into an active participant in relevant economic processes in

the energy sector, as it involves the ability to analyze market opportunities and demand for services in the field of renewable energy, objectively assess one's own professional and entrepreneurial potential, and develop business strategies and plans. This necessitates the implementation of appropriate changes in the system of specialist training, including the integration of economic disciplines, entrepreneurship courses, and project management into the curricula of V(VT)E institutions. At the same time, the study of the structure of entrepreneurial competence of renewable energy specialists confirms the close interrelationship of all its components. The specificity of professional activity in the energy sector requires the simultaneous application of technical knowledge, economic literacy, and managerial skills. The industry specifics of renewable energy – a high level of innovation, dynamic changes in technologies, complexity of regulatory frameworks, and significant initial investments – create additional requirements for entrepreneurial training of specialists and necessitate continuous updating of educational content.

Two main approaches to understanding entrepreneurial competence have been identified: as a system of professional characteristics and as a complex of personal qualities. It is precisely this combination that ensures a holistic understanding of its meaning and significance for the professional development of a specialist. This integrated approach allows for the development of comprehensive methodologies for forming the entrepreneurial component, which take into account both the objective requirements of the professional environment and the subjective factors of personal development. This is especially important for young specialists who face the need for rapid adaptation to a changing labor market and self-determination in the professional environment.

A renewable energy systems specialist with developed entrepreneurial competence contributes to the implementation of environmentally friendly technologies through their practical application and commercialization. This expands their professional role from an executor of technical tasks to a leader of innovations in the industry. Given global trends in decarbonization of the economy and the priority of environmentally friendly technologies, such specialists become important agents of sustainable development, ensuring not only technological but also socio-economic transformations of the energy sector. At the same time, the importance of entrepreneurial competence is actualized in the context of implementing local energy initiatives, developing energy cooperatives, and implementing models of energy self-sufficiency for communities, which requires specialists not only technical knowledge but also social entrepreneurship skills and communication with various stakeholders, which can be directions for further research into the content and structural components of the entrepreneurial component of renewable energy specialists. Promising areas also include research into mechanisms of interaction between V(VT)E institutions and industry enterprises to ensure the practical component of training, the development of tools for diagnosing the level of entrepreneurial competence formation, and the creation of individual trajectories for its development depending on the initial level and professional needs of students.

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ПІДПРИЄМНИЦЬКА КОМПЕТЕНТНІСТЬ У ПРОФЕСІЙНОМУ СТАНОВЛЕННІ ФАХІВЦІВ СИСТЕМ ВІДНОВЛЮВАЛЬНОЇ ЕНЕРГЕТИКИ: ЗМІСТ І СТРУКТУРНІ КОМПОНЕНТИ

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Реферат:

Актуальність дослідження зумовлюється необхідністю подолання ключових суперечностей у професійній підготовці фахівців систем відновлювальної енергетики; спостерігається дисонанс між зростаючими вимогами енергетичного ринку до комплексної компетентності фахівців і певною фрагментарністю підготовки до підприємницької діяльності; актуальність проблематики посилює динамічний розвиток галузі відновлювальної енергетики, що вимагає постійного вдосконалення професійної освіти для забезпечення відповідності компетентностей випускників новим технологічним і ринковим реаліям; актуальною залишається потреба розширення методологічних підходів до формування підприємницького мислення у технічних фахівців, що відповідатиме інноваційному характеру технологій відновлювальної енергетики; глобальні виклики енергетичної безпеки, декарбонізації економіки й необхідність прискореного впровадження технологій відновлювальної енергетики актуалізують формування принципово нового типу професіонала – фахівця, здатного не лише виконувати певні технологічні процеси, але й успішно комерціалізувати інноваційні проєкти в умовах висококонкурентного середовища; трансформаційні процеси сучасного енергетичного сектору вимагають поглибленого аналізу змісту та структурних компонентів підприємницької компетентності, який дозволить створити теоретико-методологічне підґрунтя для випереджувальної професійної підготовки, що відповідатиме актуальним тенденціям розвитку галузі, технологічним зрушенням і динамічним змінам енергетичного ринку.

Мета статті полягає у висвітленні концептуальних підходів до визначення сутності підприємницької компетентності та її структурних компонентів у контексті професійного становлення фахівців систем відновлювальної енергетики, розкритті змістовних характеристик підприємницької компетентності в енергетичній галузі та обґрунтуванні методологічних засад інтеграції технічної та підприємницької складових у професійній підготовці фахівців відновлювальної енергетики з урахуванням сучасних тенденцій її розвитку та трансформаційних процесів в енергетичному секторі економіки.

Методи: вивчення наукової джерельної бази задля систематизації концептуальних підходів до вивчення змісту та структури підприємницької компетентності, виявлення теоретико-методологічних засад дослідження її структурних компонентів; теоретичного аналізу і синтезу, системного огляду щодо досліджуваної проблеми – для визначення й обґрунтування основних складників, змісту і структури визначеної компетентності фахівців відновлювальної енергетики, визначення взаємозв'язків між її компонентами; узагальнення й систематизації – для обґрунтування методологічних засад її формування, визначення перспективних напрямків розвитку.

Результати: обґрунтовано теоретико-методологічні засади формування підприємницької компетентності фахівців систем відновлювальної енергетики, що розкривають її сутнісні характеристики, змістові домінанти та функціональну структуру в контексті системних трансформацій професійної освіти та галузевих особливостей альтернативних джерел енергії; доведено критичну важливість розвитку підприємницької компетентності майбутніх фахівців для забезпечення сталого розвитку в умовах постійних трансформацій енергетичного сектору; визначено підходи до розуміння природи підприємницької компетентності як одного з інструментів професійної самореалізації.

Висновки: підприємницька компетентність фахівців систем відновлювальної енергетики є динамічним утворенням, що формується як під час професійної підготовки, так і в процесі безпосередньої фахової діяльності; вона характеризується складною структурою, що інтегрує індивідуально-особистісні та професійні якості в цілісну систему взаємопов'язаних складових; результати дослідження підтверджують, що ця компетентність є однією з основних складових професійного становлення, яка перетворює технічного спеціаліста на активного учасника економічних процесів в енергетиці, оскільки передбачає здатність

аналізувати ринкові можливості, оцінювати власний потенціал, розробляти бізнес-стратегії та плани; специфіка професійної діяльності в енергетичному секторі вимагає одночасного застосування технічних знань, економічної грамотності, правової обізнаності, готовності до ризику й інновацій; виявлено два основні підходи до розуміння підприємницької компетентності: як системи професійних характеристик і як комплексу особистісних якостей, поєднання яких забезпечує цілісне розуміння її значення для професійного розвитку фахівця; фахівець з розвиненою підприємницькою компетентністю сприяє впровадженню екологічно чистих технологій, забезпечуючи як технологічні, так і соціально-економічні трансформації енергетичного сектору.

Ключові слова: *підприємницька компетентність, відновлювальна енергетика, професійна підготовка, структурні компоненти, системний підхід.*

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DIAGNOSTIC TOOLS FOR ASSESSING THE QUALITY OF VOCATIONAL TRAINING FOR SPECIALISTS IN ECONOMIC COLLEGES

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Abstract

Relevance. Assessing the quality of vocational training for specialists in economic colleges requires the development of effective diagnostic tools.

Aim: To substantiate the necessity of developing effective diagnostic tools that will contribute to improving the quality of education and ensure the training of highly qualified specialists capable of meeting the demands of the modern labor market.

Methods: This study applies a comprehensive approach encompassing literature analysis, empirical research, expert evaluation, modeling, and comparative analysis. These methods are employed to develop diagnostic tools for assessing the quality of vocational training for specialists in economic colleges.

Results: A model of the methodological system for assessing the quality of vocational training for specialists in economic colleges is presented. This model features a clear structure, including target, content, instrumental, organizational-methodological, diagnostic, and results-reflective blocks. The main functions of this quality assessment model are defined, and the specific characteristics of the methodological system for assessing the quality of vocational training for specialists in economic colleges are explored.

Conclusions: The developed methodological system is a comprehensive organizational and technological construct rooted in a hierarchical combination of interconnected components. These components include goals, objectives, educational content, stages, methods, forms, diagnostic tools, criteria, indicators, and assessment results. The successful implementation of this methodological system is achieved through the effective utilization of technologies for assessing the quality of specialist training in colleges.

Keywords: *diagnostic tools; quality assessment; vocational training; economic colleges; competencies; methodological system.*

Introduction. Sustainable development of the global economy and society is only possible with an improvement in the quality of human capital, which serves as the primary resource. A lack of adequate attention to its development can lead to significant losses, limiting the potential for economic growth and management effectiveness at all levels. As the Organisation for Economic Co-operation and Development (OECD) notes, "human capital is a key factor of productivity and economic growth" (OECD, 2022). In today's world, characterized by rapid technological advancements, high-quality, mobile, and vocational education is becoming increasingly important. Global political, social, and economic trends stimulate the search for new ways to address the challenge of ensuring educational quality, and the development and implementation of new educational system management approaches.

The reform process of vocational pre-higher education has necessitated the introduction of many innovations, among the most important of which is

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the implementation of a competency-based approach to interpreting the quality of educational outcomes. The problem of assessing the quality of vocational training for future specialists is one of the most pressing issues in modern vocational education. The current vocational education system aims to create a system for obtaining objective information about learning outcomes.

Economic colleges play a vital role in forming competent professionals capable of effective work across various economic sectors. Therefore, the issue of the quality of their vocational training takes on particular significance. Concurrently, a crucial element in ensuring this quality is the application of effective diagnostic tools. Such tools enable systematic analysis and monitoring of students' knowledge, skills, and abilities, as well as the effectiveness of curricula and methodologies. They encompass a variety of methods and means that provide a comprehensive assessment approach, considering both quantitative and qualitative indicators.

The development and implementation of diagnostic tools represent an important step towards improving the quality of vocational training for specialists in economic colleges. This will enable a systematic approach to assessment, enhance the effectiveness of the educational process, and prepare competitive specialists for the modern labor market.

Research Sources. The theoretical analysis of the problem was conducted based on scholarly works concerning vocational education quality assessment (S. Babinets, I. Bulakh, L. Dybkova, L. Hrynevych, S. Kretovych, O. Lokshyna, P. Luzan, N. Moiseyuk, I. Mosia, T. Pashchenko, O. Titova et al.).

In Western research, the issue of assessing educational outcomes is represented by a large number of studies. For example, the work of L. Darling-Hammond and L. Wentworth (Darling-Hammond, & Wentworth, 2010) includes an analysis of over 200 studies on the experimental effects of implementing assessment systems. The research topic "Advancements in Technology-Based Assessment: Emerging Item Formats, Test Designs, and Data Sources," initiated by *Frontiers in Psychology* journal, focuses on the latest achievements in technology-oriented assessments (*Frontiers in Psychology*, 2019). Among domestic projects concerning assessment problems, it is appropriate to mention the applied scientific research "Methodological Principles of Assessing the Quality of Specialist Training in Institutions of Professional Pre-Higher Education," which is being implemented by the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine (Luzan et al., 2021a; Luzan et al., 2024; Luzan, 2024; Luzan et al., 2021b).

It is worth agreeing with the recommendations of scholars that pedagogical assessment can be used for various purposes: to determine students' academic achievements; to establish the effectiveness of teaching methods and organizational forms; to determine the effectiveness of an educational institution's activities; to determine the effectiveness of a justified teaching method, didactic technology, etc. In our case, we will focus on assessment "for improvement" of students' competency achievements—their vocational training (Luzan et al., 2021b).

In the process of assessing competencies in a student/graduate of a vocational pre-higher education institution, it is important to consider cognitive, activity-based, and personal aspects. Taking these contexts into account, K. Baartman (Baartman, 2008) concludes that "assessment should go beyond measuring knowledge reproduction"; there is a need to develop a new generation of tools for assessing learning outcomes in general, and specific diagnostic tools for assessing intermediate results.

The **aim** of this article is to substantiate the necessity of developing effective diagnostic tools that will contribute to improving the quality of education and ensure the training of highly qualified specialists capable of meeting the demands of the modern labor market.

Research Methods: This article employs various research methods to develop diagnostic tools for assessing the quality of vocational training for specialists in economic colleges. The main research methods include: literature analysis – reviewing scientific papers, monographs, articles, and other sources related to educational quality assessment and vocational training to identify existing approaches and methodologies; empirical research – data collection through surveys and interviews with

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students and teachers of economic colleges to obtain information about the current state of vocational training and identify problematic aspects; expert evaluation of the developed diagnostic tools (validation and reliability checks); modeling – creating models for assessing the quality of vocational training to predict results and evaluate the effectiveness of various teaching approaches; comparative analysis of different methods for assessing the quality of vocational training used in economic colleges to identify the most effective methods.

Results and Discussion. In today's rapidly changing economic environment, the quality of vocational training received by students of economic colleges is of paramount importance. Learning outcomes serve as a key system-forming component in ensuring the quality of vocational training, including the preparation of future junior bachelors in economic colleges. They are an integral part of a multi-level system of program requirements formulated in relevant educational and professional standards, and they also reflect the expectations and needs of all participants in the educational process. This very thesis underpins the design and implementation of the methodological system for assessing the quality of vocational training for specialists in economic pre-higher education institutions.

It is appropriate to emphasize that the methodological system for assessing learning outcomes should be developed and implemented directly within the educational environment of a specific educational institution (Nahlyi, 2024). Such a system must ensure objective, reliable, and valid measurement of the level of formation of key knowledge, skills, and competencies among learners (Luzan, 2021a, p. 38).

An effective assessment system not only allows for accurate recording of student achievements but also serves as a tool for monitoring the quality of the educational process, identifying its weaknesses, and facilitating further improvement. It promotes the adaptation of educational content to modern economic challenges and societal needs, activates feedback between students, teachers, and stakeholders, and stimulates the continuous professional development of teaching staff.

The qualitative analysis of scientific research dedicated to various aspects of assessment activities confirms the relevance of defining priority areas for modernizing the system of assessing student learning outcomes. Based on the semantic analysis and interpretation of the content of the proposed approaches, we have concretized the main strategies for assessment activities in vocational pre-higher education institutions, which allowed us to outline the essential characteristics of the methodological system for assessing the quality of vocational training for economic specialists.

The modular assessment strategy, based on the principle of modularity, enables a holistic assessment of vocational training outcomes, as well as the fixation of the intermediate level of student competencies after the completion of each module. As is known, competence is a complex integrative category encompassing cognitive, operational-activity, value, and reflective components; therefore, its formation and assessment cannot occur within the confines of a single discipline or a separate stage of practice. This necessitates the transition of educational and professional programs to a modular format, oriented towards the purposeful formation and assessment of a defined set of competencies within each module. At the same time, within each module, content elements (compulsory and elective academic disciplines, practical training, project activities) should be structured to ensure a logical, gradual transition from theoretical mastery of content to its practical application. To implement the modular assessment strategy, it is necessary to provide for the integral measurement of student learning achievements within the module, which involves the development of complex assessment tools that proportionally represent the contribution of each module element to the formation of target competencies. Such tools may include final portfolios, modular projects, situational tasks, integrated tests, and analytical reports based on the results of academic or industrial practice.

The formative assessment strategy, defined in scientific literature as "assessment for learning," plays a key role in improving the quality of the educational process. Its conceptual foundations are widely presented in the works of leading foreign researchers, including P. Broadfoot, R. Doherty, J.

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Gardner, W. Harlen, M. James, H. Stobart (Broadfoot et al., 2002), and have found active support among domestic scholars (Hryvko, & Vashchenko, 2021), P. Luzan et al. (2021a). The essence of the strategy lies in the systematic monitoring of student learning progress at all stages of the educational process with the aim of timely adjustment of the learning trajectory. Formative assessment not only informs the teacher about the level of knowledge acquisition but also actively involves the learner in assessing their own achievements, which stimulates the development of reflective thinking and learning autonomy. In the software of the educational process of vocational colleges, this strategy is implemented by embedding current control tools into each structural component of the module—academic disciplines, elective courses, practical training, etc. Ongoing assessment is carried out on a regular basis: during lectures, practical and laboratory work, and in the process of project activities. Thus, formative assessment emerges not only as a tool for recording results but as a pedagogical technology that directly influences the quality of learning, promotes the individualization of the educational process, and develops professional reflection.

The authentic assessment strategy involves a shift from traditional academic assessment methods (testing, control works, theoretical questions on exams, etc.) to alternative, authentic methods, as well as self-assessment and peer assessment. Recent studies (Fyfe, & Rittle-Johnson, 2016; Reinholz, 2016; Seyfried, & Pohlenz, 2018) confirm that such methods promote cooperation, engage students in giving and receiving feedback on their work based on established goals and assessment criteria, increase motivation, academic development, and critical thinking skills, and account for students' talents and abilities. L. Partanen notes that "these types of assessment are known as genuine opportunities in which students participate in many interactive, reflective and outcome-oriented activities in the learning situation" (Partanen, 2020: 90). Furthermore, the use of innovative methods such as interactive journals, portfolios, project-based learning, modeling, case study solutions, reflective discussions, peer feedback, expert evaluation, self-assessment, etc., can significantly impact competence acquisition: "authentic assessment is a formative practice" (Double et al., 2020, p. 483).

The automated assessment strategy defines the use of modern automated systems for creating an electronic bank of competence-oriented assessment tools, conducting computer testing, supporting a rating system for recording learning outcomes, conducting online surveys, forming and evaluating individual electronic student portfolios, organizing distance learning, etc. Modern authors believe that the most promising methodology for implementation in educational practice is Evidence-Centered Design (ECD). This innovative technology expands assessment capabilities and includes: integration of learning aspects that contain important information about the educational content to be assessed (which can be both specific skills and broader conceptual knowledge); a task model that measures competencies corresponding to real-life scenarios or situations an individual may encounter; a big data measurement model and procedures that enable the collection of reliable evidence of task performance (tests, interviews, project work, etc.); the ability to collect and evaluate information about student activity in the process of solving tasks, which will supplement and correct the assessment depending on significant indicators of their behavior. This technology enables the creation of design templates used for assessing various subject areas (Arieli-Attali et al., 2019; Michelle, Mislevy, & Corrigan, 2015). The main idea of ECD is to create a transparent and justified assessment system that allows for accurate and reliable determination of the level of knowledge and skills of learners.

The summative assessment strategy, unlike formative assessment, aims to summarize learning and evaluate the level of competence formed in a vocational college graduate. Its purpose is to assess learning at the end of a study unit by comparing it with the requirements of the educational program standard, taking into account the profile, specialization, and level of training. Summative assessments have high value and are implemented during state final certification (SFC) in the form of defending a final qualification paper and an interdisciplinary state examination. Scholars (L. Vashchenko, L. Dybkova, T. Kanivets, L.

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Maksymova, L. Savchenko et al.) believe that it is advisable to use assessment methods and forms that are as close as possible to the conditions of the graduate's future professional activity (case tasks, mini-projects, demonstration of activity fragments, etc.). Such tasks make it possible to assess how a graduate uses acquired knowledge and skills to solve professional problems.

For the full implementation of the summative assessment strategy during SFC, considering limited time resources, it is advisable to use a digital portfolio. It should reflect all stages of competence formation, allowing the examination committee to obtain additional information about the graduate's competence acquisition process and form a holistic understanding of their level.

The systemic characteristics of each strategy generally define the direction of the educational institution's control and assessment activities, allowing for the determination of its structure. Ultimately, in the process of implementing each strategy and utilizing its potential capabilities, the application of a corresponding spectrum of quantitative and qualitative assessment methods is necessary.

The presented analysis made it possible to assess the scale of the process of creating a competence-oriented assessment system, which should not merely record the result but also reflect the consistent connections between competencies, as learning outcomes, and educational technologies, as means of forming competencies.

Our approach to pedagogical assessment is based on the activity-based approach, traditional for domestic pedagogy, which, in our opinion, fully allows for theoretical understanding and scientific design of assessment systems. Since direct study of the methodological system for assessing the quality of vocational training for specialists in economic colleges is quite problematic, we use the modeling method as a research tool to develop a model for assessing the level of professional competence acquisition with the aim of studying various aspects and properties of the educational process.

The model of the system for assessing the quality of vocational training for specialists in economic pre-higher education institutions should contain clearly formulated educational process goals and requirements for the level of student training, substantiated assessment criteria, as well as a pre-defined and accessible list of competencies to be formed. An important condition is the compliance of assessment tools with educational standards, their validity, and reliability. The development of assessment tools should be carried out in partnership between teachers and representatives of the professional environment (employers), which ensures the practical orientation of the assessment. The assessment procedure should be transparent, understandable, and accessible to all participants in the educational process, and the process itself should be flexible and dynamic, capable of continuous improvement.

The priority function of the assessment system is to establish the level of professional competencies formed in students and to determine the correspondence of this level to the requirements of state standards. An effective model of the system for assessing the quality of vocational training for specialists should ensure: objective ranking of students by the level of professional competence acquisition; use of results from both formal and informal learning; systematic monitoring of progress in competence acquisition; formation of internal student motivation through assessment transparency and clarity; implementation of innovative assessment methods and forms that go beyond traditional approaches; individualization of assessment procedures taking into account the characteristics of each learner; stimulation of self-education and self-reflection abilities; development of graduates' professional mobility in the context of the modern labor market.

The main functions of the model of the system for assessing the quality of vocational training for specialists include: diagnostic, which involves scanning the level of competence acquisition; prognostic, which consists of determining the main trends in the level of competence acquisition and making a long-term forecast; coordination and correction, which involves identifying and solving problems; motivational, focused on encouraging participants in the educational process to self-improvement.

The features of the model of the methodological system for assessing the quality of

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vocational training for specialists in economic colleges include several key aspects: a systemic approach to assessing educational outcomes (assessing the level of professional competence acquisition not only within the scope of mastering a professional module but also within the scope of mastering academic disciplines throughout the learning process); use of planned learning outcomes of the educational program as a substantive and criteria base for assessment; monitoring of the level of professional competence acquisition; combination of internal and external assessment as a mechanism for ensuring educational quality; use of personalized summative assessment procedures; level-based approach to the development of planned outcomes and tools; use of an accumulative assessment system in the form of a portfolio of professional achievements; criterion-referenced assessment; implementation of a differentiated approach; independence and objectivity of assessment achieved through expert evaluation; use of innovative methods alongside traditional ones: within the implementation of the formative (current) assessment strategy – peer review, essays, modeling and game tasks, tables, concept maps, diagrams, demonstration of simulations; within the implementation of the authentic assessment strategy – interactive journals, observation protocols, portfolios, project activities, modeling, case study solutions, reflective discussions, peer feedback, expert evaluation, collegial assessment, self-assessment, etc.; within the implementation of the accumulative (cumulative) assessment strategy – reflective self-report (professional self-development program), portfolio method, electronic portfolio (e-portfolio), business and/or role-playing game, creative tasks; within the implementation of the automated assessment strategy – a bank of competence-oriented assessment tools, computer testing, online surveys, Evidence-Centered Design (ECD) methodology; within the implementation of the summative assessment strategy – case tasks, mini-projects, demonstration of activity fragments, complex practice-oriented tasks, as well as methods of self-analysis and self-assessment, observation, testing, etc.; ensuring effective feedback.

Within the scope of the study, a model of the methodological system for assessing the quality of vocational training for specialists in economic colleges was developed, which has a clear structure including target, content, instrumental, organizational-methodological, diagnostic, and results-reflective blocks (Fig. 1).

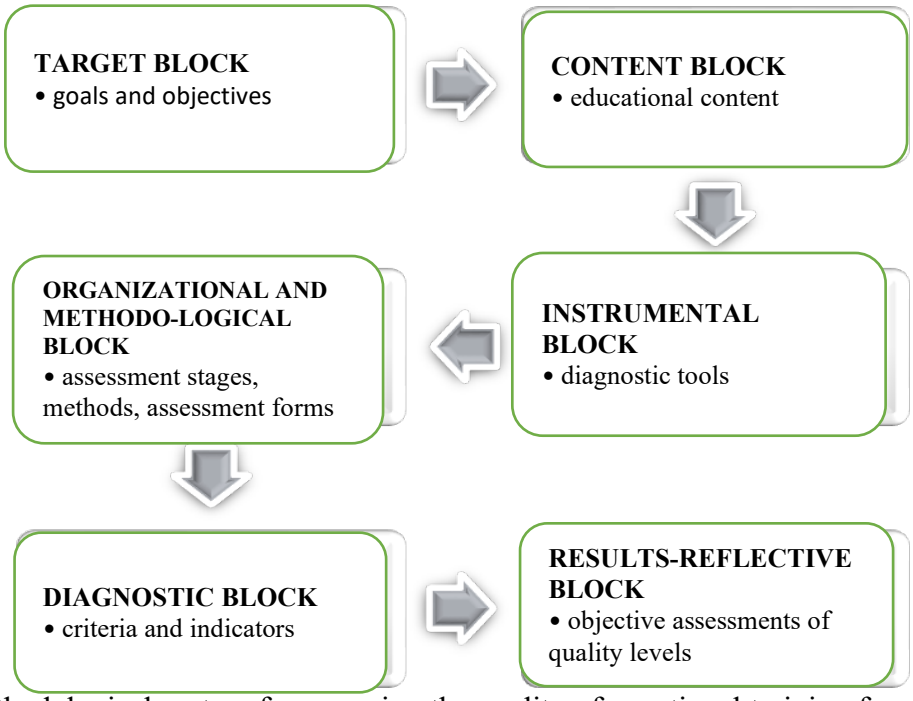

Fig. 1. Methodological system for assessing the quality of vocational training for specialists in economic colleges

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The main purpose of the methodological system is the effective organization of stages, procedures, methods, and tools for assessing the quality of specialist training in colleges. It aims to provide pedagogical staff with clear, simple, valid, objective, and reliable methodologies and technologies that enable the determination of students' levels of mastering standardized learning outcomes.

Conclusions. The developed methodological system for assessing the quality of vocational training for specialists in economic colleges is a comprehensive organizational and technological construct based on a hierarchical combination of interconnected components (goals, objectives, educational content, stages, methods, forms, diagnostic tools, criteria, indicators, and assessment results). The implementation of this system is achieved through the use of technology for assessing the quality of specialist training in colleges. An effective assessment system not only allows for accurate recording of student achievements but also serves as a tool for monitoring the quality of the educational process, identifying its weaknesses, and facilitating further improvement. It promotes the adaptation of educational content to modern economic challenges and societal needs, activates feedback between students, teachers, and stakeholders, and stimulates the continuous professional development of pedagogical staff. The developed system ensures objective ranking of students by the level of professional competence acquisition, the use of results from both formal and informal learning, systematic monitoring of progress in competence acquisition, the formation of internal student motivation through transparency and clarity of assessment, the implementation of innovative assessment methods and forms, the individualization of assessment procedures considering the specific characteristics of each learner, the stimulation of self-education and self-reflection abilities, and the development of graduates' professional mobility in the context of the modern labor market.

Prospects for further scientific research are seen in the development of a detailed technology for assessing the quality of vocational training for specialists in economic colleges, as well as in the study and application of best foreign practices regarding the formation and development of assessment systems.

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ДІАГНОСТИЧНИЙ ІНСТРУМЕНТАРІЙ ОЦІНЮВАННЯ ЯКОСТІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ ФАХІВЦІВ В ЕКОНОМІЧНИХ КОЛЕДЖАХ

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Реферат:

Актуальність оцінювання якості професійної підготовки фахівців в економічних коледжах потребує розроблення ефективного діагностичного інструментарію.

Мета: обґрунтування необхідності розроблення ефективного діагностичного інструментарію, який сприятиме підвищенню якості освіти та забезпечить підготовку висококваліфікованих фахівців, здатних відповідати вимогам сучасного ринку праці.

Методи: застосування комплексного підходу до дослідження, що охоплює аналіз літератури, емпіричні дослідження, експертне оцінювання, моделювання та порівняльний аналіз – для розроблення діагностичного інструментарію з оцінювання якості професійної підготовки фахівців в економічних коледжах.

Результати: представлено модель методичної системи оцінювання якості професійної підготовки фахівців в економічних коледжах, що має чітку структуру (цільовий, змістовий, інструментальний, організаційно-методичний, діагностичний та результативно-рефлексивний блоки); визначено основні функції моделі системи оцінювання якості професійної підготовки фахівців; розглянуто особливості моделі методичної системи оцінювання якості професійної підготовки фахівців в економічних коледжах.

*Висновки: р*озроблена методична система є комплексним організаційно-технологічним конструктом, що базується на ієрархічному поєднанні взаємопов'язаних компонентів (цілі, завдання, зміст освіти, етапи, методи, форми, діагностичний інструментарій, критерії, показники, результати оцінювання); реалізація методичної системи здійснюється завдяки використанню технологій оцінювання якості підготовки фахівців у коледжах.

Ключові слова: *діагностичний інструментарій; оцінювання якості; професійна підготовка; економічні коледжі; компетентності; методична система.*

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THE ESSENCE AND STRUCTURE OF METHODOLOGICAL COMPETENCE OF VOCATIONAL TRAINING MASTERS IN VOCATIONAL (VOCATIONAL-TECHNICAL) EDUCATION INSTITUTIONS OF THE AUTOMOTIVE INDUSTRY

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Abstract

The relevance of the study is driven by the importance of enhancing the methodological competence of vocational training masters in vocational (vocational-technical) education institutions. This is crucial for Ukraine's rapidly developing automotive industry, a strategically vital sector of the economy that requires competitive, professionally mobile specialists capable of swift adaptation during wartime and continuous professional development amidst the rapid evolution of production and digital technologies.

Purpose: To analyze contemporary approaches to defining the essence and structure of methodological competence of vocational training masters in vocational (vocational-technical) education institutions of the automotive industry to improve the quality of their professional activities, and to identify directions and forms of its development.

Methods: Theoretical analysis of official and scientific sources, as well as internet resources, was employed to ascertain the current state of research on the problem. The method of observation of the methodological activities of vocational training masters in vocational (vocational-technical) education institutions of the automotive industry was used to identify contemporary forms and directions for the development of their methodological competence.

Results: Based on theoretical analysis, the state of research and existing approaches to understanding the structure, forms, and directions of methodological competence development for vocational training masters in vocational (vocational-technical) education institutions of the automotive industry were examined.

Conclusions: It was determined that there is no unified approach to interpreting the concept of "methodological competence," necessitating its clarification. Methodological competence of vocational training masters is identified as a component of the professional-pedagogical competence of teaching staff, manifested in their methodological activities. It has a subjective character, as it is revealed in the educator's ability and readiness for creative self-realization. This competence is defined as the ability to effectively organize the educational and production process, based on a system of developed psychological-pedagogical, specialized, and methodological knowledge and skills, as well as experience in their application in professional-pedagogical activities (possessing thorough knowledge of the theory and methodology of subject teaching, mastering the technology of organizing the educational process, and being able to solve various methodological tasks). The components of the structure of methodological competence of a vocational training master were characterized (theoretical-methodological, subject-methodological, technological, organizational-managerial, and personal-deontological). Contemporary approaches to designing and organizing methodological activities should be based on the understanding of their goals as the comprehensive development of the educator's personality, encompassing both personal and professional qualities. A vocational training master needs to choose and build their own value system and master methods for creatively solving personal professional-methodological problems.

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Keywords: *methodological competence, vocational training master, vocational (vocational-technical) education institutions, automotive industry, structure of methodological competence, development of methodological competence.*

Introduction. The demands of the economy on vocational education, particularly in the sphere of training skilled workers, are diverse. On the one hand, there remains a demand for traditional, mass professions requiring a medium level of qualification. On the other hand, there is an emerging and growing need for highly qualified, competitive workers who possess knowledge and technologies, are capable of perceiving and practically applying new scientific ideas, modern technical tools and materials, innovative technologies, and creative methods of organizing activities, and who can create high-tech, knowledge-intensive products. The global community has unequivocally recognized the quality of education as the main goal and priority for humanity's development in the 21st century. Vocational (vocational-technical) education institutions (hereinafter referred to as VTEIs) face a series of complex tasks aimed at training qualified workers in accordance with labor market needs. The modern VTEI system requires pedagogical staff who are capable of successfully communicating with learners, who deeply understand their role in society, are able and willing to apply acquired knowledge, skills, and abilities in practice, strive for continuous professional growth, and are socially and professionally mobile.

A special role in ensuring high-quality results in the professional training of qualified workers belongs to the vocational training instructor, and, in particular, to their methodological competence, which manifests in educational and methodological activities aimed at improving the practical professional training of learners in training workshops, under conditions close to production environments. This includes the development and improvement of vocational training and production practice methodologies (Parashchenko, 2004, pp. 71-84). The professional-pedagogical activity of vocational training instructors necessitates their mastery of new pedagogical and production technologies and demands a readiness for continuous self-improvement (Shpak, 2019, p. 135). At the same time, achieving a high level of quality in the professional activity of vocational training instructors is not ensured by the existing practice of organizing their professional development, which is mostly not oriented towards innovative knowledge, modern pedagogical technologies, or competence-based education methodologies for future qualified workers. Vocational training instructors are predominantly graduates of industry-specific higher education institutions, and the level of their methodological knowledge, skills, and abilities requires constant improvement for the proper performance of their assigned tasks in conditions of rapidly changing industries. Therefore, the task of studying the modern content and structure of the vocational training instructor's methodological competence and developing effective technologies for its development during inter-course advanced training periods is highly relevant.

Research Sources. Conceptual provisions regarding the development of vocational education and professional development of pedagogical staff in the context of modern challenges are reflected in the National Strategy for the Development of Education in Ukraine for 2012–2021 (2013), the Laws of Ukraine "On Vocational (Vocational-Technical) Education" (latest revision – 2019), "On Education" (2017), "On Professional Pre-Higher Education" (2019), the National Qualifications Framework (2011), the Concept of State Policy Implementation in the Field of Vocational (Vocational-Technical) Education "Modern Vocational (Vocational-Technical) Education" (2019), materials of the Bruges Communiqué on enhanced European cooperation in vocational education and training (2010), UNESCO's Strategy for Technical and Vocational Education and Training 2016-2021 (2015), and others. The essence of methodological competence as a component of the future teacher's professional competence has been investigated by S. Azaryshvili, E. Azimov, I. Akulenko, T. Hushchyna, T. Zahryvnia, O. Ilchenko, T. Kocharian, O. Lebedeva, I. Mykhalevska, H. Sokolova, N.

Tarasenkova, O. Tumasheva. T. Baibara, N. Bibik, I. Ziaziun, L. Koval, O. Savchenko, and S. Sysoieva dedicated their scientific works to the problem of professional-methodological training of teachers in new conditions, and the implementation of modern active methods using information technologies in higher education institutions. It should be noted that research results on the formation of pedagogical methodological competence are quite widely covered in scientific literature. However, the study of the problem of forming the methodological competence of vocational training instructors in VTEIs deserves more attention.

The theoretical basis for solving this relevant scientific problem lies in scientific works that highlight the methodology and theories of vocational education (V. Bykov, S. Honcharenko, A. Hurzhii, I. Ziaziun, V. Kremen, V. V. Luhovyi, P. Luzan, L. Lukianova, N. Nychkalo, V. Radkevych, S. Sysoieva, etc.); and the provisions of the competence-based approach in vocational education (S. Alieksieieva, L. Bazyl, O. Borodiienko, N. Briukhanova, L. Herhanov, T. Herliand, L. Yershova, A. Kalenskyi, V. Kovalchuk, O. Koshuk, V. Kruchek, N. Kulalaieva, V. Kurok, M. Lazarev, T. Lazareva, H. Lutsenko, O. Ovcharuk, V. Orlov, M. Pryhodii, V. Radkevych, O. Radkevych, H. Romanova, O. Romanovskyi, M. Telovata, O. Shahaieva, L. Shevchuk, V. Yahupov, and others).

An analysis of the theory and practice of methodological activity of vocational training instructors reveals the following contradictions:

- Between the necessity of continuous development of vocational training instructors' methodological competence and the absence of effective models to ensure this during inter-course advanced training periods.
- Between the objective need of pedagogical practice for vocational training instructors with developed methodological competence and the insufficient level of provision of necessary pedagogical conditions in VTEIs for this purpose.
- Between modern requirements for the methodological competence of vocational training instructors and the absence of scientifically sound methodologies and practical recommendations for its development in VTEIs.

The aim of the article is to analyze modern approaches to defining the essence and structure of methodological competence of vocational training instructors in automotive VTEIs to improve the quality of their professional activity and to determine the directions and forms of its development.

Research methods: theoretical analysis of official, scientific sources, and internet resources – to clarify the state of study of the research problem; observation of the methodological activity of vocational training instructors in automotive VTEIs to identify modern forms and directions for the development of their methodological competence.

Results and Discussion. In many works, competence is considered an interdisciplinary category studied by psychologists, pedagogues, sociologists, and other scholars. Therefore, scientific sources contain a large number of definitions of this concept by various authors. However, common to many researchers is the view of competence as a certain model of educational outcome, as a decisive condition and indicator of a person's overall success, and in professional activity in particular. In a broad sense, competence is interpreted as an individual's ability for effective self-realization in any field of activity, which includes the individual's personal attitude to competence and to the subject of activity.

This concept was introduced into Ukrainian legislation by the basic Law of Ukraine "On Education," where, according to sub-paragraph 15, paragraph 1, Article 1, competence is defined as "a dynamic combination of knowledge, abilities, skills, ways of thinking, views, values, and other personal qualities that determines a person's ability to successfully socialize, conduct professional and/or further educational activities." Furthermore, sub-paragraph 16, paragraph 1, Article 1 of the Law of Ukraine "On Education" defines the ways of forming competencies: "educational process – a system of scientific-methodological and pedagogical measures aimed at the development of personality through the formation and application of its competencies"; and sub-paragraph 4, paragraph 1, Article 1 of the Law of Ukraine "On Education" states that "teaching activity – activity aimed at forming knowledge, other competencies, worldview, developing intellectual and creative abilities, emotional-volitional and/or physical qualities of learners (lecture, seminar, training, courses, master class, webinar, etc.), and which is carried out by a pedagogical (scientific-pedagogical) worker..." (Shpak, 2019, p. 135).

In the works of domestic scholars, professional, social, informational, and communicative competencies are often distinguished, and less frequently – methodological, psychological, and civic. In pedagogical theory and practice, numerous studies have been conducted on various aspects of pedagogical and methodological activity, and they have been improved at various levels of organizing continuous professional development for educators. However, there is no comprehensive systemic analysis of the essence and structure of vocational training instructors' methodological competence, although individual studies, undoubtedly, are of significant scientific and practical interest.

There are different views on the interpretation of the concept of "methodological competence." O. Tsilmak defines methodological competence as a personal ability to structurally and highly effectively build activities based on acquired knowledge, abilities, and skills. The scholar attributes mobility of knowledge, flexibility in applying methods, critical thinking, a creative approach, and responsibility for actions to the main components of methodological competence (Tsilmak, 2009). According to O. O. Yurtaieva (2011, p. 366), the structure of the professional-pedagogical competence of a vocational training instructor includes the following competencies: motivational, psychological-pedagogical, intellectual-cognitive, autopsychological, technological, communicative, and methodological. The basis of the latter consists of pedagogical technique, methods of conducting educational activities, culture of pedagogical activity, culture of stimulating and organizing students' learning activities, methodology of organizing the vocational training process, and the development and implementation of author's vocational training methodologies.

In our study, we consider the methodological competence of a vocational training instructor in the automotive VTEI as one of the tasks of their professional development and improvement. Therefore, the scientific analysis of the problem of forming and developing educators' methodological competence must be carried out in accordance with legislative requirements and taking into account modern global social and educational challenges. Methodological competence is a component of professional-pedagogical competence and largely characterizes the ability of pedagogical staff to effectively design, organize, adjust, and evaluate the professional-theoretical and practical training of future qualified workers.

The methodological competence of a vocational training instructor's professional activity is associated with the use of means, methods, and techniques of the educational process and includes: analysis and preparation of information and its methodological processing into educational material; designing techniques and methods for its optimal assimilation and control; and implementing effective teaching methods to achieve high learning outcomes.

It should be noted that the methodological competence of a vocational training instructor is aimed at mastering and improving existing principles, forms, and methods of effective organization of the educational process, as well as developing and implementing new ones. Achieving high results in professional activity in terms of the vocational training instructor's methodological competence is formed in accordance with educational standards. In this regard, methodological competence includes: developing working curricula; forming methodological support for the educational process; and implementing modern teaching methods, pedagogical technologies, and techniques. The realization of methodological competence is associated with the application of methodological knowledge, methodological and psychological-pedagogical skills in professional activity, and the performance of professional duties in accordance with the regulatory documents of the educational institution.

Given professional skills, the methodological competence of vocational training instructors in automotive VTEIs can be interpreted as theoretical and practical readiness to conduct classes according to various curricula and the ability to effectively solve typical and atypical methodological tasks, that is, readiness to perform professional functions. The content of theoretical (scientific) readiness is revealed through the generalized ability to think pedagogically, which implies the presence of analytical, prognostic, design, and reflective skills. The essence of the practical aspect of methodological competence lies in the technological readiness of the educator to professionally use modern information

and educational technologies, methods, and techniques in the educational process, adapting them to various pedagogical situations.

In the professional standard "Vocational Training Instructor," approved by Order of the Ministry of Economy of Ukraine No. 430-21 dated August 17, 2021, methodological activity includes the ability to develop a teaching and methodological complex for vocational training and practical training; the ability to use digital technologies to solve methodological problems; the ability to innovate, test, and disseminate its results; and the ability to analyze and utilize positive pedagogical practice. Thus, a vocational training instructor must be ready to develop educational and methodological materials that correspond to the modern development of education and production, and to implement highly effective forms and methods of teaching and innovative pedagogical technologies.

The selection and structuring of the content for the development of vocational training instructors' methodological competence is a problem that requires thorough research and directs scientific inquiry towards defining the main, key stages of improving the existing professional development system. Structuring competence-oriented content is a necessary condition for improving the existing professional development system regarding the development of vocational training instructors' methodological competence in VTEIs.

Analyzing theoretical sources on the problem of forming and developing the educator's methodological competence, and based on the principles of competence-based and subject-activity approaches, we conclude that the methodological competence of a vocational training instructor is a unity of the following components:

- Theoretical and Methodological: knowledge of the fundamentals of pedagogy, psychology, andragogy, and didactics; understanding of modern trends in education and professional training; mastery of research methods.
- Subject-Methodological: deep knowledge of the specialty in which training is provided; mastery of methods for teaching specialized disciplines and vocational training; ability to develop educational and planning documentation.
- Technological: mastery of modern teaching methods and technologies such as problem-based learning, project-oriented learning, modular learning; ability to use interactive teaching methods such as business games, trainings, cases; use of computer technologies and multimedia tools in teaching.
- Organizational and Managerial: ability to plan, organize, and conduct the educational and production process; mastery of methods for controlling and evaluating students' knowledge, skills, and abilities; ability to maintain methodological documentation.
- Personal and Deontological: professionally important qualities: responsibility, organization, independence; creative approach to work; communicativeness, ability to work in a team; high moral qualities.

The identified components of vocational training instructors' methodological competence in VTEIs demonstrate the level of methodological training for realizing their professional activity, taking into account modern trends in the development of the relevant industry. The process of forming the methodological competence of a vocational training instructor in VTEIs involves: professional orientation of general scientific and special training in the field; methodological training and mastery of innovative technologies of professional training; development of technological literacy with an emphasis on the use of technological knowledge in the content of methodological training; and the integration of personal and developmental approaches in the methodological training of future specialists. It should also be noted that the effective development of methodological competence of a vocational training instructor in the automotive industry depends on the implementation of a set of pedagogical conditions: activation of the vocational training instructor's position in the development and self-development of methodological competence; ensuring an individual trajectory for the successful development of the instructor's methodological competence; effectiveness of scientific and methodological support for the development of vocational training instructors' methodological competence in its various forms; and the creation of an effective information and professional environment.

The main pathways for developing the methodological competence of vocational training instructors can be defined as follows:

- Methodological work: development and implementation of original methodological elaborations, participation in methodological competitions, exchange of experience with colleagues.
- Research activity: participation in research projects, publication of scientific articles, presentations at scientific conferences.
- Self-education: studying specialized literature, methodological manuals, internet resources, participation in methodological seminars, webinars, trainings, attending master classes, and advanced training courses.

Experience convincingly demonstrates that the professional development of educators in VTEIs occurs continuously through a combination of different forms of education: formal, which involves course-based advanced training in psychological-pedagogical and methodological preparation; non-formal – internships, participation in the organization and conduct of professional skills competitions, exhibitions, conferences, seminars, workshops, master classes, trainings, round tables, webinars, author's schools, etc.; informal – self-education: Internet, online courses "Prometheus," etc. Modern teaching aids, new production technologies and relevant equipment, and new pedagogical technologies involve the use of the latest tools for accumulating, processing, and transmitting scientific and methodological information through digital technologies and tools, including the use of local and international educational networks, websites, video programs, etc., which form the information component of the educational institution's environment (Hurevych, 2005, p. 366).

The main form of developing the methodological competence of vocational training instructors is their individual self-educational work. It expands the instructors' basic methodological education, forms their individual style of pedagogical activity, and helps educators critically reflect on their own pedagogical experience (Stadova, 1996, p. 250). Self-educational activity is most effectively realized in the process of organizing in-depth work of pedagogical teams and vocational training instructors on scientific and methodological problems and according to the individual self-educational plans of each pedagogical worker. In the methodological offices of VTEIs, as a rule, methodological sheets, orders, and directives on various issues, lists of new methodological literature received by the library, thematic folders with materials from various periodicals that may be of interest to instructors according to their professional training profile, methodological recommendations for conducting vocational training lessons, etc., are available. However, in our opinion, the approach to organizing instructors' self-education must be necessarily differentiated and democratic. Such a form of individual work, in terms of content, should be a component of scientific and methodological support for the development of professional-pedagogical, and especially methodological, competence of vocational training instructors.

Conclusions. The results of the analysis of the problem under study in pedagogical theory and practice indicate the absence of a unified approach to the interpretation of the concept of "methodological competence," which necessitated its clarification. The methodological competence of vocational training instructors is distinguished as a component of the professional-pedagogical competence of pedagogical staff; it manifests in the methodological activity of vocational training instructors, thus having a subjective nature, as it characterizes them as subjects of methodological activity and is manifested in their ability and readiness for creative self-realization as educators. It is defined as the ability to effectively organize the educational and production process, based on a system of developed psychological-pedagogical, professional, and methodological knowledge and skills, as well as the experience of their use in the process of professional-pedagogical activity. A vocational training instructor must have profound knowledge of the theory and methodology of teaching the subject, master the technology of organizing the educational process, and be able to solve various methodological problems. The structure of the vocational training instructor's methodological competence includes: theoretical-methodological, subject-methodological, technological, organizational-managerial, and personal-deontological components.

Modern approaches to the design and organization of methodological activity should be based on the understanding of its goals as the development of the educator's personality in its full completeness and integrity of personal and

professional qualities. Given this, a vocational training instructor needs to choose and build their own world of values, and master ways of creatively solving personal professional-methodological problems.

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СУТЬ І СТРУКТУРА МЕТОДИЧНОЇ КОМПЕТЕНТНОСТІ МАЙСТРІВ ВИРОБНИЧОГО НАВЧАННЯ ЗАКЛАДІВ ПРОФЕСІЙНОЇ (ПРОФЕСІЙНО-ТЕХНІЧНОЇ) ОСВІТИ АВТОМОБІЛЬНОЇ ГАЛУЗІ

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Реферат:

Актуальність дослідження зумовлюється важливістю підвищення рівня розвитку методичної компетентності майстрів виробничого навчання закладів професійної (професійно-технічної) освіти для стратегічно важливої для економіки України автомобільної галузі, що швидко розвивається і потребує конкурентоспроможних, професійно мобільних фахівців, здатних до швидкої адаптації в умовах воєнного стану та постійного професійного розвитку в умовах бурхливого розвитку виробничих і цифрових технологій.

Мета: проаналізувати сучасні підходи до визначення суті та структури методичної компетентності майстрів виробничого навчання закладів професійної (професійно-технічної) освіти автомобільної галузі для підвищення якості їхньої професійної діяльності та визначити напрями та форми її розвитку.

Методи: теоретичний аналіз офіційних, наукових джерел та інтернет-ресурсів – для з'ясування стану вивченості проблеми дослідження; метод спостереження за методичною діяльністю майстрів виробничого навчання закладів професійної (професійно-технічної) освіти автомобільної галузі для з'ясування сучасних форм і напрямів розвитку їх методичної компетентності.

Результати: на основі теоретичного аналізу вивчено стан дослідженості та існуючи підходи до розуміння структури, форми та напрямки розвитку методичної компетентності майстрів виробничого навчання закладів П(ПТ)О автомобільної галузі.

Висновки: з'ясовано, що відсутній єдиний підхід до трактування поняття «методична компетентність», що спричинило необхідність його уточнення; методична компетентність майстрів виробничого навчання виокремлюється як складова професійно-педагогічної компетентності педагогічних працівників, проявляється в методичній діяльності майстрів виробничого навчання, має суб'єктивний характер, оскільки виявляється у здатності та готовності до творчої самореалізації педагога; ця компетентність визначається як здатність ефективно організовувати навчально-виробничий процес, що ґрунтується на системі розвинених психолого-педагогічних, фахових, методичних знань і вмінь, а також досвіді їх використання в процесі професійно-педагогічної діяльності (мати ґрунтовні знання з теорії та методики навчання предмета, володіти технологією організації освітнього процесу, вміти розв'язувати різноманітні методичні завдання); охарактеризовано компоненти структури методичної компетентності майстра виробничого навчання (теоретико-методологічна, предметно-методична, технологічна, організаційно-управлінська та особистісно-деонтологічна); сучасні підходи до проектування й організації методичної діяльності мають базуватись на усвідомленні її цілей як розвитку особистості педагога у всій повноті та цілісності особистісних і професійних якостей; майстру виробничого навчання необхідно обрати і вибудувати власний світ цінностей, оволодіти способами творчого вирішення особистих професійно-методичних проблем.

Ключові слова: *методична компетентність, майстер виробничого навчання, заклади професійної (професійно-технічної) освіти, автомобільна галузь, структура методичної компетентності, розвиток методичної компетентності.*

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TRENDS IN QUALITY ASSURANCE OF VOCATIONAL EDUCATION AND TRAINING FOR SPECIALISTS IN THE KINGDOM OF THE NETHERLANDS

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Abstract

Relevance. The article's relevance is driven by the pivotal role of vocational education and training (hereinafter referred to as VET) in shaping a competitive workforce for strategically important sectors of the economy in the Kingdom of the Netherlands. The negative perception of VET within the country, despite its international recognition, poses challenges for attracting young people and maintaining public trust in the system. Contemporary demands for the integration of digital technologies, artificial intelligence, and ensuring inclusivity, among other factors, necessitate continuous improvement of the VET quality assurance system. Investigating these and other trends is crucial for Ukraine, as it allows for adapting the advanced experience of the Netherlands to enhance the effectiveness of the national quality assurance system for vocational education.

*Aim***:** To identify and analyze the main trends in quality assurance of VET for specialists in the Kingdom of the Netherlands, and to ascertain the possibilities of incorporating them into the improvement of the vocational education quality assurance system in Ukraine.

*Methods***:** Study of scientific sources, legislative, regulatory, and legal documents, and empirical data on quality assurance of VET for specialists in the Kingdom of the Netherlands – to clarify the state of the research problem; theoretical analysis and synthesis – to identify the main trends in quality assurance of VET for specialists in the Netherlands; generalization and systematization – to formulate conclusions and recommendations.

*Results***:** The following were identified and analyzed: the multi-level structure of VET for specialists in the Kingdom of the Netherlands (initial, basic, professional, specialized); two educational pathways (school-oriented (BOL) – for youth; work-oriented (BBL) – for adults); types of VET institutions (Regional Training Centers (ROCs), agricultural colleges, specialized professional colleges, and private accredited institutions); legislative reform in the VET sector; the VET quality assurance system (division of responsibility between VET institutions (self-regulation) and external bodies (Inspectorate of Education), tripartite organization SBB); and trends in quality assurance of VET for specialists.

*Conclusions***:** The contemporary trends in quality assurance of VET for specialists in the Kingdom of the Netherlands include: aligning VET with labor market needs (high graduate employment rate: 85.4%, with 81% finding employment within three months); development of professional competence and lifelong learning (competence-oriented education, LLO Katalysator initiative (2022-2027) supports continuous learning); development of "green" skills (integration of research through "hubs" for the development of ecological competencies); digital transformation of VET and the use of artificial intelligence (AI) (Npuls program until 2031 promotes digitalization); inclusivity and equal opportunities in VET access (investments of €1 billion for 2024-2027 and the "Appropriate education" policy aim to ensure equal opportunities); professional development of teachers and their engagement in pedagogical activities (a shortage of 13,500 teachers affects quality, and Comenius Teaching Fellow grants aim to retain them); internationalization of VET (Erasmus+ programs contribute to expanding mobility and developing intercultural competencies); increasing public funding for VET (high public expenditure on VET – 0.76% of GDP, but there are concerns about the efficiency of fund distribution); development of a VET quality culture and internal quality assurance system (self-regulation of VET institutions, student surveys, and cooperation with stakeholders foster a VET quality culture, but teacher involvement is needed).

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Keywords: *trends; vocational education and training; quality assurance system; Kingdom of the Netherlands; recommendations for Ukraine.*

Introduction. Vocational education and training (hereinafter referred to as VET) in the Kingdom of the Netherlands plays a fundamental role in shaping the national economy and society. Approximately 40% of the Dutch working population holds a vocational qualification, underscoring the importance of VET as the "foundation of the economy" and the "basis of society" (MBO Amersfoort, n.d.). Graduates of the VET system are vital for key sectors such as healthcare, construction, technology, and energy, where there is a chronic shortage of skilled labor (Eurydice, 2023; Holland Times, 2025). This critical reliance on specialists trained in VET institutions creates an urgent need for robust and effective quality assurance systems. Any shortcomings in quality assurance mechanisms directly lead to risks for national economic competitiveness and the country's social well-being.

Despite the high international reputation of the VET system in the Kingdom of the Netherlands, recognized as one of the best in the world by international organizations such as the OECD, it faces a paradoxical "poor image domestically" (Cedefop, 2017). Surveys show that 41% of respondents in the Netherlands have a negative perception of VET, which is significantly higher than the EU average (23%) (Cedefop, 2017). This dissonance between external recognition and internal perception is a significant problem. Even if the quality assurance system is reliable in practice, a lack of public trust or understanding can undermine its effectiveness in attracting talented young people and ensuring its societal role. The negative internal image indicates a gap in public perception that deters potential students, affecting recruitment and, ultimately, the supply of skilled labor, even if the VET itself is excellent. Furthermore, the VET quality assurance system in the Netherlands constantly faces challenges related to adapting to rapid labor market changes, integrating new technologies into the educational process, such as artificial intelligence (AI) and digital skills, ensuring inclusivity, and overcoming teacher shortages (Eurydice, 2023; OECD, n.d.; Erasmus University Rotterdam, n.d.). These structural changes highlight the need to rethink certain components of the VET system to make them more resilient and ensure maximum utilization of the opportunities provided by digital and green transitions (OECD, n.d.).

Effective quality assurance of VET in the Netherlands is critically important for training specialists who can successfully adapt to dynamically changing labor market requirements (OECD, n.d.) and contributes to their social cohesion and equal opportunities, especially for vulnerable population groups (Netherlands Court of Audit, 2024; Government of the Netherlands, n.d.). Accordingly, the quality management of VET specialists in the Netherlands, as in other European Union countries, according to scholars from the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine led by Academician V.O. Radkevych, involves the application of a quality assurance methodology that complies with standard international systems (ISO or IFQM). In VET quality assurance, emphasis is placed on: defining VET quality assurance policy and its implementation tools; developing and approving educational programs; implementing a student-centered approach to teaching and assessing learning outcomes; establishing transparent procedures for student enrollment, recognition of their learning outcomes, and certification; ensuring transparency in the competitive selection of VET institution teachers and continuous improvement of their professional qualifications; the availability of modern learning resources, high-tech material and technical base, and diversified funding sources; providing informational and educational-methodological support for the educational process and its systematic monitoring; ensuring public access to information (Radkevych et al., 2021). In view of this, when defining the trends in VET quality assurance for specialists in the Kingdom of the Netherlands, it is important to consider the trends

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in partnership development in the VET sector in EU countries, namely: development of motivation of partnership participants aimed at improving qualifications and graduate employment, which is the basis of partnership and goes beyond financial incentives; legislative support for partnership and its formal administrative basis – the memorandum; co-financing mechanisms; risks in the development of professional skills; compliance of VET content with constantly changing labor market requirements; mechanisms for monitoring the labor market and professional potential; the role of the private partner is higher than the role of the regulator of VET service providers, as it is more interested in VET development; eighth, the private sector is motivated to ensure the quality of professional skills, and therefore to solve problems of their compliance with labor market needs and market competition (Radkevych, 2022).

Sources. The problem of quality assurance of VET for specialists in the Kingdom of the Netherlands is widely researched, as reflected in a significant number of publications. Existing works comprehensively cover the structure of the VET system, its legal framework, including the Education and Vocational Training Act (Wet educatie en beroepsonderwijs – WEB, 1996), and the role of key institutions such as the Foundation for Cooperation in Vocational Education, Training, and the Labor Market (SBB), the Inspectorate of Education, and the Accreditation Organization of the Netherlands and Flanders (NVAO) (Cedefop, 2021; Cedefop, 2023; Eurydice, 2023; Gatsby Foundation, 2024). Of particular value to the research is the work by Radkevych O.P. regarding the legal framework for the functioning of the education and vocational training system in the Netherlands, which implements educational programs of various levels. The author established that educational institutions and vocational training schools are united into regional vocational training centers, where theoretical studies are combined with practical training at enterprises (Radkevych, 2018).

The impact of the WEB Act on the consolidation of vocational colleges and the unification of qualifications, which was a significant step in reforming the VET system in the Kingdom of the Netherlands, is analyzed (Cedefop, n.d.). Considerable attention is paid to aligning the Dutch VET quality assurance system with the European Quality Assurance in Vocational Education and Training (EQAVET) framework. Although the direct impact of EQAVET on the already established Dutch VET quality assurance system is considered "insignificant," it serves as a "guideline" and contributes to improving quality assurance and international cooperation (Gatsby Foundation, 2024). The research also covers issues of VET alignment with labor market needs and graduate employment, highlighting the high employment rate of VET system graduates (Government of the Netherlands, 2023; Cedefop, 2019). Specific trends such as digital transformation, the integration of "green" skills, as well as inclusivity and equal opportunities, are also subjects of scientific analysis (Government of the Netherlands, n.d.; RSIS International, n.d.; EQAVET, 2025; Cedefop, 2024).

Scientific interest lies in studies of the comprehensive impact of AI on VET quality assurance, specific challenges, and best practices for integrating AI into educational programs (St. Matthew's University, n.d.; UCLanData, n.d.; Autoriteit Persoonsgegevens, n.d.), as well as regarding teacher training in assessing algorithmic materials, changes in the role of teachers, and ensuring data confidentiality (Autoriteit Persoonsgegevens, n.d.). This indicates a gap between strategic vision and operational capacity of VET, which requires targeted investment in human capital and infrastructure, beyond simply implementing technology. Cause-and-effect studies in the field of VET system management are valuable, which complicates determining the effectiveness of specific quality assurance policies (Tandfonline, 2025). This means that, while general quality assurance principles can be defined, their application and effectiveness in specific national contexts, such as the Netherlands, require targeted study. Finally, problems related to the perception of VET quality assurance as an an administrative burden by teachers and insufficient parental involvement in quality assurance processes are important aspects that require further research to improve the internal quality culture of VET (EQAVET, n.d.). This proves that the effectiveness

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of internal VET quality assurance systems depends not only on processes and indicators but also on human and organizational factors.

The **aim of the article** is to identify and analyze the main trends in quality assurance of VET for specialists in the Kingdom of the Netherlands, and to ascertain the possibilities of incorporating them into the improvement of the vocational education quality assurance system in Ukraine.

Methods: Study of scientific sources, legislative, regulatory, and legal documents, and empirical data on quality assurance of vocational education and training for specialists in the Kingdom of the Netherlands – to clarify the state of the research problem; theoretical analysis and synthesis – to identify the main trends in quality assurance of vocational education and training for specialists in the Netherlands; generalization and systematization – to formulate conclusions and recommendations. To conduct the research, official reports and publications from leading national and European educational organizations, as well as academic publications and analytical reports, were used. Among the key data sources, materials from organizations such as: the European Centre for the Development of Vocational Training (Cedefop, 2017; Cedefop, n.d.; Cedefop, 2023; Cedefop, 2019; The Netherlands, n.d.); the Education Information Network in Europe (Eurydice, 2023; Onderwijsinspectie, n.d.); the Organisation for Economic Co-operation and Development (OECD, n.d.; Onderwijsinspectie, n.d.); the Inspectorate of Education of the Netherlands (Eurydice, 2023; Onderwijsinspectie, n.d.; DeFabrique, n.d.; Cedefop, n.d.; Netherlands Court of Audit, 2023; Erasmus University Rotterdam, n.d.); the Foundation for Cooperation in Vocational Education, Training, and the Labor Market (MBO Amersfoort, n.d.; Cedefop, 2023; Gatsby Foundation, 2024; Eurydice, 2023); the Accreditation Organization of the Netherlands and Flanders (Eurydice, 2023; NVAO, n.d.; The Hague University of Applied Sciences, n.d.; Utrecht University, n.d.) and other academic and analytical sources were processed.

Results and Discussion. The VET system in the Kingdom of the Netherlands is multifaceted and multifunctional, ensuring the training of specialists at various levels and through different educational pathways. Specifically, VET offers four levels of education, corresponding to EQF levels 1-4 (MBO Amersfoort, n.d.; Cedefop, 2023): Level 1 (initial): one-year programs designed for young people who did not obtain a certificate in previous education. They prepare specialists for the labor market or allow them to progress to a Level 2 course (Cedefop, 2023; Eurydice, 2023); Level 2 (basic): courses lasting 1-2 years that train specialists in professions such as hairdresser or mechanic. This level is considered the "official" minimum qualification level for the labor market (Cedefop, 2023; Eurydice, 2023); Level 3 (professional): programs lasting 2-3 years, where students learn to independently perform various tasks in their chosen professional field, for example, nursing assistant or mechanic (Cedefop, 2023; Eurydice, 2023); Level 4 (specialized): the highest level within VET, lasting 3-4 years (or 1 year for specialized training after VET). Graduates of this level can continue their studies in higher professional education (HBO) (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023) (Table 1).

The VET system offers two equivalent educational pathways that enable students to obtain the same diplomas based on a combination of theoretical learning in VET institution classrooms with practical training at enterprises (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023; Nuffic, n.d.). According to the first option (school-based learning pathway – BOL), students spend most of their study time in a VET institution, and between 20% and 59% at enterprises. This educational pathway is predominantly chosen by young students (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023). The second option of the educational pathway (work-based learning pathway / dual pathway – BBL) is known as the apprenticeship system, according to which students combine workplace learning (at least 60% of study time) with classes in VET institution classrooms, often 4 days of work at an enterprise and 1 day of theoretical study at a VET institution. Enrollment requires a contract with a company, and therefore this educational pathway is primarily chosen by adults for professional development (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023).

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Table 1

STRUCTURE OF LEVELS AND EDUCATIONAL TRACKS OF VET IN THE KINGDOM OF THE NETHERLANDS

Level	EQF Correspondence	Duration of Study	Main Purpose / Objective	Characteristics of BOL (practical training, classroom)	Characteristics of BBL (practical training, classroom)	Examples of Professions/Qualifications
Level 1 (Entry level)	EQF 1	1 year	Preparation for the labor market or transition to Level 2	20-59% practical training, mostly youth	≥60% practical training, 1 day at school, often adults	Construction assistant, care assistant
Level 2 (Basic vocational training)	EQF 2	1-2 years	Preparation for skilled worker professions (official minimum for the labor market)	20-59% practical training, mostly youth	≥60% practical training, 1 day at school, often adults	Hairdresser, mechanic, security guard
Level 3 (Professional training)	EQF 3	2-3 years	Independent execution of tasks in the chosen field	20-59% practical training, mostly youth	≥60% practical training, 1 day at the institution, often adults	Nurse assistant, chief mechanic, carpenter
Level 4 (Middle-management and specialist training)	EQF 4	3-4 years (or 1 year for a specialist)	Independent execution of all tasks, access to HBO (higher professional education)	20-59% practical training, mostly youth	≥60% practical training, 1 day at the institution, often adults	Store manager, rehabilitation technician, dental nurse

Sources: (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023; Nuffic, n.d.)

In the Netherlands, various types of VET institutions function: Regional Training Centers (ROCs): 41 large multi-sector centers offering a full range of courses for both young students and adults (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023); Agricultural Professional Colleges (AOCs): 16 colleges specializing in "green" VET, including professions in services, nature, and environment, etc. (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023); 11 specialized professional colleges that offer VET programs in specific professional fields (MBO Amersfoort, n.d.; Cedefop, 2023; Eurydice, 2023). In addition, there are private educational institutions that train specialists in accredited courses and professional qualifications (Eurydice, 2023).

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The Education and Vocational Training Act (WEB), introduced in 1996, significantly reformed the VET system in the Netherlands, influencing its organizational structure and the quality of educational program content (Cedefop, n.d.). This law led to a significant reduction in the number of VET institutions (from 350 to less than 100 in 10 years) and to the centralization of management primarily by regional training centers (Cedefop, n.d.). This structural improvement aimed to increase the efficiency of standardization and optimize the VET system. The optimization of institutions and the unification of educational pathways in accordance with the qualification framework ensured the creation of VET standards, regardless of the forms of learning, which increased the effectiveness of qualification recognition. This demonstrates strategic efforts to create a more streamlined and controlled quality system that can better adapt to labor market needs and provide clear conditions for student progress. WEB also granted vocational colleges a high degree of autonomy in developing educational programs, provided that competencies demanded by the labor market are considered (Cedefop, n.d.). The Act also established the "tripartite goal" of VET: preparation for the labor market, further education, and preparation for full participation in society (Cedefop, n.d.). Furthermore, Dutch language, mathematics, English language (for the fourth level), and civics were defined as mandatory general competencies for all specialists (Cedefop, n.d.; Eurydice, 2023).

The VET quality assurance system in the Netherlands is characterized by a division of responsibility between educational institutions and external supervisory organizations. This approach is based on the principle of institutional self-regulation, where educational institutions bear primary responsibility for the quality of VET they provide, while the Minister of Education, Culture, and Science is responsible for quality at the systemic level (Eurydice, 2023). In ensuring VET quality in the Netherlands, the **Inspectorate of Education** plays a crucial role as a key external body responsible for overseeing compliance with legislation, financial policy, and the overall quality of the education system, including VET (Eurydice, 2023; Onderwijsinspectie, n.d.). The Inspectorate has a special inspection system for VET, "Inspection framework VET-education" (Onderwijsinspectie, n.d.; Onderwijsinspectie, n.d.), which is regularly updated (Cedefop, 2023), and also publishes "inspection cards" of VET institutions that reflect the effectiveness of their activities (Eurydice, 2023). It encourages VET institutions to improve quality beyond basic standards (Gatsby Foundation, 2024). The Inspectorate's cooperation with research institutes, such as the Erasmus School of Economics, is aimed at improving inspection methods and, ultimately, the quality of Dutch education (Erasmus University Rotterdam, n.d.).

Table 2

KEY BODIES AND THEIR ROLE IN ENSURING VET QUALITY IN THE KINGDOM OF THE NETHERLANDS

Body/Institution	Area of Responsibility	Key Functions/Powers	Key Legislative Acts/Documents
Ministry of Education, Culture and Science	Overall quality of education at the systemic level	Policy development, legislation, funding, approval of qualification profiles	Wet educatie en beroepsonderwijs (WEB), Higher Education and Research Act (WHW)
Inspectorate of Education	Supervision of compliance with legislation, financial regularity, and overall VET quality	Monitoring the quality of teaching and examinations, publishing inspection reports, promoting improvement	Education Inspection Act (WOT)

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SBB (Cooperation Organisation for Vocational Education, Training and the Labour Market)	Link between VET and the labor market, quality of practical training	Development of qualification files, accreditation of companies for practical placements, collection of labor market information, support for instructors	Wet educatie en beroepsonderwijs (WEB)
NVAO (Netherlands-Flanders Accreditation Organisation)	Accreditation of programs and quality assurance systems in higher education (HBO, universities)	Assessment of the quality of educational programs, institutional audits, maintenance of a register of accredited programs	Higher Education and Research Act (WHW)

Sources: (MBO Amersfoort, n.d.; Cedefop, n.d.; Cedefop, 2023; Eurydice, 2023; Onderwijsinspectie, n.d.; NVAO, n.d.; The Hague University of Applied Sciences, n.d.; Utrecht University, n.d.)

A key role in ensuring the quality of student internships and maintaining qualification standards is played by the tripartite organization (Samenwerkingsorganisatie Beroepsonderwijs Bedrijfsleven – SBB), established in 2015, which unites VET institutions and labor market representatives. SBB is responsible for developing and maintaining the VET qualification framework, including qualification standards, accrediting and coordinating companies that provide workplaces for student practical training, which is a legal requirement for companies offering internships to VET students (Cedefop, 2023; Eurydice, 2023; Gatsby Foundation, 2024; Cedefop, n.d.). In addition, SBB collects labor market information and provides data on employment prospects for VET program graduates, and also organizes training and competence development for workplace instructors (Cedefop, n.d.; Cedefop, 2023). The Inspectorate of Education oversees SBB's fulfillment of its statutory duties (Eurydice, 2023).

The VET quality assurance system is based on the "Plan-Do-Check-Act" (PDCA) sequence of stages and takes into account the requirements of the European Quality Assurance in Vocational Education and Training (EQAVET) framework, as most of its descriptors and indicators are integrated into the Dutch qualification system (Gatsby Foundation, 2024; EQAVET, 2025; EQAVET, 2023). The influence of EQAVET on the Dutch system is considered "insignificant" in terms of direct policy implementation, but it serves as a "guideline" and contributes to raising the profile of quality assurance and international cooperation (Gatsby Foundation, 2024; EQAVET, 2023). The multi-stage approach to VET quality assurance in the Netherlands balances institutional self-regulation with external oversight, demonstrating the system's complexity. The clear division of functions between the Inspectorate (systemic compliance and improvement) and SBB (labor market alignment and quality of practice) (Cedefop, 2023; Gatsby Foundation, 2024; Eurydice, 2023) indicates a sophisticated system designed to adhere to both educational standards and ensure the practical relevance of VET. This approach reflects that VET quality is multifaceted and requires specialized oversight of different areas (e.g., pedagogical quality vs. workplace relevance). The system strives for comprehensive quality assurance by distributing responsibility and fostering cooperation among key stakeholders. In this context, as Radkevych V.O. (2023) rightly points out, private companies help VET institutions create educational and training programs that can reduce bureaucracy, allow students to learn at their own convenient time and pace, and ensure the development of competencies necessary for remote work. Partnership in VET stimulates the development of new forms of learning, such as distance education and integrative courses, which are more effective and convenient for students. In the Netherlands, in particular, the number of educational programs aimed at preparing students for work in innovative technological fields

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(software development, cybersecurity, big data, etc.) is increasing.

In view of the above, a leading trend in VET quality assurance for specialists in the Netherlands is the alignment of VET with labor market needs and graduate employment (Table 3). The Dutch VET system is the main supplier of personnel to the labor market (MBO Amersfoort, n.d.). VET graduates demonstrate a high employment rate for the 20-34 age group, which is higher than the EU average (Cedefop, 2019). The Netherlands faces a chronic shortage of skilled workers (200,000) in the technology, healthcare, and construction sectors, leading to increased salaries for VET graduates, sometimes even higher than university graduates (Holland Times, 2025). SBB plays a key role in aligning labor market needs with educational programs, maintaining the relevance of qualifications, and accrediting companies for practical training (MBO Amersfoort, n.d.; Cedefop, 2023; Gatsby Foundation, 2024). At the same time, there are problems of dropout among certain VET students due to incorrect course selection, which indicates the need for improved vocational guidance for applicants (Eurydice, 2023). There is also a decrease in the percentage of VET graduates who directly continue their studies at universities (Cedefop, 2023; Cedefop, 2019). The high employment rate and rising salaries of VET graduates demonstrate a strong functional dependence between VET outcomes and labor market demand. However, the existing "poor image" of VET in the country (Cedefop, 2017) and problems with course selection (Eurydice, 2023) indicate a gap between objective market value and subjective public perception of VET. This means that VET quality assurance must go beyond educational programs and learning outcome assessment, encompassing the entire student learning journey: from vocational guidance to tracking their professional career.

In ensuring the quality of VET for specialists in the Netherlands, a significant trend is the development of professional competence and lifelong learning. Competency-based education is a leading paradigm for innovation in Dutch VET, aimed at reducing the gap between VET and the labor market (Cedefop, n.d.; BWPat, n.d.). The emphasis is shifting from simply obtaining a diploma to developing "abilities" and continuous skill development, which is an important prerequisite for the employment of VET graduates (BWPat, n.d.). This reflects a transition from a traditional, input-oriented VET model to an outcomes-oriented and adaptive model. Lifelong learning (LLL) addresses the need for specialists to continuously develop skills throughout their professional careers (OECD, n.d.; RSIS International, n.d.; Eurydice, 2023). The "Lifelong Learning Catalyst" (LLO Katalysator) initiative (2022-2027) is a significant step in this direction, aimed at creating an independently functioning LLL ecosystem that unites VET institutions, businesses, and government to respond to the needs of a rapidly changing labor market (Eurydice, 2023; Cedefop, n.d.). This demonstrates a proactive and adaptive strategy of the Dutch VET system aimed at maintaining its relevance in a dynamic global economy.

The transition to a sustainable economy requires robust and high-quality VET, which highlights the trend towards the development of "green" skills for specialists (OECD, n.d.). Dutch agricultural VET institutions actively integrate "green" innovations into their curricula through "hubs" (Cedefop, 2024). These allow VET students to participate in research projects funded by the "KIEM-groen" subsidy scheme, fostering the creation of applied knowledge and the development of research skills (Cedefop, 2024). "Green" skills encompass both professional and key competencies, such as critical thinking and teamwork, necessary for modern production (SGI Europe, n.d.). The creation of "hubs" is an innovative and proactive model for integrating research and the development of "green" skills directly into VET. This elevates the role of VET: from a simple transfer of skills to a center of applied research and innovation, directly impacting the quality and relevance of VET.

Among the contemporary trends in quality assurance of VET for specialists are the digital transformation of VET and the use of AI. This is driven by the growing demand for digital skills across all industries, making the integration of digital competencies into VET educational and

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training programs critically important (Cedefop, n.d.). Dutch VET institutions actively collect and use quantitative and qualitative data to improve quality assurance systems (EQAVET, 2025). However, the "Plan-Do-Check-Act" (PDCA) sequence of stages is often not followed due to time constraints and the complexity of the necessary actions (EQAVET, 2025). This indicates that, although data collection occurs, its transformation into actionable improvements in VET quality is complicated. Therefore, the Npuls Program was initiated, which will run until 2031 to facilitate knowledge exchange and the development of digital innovations throughout the education system, including VET, with a particular emphasis on the application of AI (UvA, 2024). It should be noted that AI is currently widely used in the Netherlands to transform diagnostic processes in various fields of activity, increasing accuracy and efficiency, which requires professional training of future specialists to work with advanced technologies (St. Matthew's University, n.d.). At the same time, there are certain challenges and risks associated with the use of AI in VET, namely: the ability of adaptive systems to recognize individual student needs, the need to train teachers in evaluating algorithmic learning materials, the changing role of teachers, and issues of personal data confidentiality, etc. (Autoriteit Persoonsgegevens, n.d.). This indicates the existence of a systemic challenge where technological progress outpaces the development of human potential, organizational culture, and pedagogical models necessary for applying AI to improve VET quality. Therefore, without significant investment in the development of digital literacy of VET teachers and a culture of lifelong learning, the full potential of digitalization and AI in the Dutch VET system cannot be realized.

A key trend in VET quality assurance for specialists in the Netherlands is inclusivity and equal opportunities for VET attainment. The Dutch government is investing significant funds (€1 billion for 2024-2027) to promote equal opportunities for individuals to acquire vocational qualifications (Eurydice, 2023; Netherlands Court of Audit, 2024). The "Appropriate education" (Passend Onderwijs) policy, implemented since 2014, obliges VET institutions to provide appropriate learning environments for all interested individuals, including those with special educational needs (Government of the Netherlands, n.d.; Xpat, n.d.). Despite these opportunities, existing conditions, such as migration background and parents' education level, still affect access to quality educational services (Netherlands Court of Audit, 2024). There are also disparities in the levels of support from VET institution management and staff for such individuals, as well as cases of discrimination against them during internships at enterprises (Netherlands Court of Audit, 2024; Government of the Netherlands, 2023). To overcome these challenges, the Dutch government has formulated an action plan to reduce the number of early school leavers in VET institutions to 18,000 by 2026 (Eurydice, 2023). Although significant financial and legislative commitments demonstrate a strong political intention to ensure inclusivity, the persistence of inequality in vocational qualification attainment and reports of discrimination indicate a gap between educational policy formulation and its effective implementation on the ground. This means that the quality assurance of inclusivity must go beyond merely checking for policy existence, actively monitoring student experiences and the effectiveness of support systems.

In VET quality assurance, an important trend is the professional development of teachers and their involvement in pedagogical activities. The Netherlands faces a shortage of 13,500 teachers, which significantly impacts VET quality (Erasmus University Rotterdam, n.d.). This shortage leads to increased workload, burnout, and a desire to leave the profession (Erasmus University Rotterdam, n.d.). Professional development is proposed as a strategy for teacher retention, which can increase job satisfaction (Erasmus University Rotterdam, n.d.). Since 2023, VET teachers can apply for Comenius Teaching Fellow grants to participate in educational innovation projects (Cedefop, 2024). However, problems with exam quality in VET have persisted for years, highlighting the need for further professionalization of teachers in this area (Cedefop, n.d.). The acute shortage of teachers

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poses a direct and significant threat to the quality of Dutch VET. Although grants are positive policy measures, their effectiveness in attracting and retaining talent depends on addressing the underlying causes of dissatisfaction, such as workload and the perception of the value of the teaching profession. The quality of VET is inextricably linked to the quality and well-being of its teachers.

Internationalization of VET, as a modern trend, contributes to improving its quality by enhancing employability, personal development, and intercultural competencies of VET graduates (MBO Raad, n.d.; Nuffic, n.d.). It should be noted that Dutch public organizations such as: the Association of VET Colleges (MBO Raad) and the Dutch Organization for Internationalization in Education (Nuffic) actively promote internationalization, supporting student and teacher mobility (e.g., through the Erasmus+ program) and strengthening the position of Dutch VET at the European level (MBO Raad, 2023; Nuffic, n.d.). The Netherlands has almost reached the EU target for VET student mobility abroad (8% by 2025) (Nuffic, n.d.). The expansion of internationalization demonstrates a forward-looking approach to VET quality, recognizing that "international competencies" are important for employment in a globalized labor market. This impacts VET quality by emphasizing skills such as adaptability and cultural diversity.

A significant impact on VET quality assurance is exerted by the trend: increasing public funding for VET (0.76% of GDP, above the EU average), including structural funding and significant amounts from the National Lifelong Learning Fund (LLO). The government invests hundreds of millions of euros in VET modernization (Eurydice, 2023; Cedefop, 2023). Expenditures per student are also relatively high (Cedefop, 2019). Despite investments, there are concerns about overall budget cuts and the efficiency of fund utilization (Zorgtoeslag, n.d.). Official Development Assistance (ODA) funding for vocational and higher education will be gradually discontinued. This applies only to international projects, not internal VET funding (DonorTracker, n.d.). Significant public investment in VET indicates a strong political commitment to its quality and societal role. However, public debates regarding the distribution and efficiency of funding suggest a tension between perceived need and resource optimization. This means that, while funding is available, the impact of transparent and effective monitoring on VET quality outcomes is crucial for public and political support.

In the context of VET quality assurance, a contemporary trend is the development of a VET quality culture and an internal quality assurance system. VET institutions bear primary responsibility for the quality of vocational training of specialists, based on the principle of self-regulation (Eurydice, 2023). A VET quality culture is defined as collective ownership and systematic efforts to improve VET quality, which includes a willingness to learn, feedback, and mutual responsibility (QQI, n.d.). Pedagogical teams are a central part of VET quality assurance, requiring open dialogue with stakeholders such as representatives of enterprises, organizations, institutions, and parents (EQAVET, n.d.; QQI, n.d.). Student satisfaction surveys are an important tool for gathering feedback (Eurydice, 2023). The emphasis on "VET quality culture" and institutional self-regulation is a complex approach to VET quality assurance that goes beyond external compliance to foster internal motivation for improvement. However, the identified challenge regarding VET quality assurance indicates that implementing a VET quality culture requires significant attention to engaging teachers in pedagogical activities, their professional development, and demonstrating the direct value of VET quality assurance for their daily practice.

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Table 3

KEY TRENDS AND CHALLENGES IN ENSURING VET QUALITY IN THE KINGDOM OF THE NETHERLANDS

Тенденція	Короткий опис тенденції/політики	Пов'язані виклики/проблемні аспекти	Ключові успіхи/ініціативи
Trend	Brief Description of Trend/Policy	Associated Challenges/Problematic Aspects	Key Successes/Initiatives
Digital Transformation of VET and AI Integration	Integration of digital skills and AI into educational and training programs. Use of data to improve Quality Assurance (QA).	Insufficient use of data to improve the "Check/Act" phase, low digital literacy among teachers, ethical risks of AI, changing role of the teacher.	Npuls program, use of data for monitoring, integration of AI in diagnostics (veterinary medicine).
Development of Professional Competence and Lifelong Learning	Shift from qualifications to competencies, emphasizing "abilities." Continuous skill development throughout one's career.	Adapting programs to rapid changes, ensuring flexibility and accessibility of LLL (Lifelong Learning).	"LLO Katalysator" initiative, flexible programs for adult upskilling/reskilling.
Alignment of VET with Labor Market Needs and Graduate Employment	Adaptation of programs to economic needs, high employment rate of graduates.	Negative internal image of VET, incorrect course selection by students, reduced progression to higher education.	High employment rate, rising salaries in deficit sectors, SBB's role in coordination.
Ensuring Inclusivity and Equal Opportunities in VET Access	Policies supporting vulnerable groups, ensuring equal access and support.	Impact of socio-economic background on outcomes, discrimination during internships, disparities in support.	Significant government investments, "Appropriate Education" policy, plans to reduce early dropout.
Development of "Green" Skills	Integration of environmental sustainability and relevant competencies into VET.	Defining and implementing both professional and key "green" skills.	Creation of "hubs" in agricultural VET institutions, research projects on "green" technologies.
Professional Development of Teachers and Their Engagement in Pedagogical Activity	Upskilling teachers, engaging them in innovation.	Teacher shortages, increased workload, burnout, issues with exam quality.	Comenius Teaching Fellow grants, "upskilling" concept, professionalization programs.
Internationalization of VET	Promoting international mobility of students and teachers, developing intercultural competencies.	Stabilization of mobility growth, need for further encouragement.	Active support from MBO Raad and Nuffic, participation in the Erasmus+ program, development of "international competencies."
Growth in State Funding for VET	Significant government investments in VET.	Public concerns about the effectiveness of fund utilization, potential budget cuts.	High expenditure on VET and per student, structural funding, investments from the Growth Fund.

Sources: (Eurydice, 2023; Holland Times, 2025; Cedefop, 2017; OECD, n.d.; Erasmus University Rotterdam, n.d.; Netherlands Court of Audit, 2024; Cedefop, 2023; Government of the Netherlands, 2023; Cedefop, 2019; EQAVET, 2025; St. Matthew's University, n.d.; Autoriteit Persoonsgegevens, n.d.; Cedefop,

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n.d.; BWPat, n.d.; RSIS International, n.d.; MBO Amersfoort, n.d.; Nuffic, n.d.; SGI Europe, n.d.; Cedefop, 2024; Zorgtoeslag, n.d.; DonorTracker, n.d.; QQI, n.d.; EQAVET, n.d.; UvA, 2024; MBO Raad, n.d.)

Conclusions. The VET system in the Netherlands is clearly structured into four levels, corresponding to the European Qualifications Framework (EQF). This ensures transparency, standardization, and the possibility of transition between educational levels and the labor market. The Education and Vocational Training Act (WEB) contributed to the centralization of management and optimization of the VET institution network, which increased the system's efficiency. VET institutions implement two educational pathways (BOL and BBL) that combine theoretical learning with practical training. In particular, BBL allocates 60% of time to practical training, contributing to a high graduate employment rate. In the Netherlands, the SBB organization ensures cooperation between VET institutions, employers, and the government, developing qualification frameworks, accrediting companies for practical training, and analyzing labor market needs. The Dutch VET quality assurance system is based on the principle of self-regulation of VET institutions, complemented by external oversight from the Inspectorate of Education, which uses the Plan-Do-Check-Act (PDCA) sequence of stages and complies with EQAVET standards. The high dropout rate of students due to incorrect course selection indicates the need for improved vocational guidance. At the same time, the high graduate employment rate (85.4%) confirms the system's effectiveness.

Dutch "hubs" integrate research and "green" skills into VET programs, promoting innovation and sustainable development. They also actively implement digital technologies and AI into VET content through the Npuls program but face challenges in teacher training and adapting pedagogical models. This refers to the shortage of teachers in the Netherlands (13,500) and their burnout, which affects VET quality. The Netherlands invests significant funds in inclusivity and implements Comenius Teaching Fellow grants; however, problems with discrimination and inequality persist, requiring appropriate monitoring. The internationalization of VET is actively pursued through Erasmus+ programs and cooperation with Nuffic, which enhances students' intercultural competencies.

The contemporary trends in quality assurance of VET for specialists in the Kingdom of the Netherlands include: aligning VET with labor market needs and graduate employment; development of professional competence and lifelong learning; development of "green" skills; digital transformation of VET and the use of AI; inclusivity and equal opportunities in VET attainment; professional development of teachers and their engagement in pedagogical activities; internationalization of VET; increasing public funding for VET; and the development of a VET quality culture and internal quality assurance system.

Based on the analysis of trends in quality assurance of VET for specialists in the Kingdom of the Netherlands, which is characterized by multifacetedness, adaptability to the labor market, and a high level of institutional self-regulation, recommendations are proposed for improving the quality assurance system of vocational education in Ukraine:

- Improvement of educational program structure and content: Based on a clear structure of qualification levels harmonized with the European (EQF), optimize the network of vocational education institutions by consolidating small institutions into large specialized professional colleges and regional centers, similar to the Dutch ROCs, to increase management efficiency. Grant vocational education institutions autonomy in developing educational and training programs, provided that labor market needs are taken into account, which will contribute to the flexibility and relevance of vocational education.
- Development of a dual vocational education system: Create a legal framework for concluding agreements between vocational education institutions and employers; stimulate employers to participate in dual education through tax incentives or subsidies for companies providing internship placements; introduce flexible educational pathways for youth and adults, including short-term retraining programs for adults, similar to Dutch BBL programs.
- Establishment of a tripartite organization for coordinating labor market linkages: Create an analogue of SBB in Ukraine – a tripartite organization

that will unite representatives of vocational education institutions, employers, and the government. This organization will be responsible for developing and updating professional standards aligned with labor market needs, accrediting companies for student practical training, collecting labor market data, and forecasting personnel needs; introduce monitoring of graduate employment to assess the compliance of educational programs with market needs.

- Implementation of an internal and external vocational education quality assessment system: Introduce the Plan-Do-Check-Act (PDCA) sequence of stages into the quality assurance system of Ukrainian vocational education institutions, with clear stages of planning, implementation, verification, and improvement; create an independent oversight body similar to the Dutch Inspectorate of Education to monitor educational quality, financial activities, and compliance with legislation; develop "inspection cards" for vocational education institutions that will publicly reflect their effectiveness, promoting transparency and competitiveness; integrate EQAVET standards into the national quality assurance system for harmonization with European practices.
- Improvement of vocational guidance and reduction of vocational education dropout rates: Develop a vocational guidance system in general secondary and vocational education institutions, including counseling, testing, and familiarization with professions through practical classes; introduce mentorship programs for first-year students in vocational education institutions to help them adapt to their chosen specialty; create mechanisms for tracking graduates' career paths to assess the effectiveness of vocational guidance measures.
- Integration of "green" skills and research initiatives: Introduce "green" skills, especially for professions related to agriculture, energy, and ecology; establish research centers at vocational education institutions, similar to "hubs," to engage students in applied research; involve businesses in financing research projects in vocational education institutions, which will contribute to the introduction of innovations into vocational education content.
- Digital transformation and AI integration: Integrate digital competencies into all vocational education and training programs, including AI skills and data analysis; develop training programs for teachers to work with digital technologies and AI, with an emphasis on assessing algorithmic learning materials; create a platform for knowledge exchange between vocational education institutions regarding the use of digital technologies, similar to Npuls.
- Ensuring inclusivity and equal opportunities in vocational education attainment: Implement an inclusivity policy similar to "Appropriate education" that will ensure access to vocational education for students with special educational needs; create a monitoring system to identify cases of discrimination during study and practical training; develop support programs for students from vulnerable groups, including financial assistance and psychological support.
- Professional development of teachers: Introduce professional development programs for teachers of vocational education institutions, including training on pedagogical innovations and digital technologies; create grant programs for teachers who develop innovative teaching methods; reduce teacher workload through optimization of curricula and involvement of assistants.
- Internationalization of vocational education: Expand the participation of students and teachers of Ukrainian vocational education institutions in Erasmus+ programs; expand cooperation with European VET institutions for experience exchange and development of joint educational programs; integrate intercultural competencies into curricula to prepare students for work in a globalized labor market.

The implementation of the proposed recommendations in Ukrainian vocational education institutions will require legislative reform, stakeholder engagement, and investment in infrastructure and human capital. This will contribute to improving the quality of vocational education, its compliance with market needs, and its integration into the European educational space.

Prospects for further scientific research may focus on investigating: the effectiveness of measures to overcome inequality in educational opportunities; optimal models for integrating AI and digital skills; ways to enhance teacher and parent involvement in VET quality assurance processes, etc. Despite the significant amount of research, there is also a need for interdisciplinary studies to understand and overcome the underlying socio-cultural factors that shape educational choices and perceptions of VET in the Kingdom of the Netherlands.

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ТЕНДЕНЦІЇ ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ПРОФЕСІЙНОЇ ОСВІТИ І ПІДГОТОВКИ ФАХІВЦІВ У КОРОЛІВСТВІ НІДЕРЛАНДИ

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Реферат:

Актуальність статті зумовлена ключовою роллю професійної освіти і підготовки (далі-ПОП) у формуванні конкурентоспроможної робочої сили для стратегічно важливих секторів економіки Королівства Нідерланди. Негативне сприйняття ПОП всередині країни, попри її міжнародне визнання, створює виклики для залучення молоді та підтримання суспільної довіри до системи. Сучасні вимоги до інтеграції цифрових технологій, штучного інтелекту та забезпечення інклюзивності тощо зумовлюють необхідність постійного вдосконалення системи забезпечення якості ПОП. Дослідження цих та інших тенденцій є важливим для України, оскільки дає змогу адаптувати передовий досвід Нідерландів для підвищення ефективності національної системи забезпечення якості професійної освіти.

Метою статті є виявлення та аналіз основних тенденцій забезпечення якості ПОП фахівців у Королівстві Нідерланди, з'ясування можливостей їх урахування у вдосконаленні системи забезпечення якості професійної освіти в Україні.

Методи: вивчення наукових джерел, законодавчих, нормативно-правових документів, емпіричних даних щодо забезпечення якості ПОП фахівців у Королівстві Нідерланди – для з'ясування стану проблеми дослідження; теоретичний аналіз і синтез – для виявлення основних тенденцій забезпечення якості ПОП фахівців у Нідерландах; узагальнення та систематизація– для формування висновків і рекомендацій.

Результати: виявлено та проаналізовано: багаторівневу структуру ПОП фахівців у Королівстві Нідерланди (початковий, базовий, професійний, спеціалізований); дві освітні траєкторії (шкільно-орієнтована (BOL) – для молоді; робітничо-орієнтована (BBL) – для дорослих); типи закладів ПОП (регіональний навчальний центр (ROCs), сільськогосподарські коледжі, спеціалізовані професійні коледжі та приватні акредитовані заклади); законодавчу реформу у сфері ПОП; систему забезпечення якості ПОП (розподіл відповідальності між закладами ПОП (саморегуляція) та зовнішніми органами (Інспекція освіти), тристороння організація SBB); тенденції забезпечення якості ПОП фахівців.

Висновки: до сучасних тенденцій забезпечення якості ПОП фахівців у Королівстві Нідерланди віднесено: узгодження ПОП з потребами ринку праці (високий рівень працевлаштування випускників: 85,4%,з них 81% знаходять роботу впродовж трьох місяців); розвиток професійної компетентності та навчання впродовж життя (освіта орієнтована на компетентності, ініціатива LLO Katalysator (2022-2027 рр.) підтримує безперервне навчання); розвиток «зелених» навичок (інтеграція досліджень через «хаби» для розвитку екологічних компетентностей); цифрова трансформація ПОП та використання штучного інтелекту (ШІ) (програма Npuls до 2031 р. сприяє цифровізації); інклюзивність та рівні можливості здобуття ПОП (інвестиції €1 млрд на 2024-2027 рр. і політика «Appropriate education» спрямовані на забезпечення рівних можливостей); професійний розвиток викладачів та їхня залученість до педагогічної діяльності (нестача 13,500 тис. викладачів впливає на якість, а гранти Comenius Teaching Fellow спрямовані на їх утримання); інтернаціоналізація ПОП (програми Erasmus+ сприяють розширенню мобільності та розвитку міжкультурних компетентностей); зростання обсягів державного фінансування ПОП (високі державні витрати на ПОП – 0,76% ВВП, але є занепокоєння щодо ефективності розподілу коштів); розвиток культури якості ПОП та внутрішньої системи забезпечення якості (саморегуляція закладів ПОП, опитування студентів і співпраця зі стейкхолдерами формують культуру якості ПОП, але є необхідність залучення викладачів).

Ключові слова: *тенденції; професійна освіта і підготовка; система забезпечення якості; Королівство Нідерланди; рекомендації для України.*

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SYSTEMATIZATION OF QUALITY ASSURANCE PRACTICES IN VOCATIONAL EDUCATION AND TRAINING IN ICELAND AND BELGIUM

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Abstract

Relevance. Ensuring the quality of professional training for future specialists is the primary goal of vocational education. Improving learning outcomes will reduce the qualification gap and increase public trust. In current conditions, the experience of vocational training for young people in EU countries is of significant interest for reforming Ukraine's vocational education system. Specifically, a comparative analysis of Iceland's and Belgium's approaches to systematizing management practices, identifying commonalities and differences in their quality assurance strategies for vocational education, is of particular interest.

Purpose: To identify commonalities and differences in the approaches to quality assurance in vocational education in Belgium and and Iceland.

Methods: Systematization and comparative analysis of quality assurance practices in vocational education in Iceland and Belgium.

Results: A comparative analysis of management approaches to quality assurance in vocational education institutions in Iceland and Belgium was conducted. This analysis was based on an examination of national frameworks, legislation, the activities of key organizations, internal/external evaluation mechanisms, and the role of national/European qualification frameworks.

Conclusions: Iceland utilizes the Icelandic Quality Assurance Agency for external reviews and mandates internal evaluations for institutions. In Belgian Flanders, NVAO operates for educational accreditation, alongside a system for validating acquired competencies. In the Belgian regions of Wallonia and and Brussels, AEQES is responsible for evaluating the quality of educational institutions. Common features in the quality assurance practices of both countries were identified: harmonization of European traditions and national specificities; effective combination of internal self-evaluation and external evaluation; the presence of effective mechanisms for involving all stakeholders in quality assurance; an orientation towards learning outcomes; and compliance with European frameworks (EQF, EQAVET). Differences were also characterized: Iceland's management system is centralized, while Belgium's is decentralized; Belgium has a bi-national agency; Iceland uses digital journals for quality assurance, whereas Belgium uses the VAC system. At the same time, ensuring quality education in both countries is complex, particularly across the different regions of Belgium.

Keywords: *quality assurance, comparative analysis, Icelandic Quality Assurance Agency, vocational education in Iceland, vocational education in Belgium, legislative acts.*

Introduction. Quality of vocational education is a cornerstone of economic growth, social cohesion, and individual development in today's globalized world. Amidst rapid technological changes and labor market transformations, effective quality assurance systems for vocational education become critically important, ensuring the alignment of educational

programs with the needs of learners, employers, and society as a whole, while also promoting improved learning outcomes and strengthening public trust. Iceland and Belgium, each with their unique socio-economic and educational contexts, demonstrate interesting approaches to building and operating such systems. In Iceland, vocational education primarily takes place at the upper secondary level with a significant emphasis on work-based learning (Cedefop, n.d.). In Belgium, however, there is a complex federal structure with distinct systems in Flanders, Wallonia, and Brussels, necessitating separate consideration of Flanders and Wallonia/Brussels due to differences in governance and practices (Cedefop & Bruxelles Formation, 2022). The purpose of this article is to systematize and thoroughly analyze quality assurance practices in vocational education in these two countries. The emphasis is on identifying the features, advantages, and disadvantages of existing models, not to advocate for specific solutions, but to structure knowledge and foster a comprehensive understanding of the issue. A comparative analysis of their experiences can be beneficial for other countries aiming to improve their own national vocational education systems. The article will sequentially examine the theoretical foundations of quality assurance, analyze the systems of Iceland and Belgium in detail, conduct their comparison, and offer conclusions.

Research Sources. This study is based on an analysis of existing quality assurance practices in vocational education, reflected in recent research and publications, including materials from Cedefop, Eurydice, ENQA, NVAO, as well as legislative acts and regulatory documents from Iceland and Belgium. The issue of quality assurance in vocational education is crucial for improving learning outcomes and labor market relevance. Although Iceland and Belgium (with its federal structure and separate systems in Flanders and Wallonia/Brussels) have interesting approaches, there is a need for systematization and comparative analysis of their practices. The unresolved part of the general problem addressed in this work is precisely conducting such a comparative analysis of quality assurance practices in vocational education in Iceland and Belgium, providing specific examples of their application. The study also analyzes the impact of European quality assurance frameworks on national systems.

Article Aim: The aim is to systematize and comparatively analyze quality assurance practices in vocational education in Iceland and Belgium (Flanders and Wallonia/Brussels) based on an examination of their national frameworks, legislative acts, the activities of key organizations, internal and external evaluation mechanisms, and the role of national and European qualification frameworks.

Methods. To achieve the stated aim—the systematization and comparative analysis of quality assurance practices in vocational education in Iceland and Belgium (Flanders and Wallonia/Brussels)—the following methods were used: systematization and comparative analysis. These methods were applied to investigate national frameworks, legislation, the activities of key organizations, internal and external evaluation mechanisms, and the role of national and European qualification frameworks in both countries. Analysis: The impact of European quality assurance frameworks on national systems was analyzed. Review: National frameworks, key organizations, the legislative basis, and specific examples of quality assurance practices, including internal and external evaluation, student feedback, stakeholder engagement, curriculum development and revision, and quality assurance for work-based learning programs, were reviewed. The application of these methods aimed to identify commonalities and differences in approaches to quality assurance in vocational education in Belgium and Iceland based on the presented research results.

Results and Discussion. Quality Assurance in Vocational Education in Iceland: National Framework, Organizations, and Legislative Basis. The general national quality assurance framework in Iceland's education system assigns responsibility to the Ministry of Education, Science and Culture (for pre-primary, primary, and secondary education) and the Ministry of Higher Education, Science and Innovation (for higher education) as the primary responsible bodies (Eurydice, n.d.). A key role in ensuring the quality of higher education, including vocational programs at this level, is played by the Icelandic Quality Assurance Agency (IAQA), an independent organization (ENQA, n.d.). The IAQA, formerly known as the Quality Board for Icelandic Higher Education (ENQA, n.d.), is mandated to oversee the quality of higher education and operates autonomously from the government and educational institutions (ENQA, n.d.). The Directorate of Education also plays an important role in various aspects of evaluation and monitoring, especially at the pre-primary, primary, and secondary education

levels (Eurydice, n.d.). To enhance the quality of Icelandic universities, the IAQA developed the Quality Enhancement Framework (QEF). The IAQA issues monitoring and internal review guidelines designed to support staff in Icelandic Higher Education Institutions (HEIs) responsible for internal monitoring and review of educational services and research (Education - Government of Iceland, 2025), which includes regular evaluations of university activities (Háskólinn í Reykjavík, n.d.). The QEF has undergone several phases: QEF1 (2010-2016), QEF2 (2017-2023), and QEF3 (2024-2029) (Háskólinn í Reykjavík, n.d.).

Quality assurance in vocational education in Iceland is based on key legislative acts, including the Higher Education Act No. 63/2006 (Education - Government of Iceland, 2025), the Upper Secondary School Act No. 92/2008 (Cedefop, n.d.), and the Icelandic National Qualifications Framework No. 80/2007 (Education - Government of Iceland, 2025). These laws define and guide quality assurance processes, including monitoring, evaluation, and accreditation. Specifically, the Higher Education Act sets requirements for the accreditation of higher education institutions and their programs (Education - Government of Iceland, 2025). Furthermore, Regulation No. 1165/2024 provides additional details on monitoring the quality of teaching and research in higher education institutions (Háskólinn í Reykjavík, n.d.). These legislative acts and regulatory documents create a solid foundation for ensuring the quality of vocational education in the country.

Higher education institutions in Iceland are obliged to conduct systematic internal reviews, including the collection of clearly defined key data on their activities (Government of Iceland, 2024). Reykjavík University (RU) is an example of an institution that implements internal evaluation at the institutional level through faculty self-evaluation and peer review of academic course content (Háskólinn í Reykjavík, n.d.). Schools at all levels must also systematically evaluate their internal operations with the active participation of staff, students, and parents, and publish information about these evaluations and improvement plans (Eurydice, n.d.). RU also publishes annual quality reports, ensuring transparency of internal quality assurance processes (Háskólinn í Reykjavík, n.d.).

The IAQA conducts external quality reviews of all higher education institutions with the aim of continuously improving their performance (ENQA, n.d.). These evaluations are regular and systematic, carried out at least every five years (Eurydice, 2025). The Ministry of Education, Science and Culture also conducts comprehensive external evaluations at the pre-primary, primary, and secondary education levels, often in collaboration with the Directorate of Education (Eurydice, n.d.). International experts and student representatives participate in the external evaluation process of higher education (Government of Iceland, 2024). Evaluation reports are published by universities and the IAQA to ensure transparency (Eurydice, n.d.). RU collects and analyzes student data, including their satisfaction with programs, progress, and dropout rates, to inform quality assurance processes (Háskólinn í Reykjavík, n.d.). Student evaluation of course quality is a key component of faculty evaluation at RU (Háskólinn í Reykjavík, n.d.). Internal evaluations at all levels of education involve the active participation of staff, students, and parents (Eurydice, n.d.). Students also participate in external expert groups for higher education quality evaluation (Government of Iceland, 2024).

Since 2011, upper secondary schools in Iceland have adopted a decentralized approach to curriculum development, as stipulated by the Upper Secondary School Act (Cedefop, n.d.). The National Curriculum for Upper Secondary Schools provides a general framework for curriculum development (Cedefop, n.d.). RU emphasizes the alignment of course organization, teaching, and assessment with learning outcomes (Háskólinn í Reykjavík, n.d.). Companies providing work-based learning must be officially certified and enter into training agreements (Cedefop, n.d.). Digital logbooks are used in apprenticeship programs to record the learning process and acquired competencies (Cedefop, n.d.). A recent policy change involves transferring the responsibility for finding apprenticeship contracts from students to vocational education institutions to strengthen the vocational education system (Cedefop, n.d.).

Structure of Vocational Education in Belgium. Belgium has a complex vocational education structure with separate systems in Flanders and Wallonia/Brussels (Cedefop & Bruxelles Formation, 2022). Vocational education is offered at various levels: secondary, post-secondary, and tertiary (Cedefop, 2024). In Flanders, the Accreditation Organization of the Netherlands and Flanders (NVAO) is responsible for quality assurance in higher education (NVAO, n.d.). NVAO accredits programs and evaluates the quality assurance systems of higher education institutions

(NVAO, n.d.). The Agency for Higher Education, Adult Education, Qualifications and Study Grants (AHOVOKS) plays an important role in quality assurance in these sectors and also serves as the EQAVET National Reference Point for Flanders (Cedefop & Bruxelles Formation, 2022). The Education Inspectorate conducts external reviews and ensures compliance with educational standards (Eurydice, 2023). Program accreditation and institutional review: NVAO accredits new and existing programs in higher education, using expert evaluation and ensuring public access to information (NVAO, n.d.). NVAO (the Dutch-Flemish Accreditation Organisation) initiates the organization of this dialogue, and its specific format is determined by mutual agreement between the committee and the educational program. Traditionally, a site visit to the evaluation object is an integral part of this procedure. However, considering efficiency and contextual specificities, the committee may decide to waive a physical visit if existing conclusions from previous evaluations are sufficient, or if a physical visit does not provide added value. In such cases, the dialogue can be conducted through a series of online meetings. A combined use of both formats is also possible, especially to involve stakeholders who find it difficult to travel physically.

The committee's preparation for this key stage involves preliminary consultations, ensuring its readiness to perform the assigned tasks. The organization also conducts institutional reviews to assess the overall quality assurance policies of universities and university colleges (NVAO, n.d.). Validation of Acquired Competences (VAC): In Flanders, the VAC system operates for the assessment and certification of competences acquired through work experience or non-formal learning (De Vlaamse Kwalificatiestructuur, 2020). VAC aligns with the Flemish Qualifications Framework (FQF) and the European Qualifications Framework (EQF) (Flanders.be, 2019). Peer review and appreciative inquiry approach: In Flanders, significant attention is paid to the peer review of educational quality, involving professionals from the vocational sphere, education experts, and students (NVAO, n.d.). NVAO employs an approach based on trust and open dialogue during evaluation. Based on the NVAO program proposal, the committee, in conjunction with the educational program, defines the substantive content of the program. The process coordinator acts as a mediator, ensuring effective communication between the parties. After the final program is approved, the educational program submits proposals for the composition of participants. During the dialogue, the committee has the right to request additional information necessary for a reasoned conclusion, with mandatory justification for such requests. A list of all studied information is recorded in the evaluation report. In connection with the possibility of a need for additional information or the institution's initiative to provide it, free time is provided in the program. This allows the educational program to submit additional documents or schedule additional meetings.

To ensure the independence and objectivity of the evaluation, any events that might affect this principle must be immediately reported to NVAO. This applies to stakeholders, including committee members, process coordinators, secretaries, institutional staff, and students, who can use the complaint procedure available on the official website (NVAO, n.d.). Overall Quality Framework for Vocational Qualification Courses: There is a general quality framework for vocational qualification courses offered by training providers and validation bodies outside formal education (European Commission, 2023). This framework consists of five components related to objectives, design, guidance, assessment, and improvement actions (European Commission, 2023).

Organizations Involved in Quality Assurance in Wallonia. The Agency for Quality Assurance in Higher Education (AEQES) is responsible for evaluating the quality of higher education in the French Community of Belgium, including universities and university colleges (ENQA, 2021). AEQES is an independent organization and is registered with EQAR (ENQA, 2021). The Education Inspectorate organizes regular evaluations in the field of adult education and part-time artistic education (Eurydice, 2023). FOREM (Walloon Office for Employment and Vocational Training) and Bruxelles Formation participate in ensuring the quality of vocational training for job seekers and workers (Cedefop & Bruxelles Formation, 2022). IFAPME (Walloon Institute for Alternating Training and Entrepreneurship Training) and SFPME (Service for Training for Small and Medium-sized Enterprises in Brussels) are responsible for alternating training programs and potential mechanisms for their quality assurance (Vocational education and training in Europe | Belgium - Cedefop - European Union, n.d.). External evaluation by AEQES: AEQES conducts

formative evaluations based on dialogue with stakeholders and on-site visits to assess higher education programs (ENQA, 2021). The Education Inspectorate organizes regular evaluations in the field of adult education (Eurydice, 2023). Adult education institutions are obliged to conduct systematic internal quality evaluations of their activities and publish information about their quality control and improvement plans (Eurydice, n.d.). SYNTRA Flanders uses an EFQM-based self-assessment tool in combination with an expert committee for its centers (Eurydice, 2023). Quality Assurance in Alternating Training Programs: SYNTRA-Flanders is responsible for overall quality assurance in its centers, which include alternating training programs (Eurydice, 2023). In the French Community, amendments have been made to the Cooperation Agreement on Alternating Training to improve the quality of apprenticeship programs (OIT/Cinterfor, 2020). The EQAVET National Reference Point for Wallonia-Brussels organized a peer review in 2023, focusing on how training and skills needs of the labor market are met (European Commission, 2023).

Analysis of Quality Assurance Practices. Similarities. Iceland and Belgium (Flanders and Wallonia/Brussels) emphasize the importance of both internal and external evaluation mechanisms. Both countries recognize the value of stakeholder engagement, including students, staff, and sometimes parents or employers, in quality assurance processes. The concept of linking education and training to learning outcomes is common in both systems, often through national qualification frameworks (Education - Government of Iceland, 2025). Both countries are influenced by European quality assurance frameworks and initiatives such as EQF and EQAVET (Cedefop, 2024). Differences. Iceland has a more centralized system with a national agency (IAQA) playing a dominant role in higher education quality assurance, while Belgium demonstrates a more decentralized approach with regional variations and multiple actors. Flanders has a bi-national accreditation agency (NVAO) for higher education, reflecting close ties with the Netherlands, which is not present in Iceland or Wallonia/Brussels. The emphasis on specific mechanisms may differ; for example, Flanders places significant emphasis on institutional review at the higher education level through NVAO, while the IAQA in Iceland focuses on program and institutional evaluation. Wallonia/Brussels relies more on inspections for adult education quality assurance. The level of detail and formality in quality assurance regulations and guidelines can vary between countries and regions.

National Qualification Frameworks (NQFs) in Iceland (ISQF) and Belgium (FQF for Flanders and CFC for the French Community) play an important role in quality assurance. They define learning outcomes, qualification levels, and promote transparency and mobility (Education - Government of Iceland, 2025). These frameworks also facilitate the inclusion of vocational qualifications and the recognition of non-formal learning (De Vlaamse Kwalificatiestructuur, 2020). The European Qualifications Framework (EQF) and the European Quality Assurance Reference Framework for Vocational Education and Training (EQAVET) have influenced the development and implementation of national quality assurance practices in Iceland and Belgium (Cedefop, 2024). National EQAVET Reference Points contribute to the implementation and further development of the EQAVET framework in both countries (European Commission, n.d.).

Reykjavík University's Quality Assurance System: Includes self-evaluation, student feedback, peer review, and alignment with international standards (Háskólinn í Reykjavík, n.d.). Quality assurance of apprenticeship programs is achieved through the use of digital logbooks, which serve as a tool for documenting skills and competencies acquired during work-based learning (Cedefop, n.d.). The IAQA conducts regular external evaluations of higher education institutions for continuous quality improvement (ENQA, n.d.).

In Flanders, NVAO Program Accreditation: The NVAO program accreditation process includes peer review and the publication of evaluation reports (NVAO, n.d.). The Validation of Acquired Competences (VAC) in a sectoral context is a mechanism that ensures the official recognition and confirmation of skills acquired by individuals outside the formal education system, particularly in fields such as information technology (IT) or trade (De Vlaamse Kwalificatiestructuur, 2020). Adult education centers in Flanders have internal quality assurance systems and are subject to external oversight by the Education Inspectorate (Eurydice, 2023). The methodology for external quality evaluation of higher education, carried out by the Agency for Quality Assurance in Higher Education (AEQES) in Brussels, integrates key elements such as structured dialogue with all relevant stakeholders and conducting on-site visits to higher education

institutions (ENQA, 2021). IFAPME uses various mechanisms to ensure the quality of apprentice training in Wallonia (Cedefop, 2024). Adult education centers in Brussels conduct self-evaluation, and the Education Inspectorate performs subsequent monitoring (Eurydice, n.d.).

Conclusions. Therefore, quality assurance practices in Iceland and Belgium reflect both common European trends and unique national characteristics. Both countries emphasize the importance of combining internal self-evaluation and external independent evaluation to ensure the quality of vocational education. Stakeholder engagement, especially students, is a key element in both systems, contributing to increased transparency and accountability. One noticeable difference is the level of centralization of the systems. Iceland demonstrates a more centralized approach, especially in higher education, where the IAQA plays a leading role in national quality assurance. Belgium, with its federal structure, has a more decentralized system with regional variations and various bodies responsible for quality assurance in different education sectors. The presence of a bi-national accreditation agency (NVAO) in Flanders is a unique feature, reflecting close cooperation with the Netherlands in higher education.

Among the innovative approaches, one can highlight the Icelandic system of digital logbooks for apprenticeship programs, which provides detailed tracking of acquired competencies in the workplace. In Flanders, the comprehensive system of Validation of Acquired Competences (VAC) deserves attention, as it promotes the recognition of non-formal learning and increases labor market mobility. Ensuring the quality of vocational education is a complex task, especially in the context of diverse educational environments and governance structures, which is particularly evident in Belgium. Further research could focus on evaluating the effectiveness of different quality assurance models in both countries and identifying best practices that could be applied in other contexts.

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СИСТЕМАТИЗАЦІЯ ПРАКТИК ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ПРОФЕСІЙНОЇ ОСВІТИ В ІСЛАНДІЇ ТА БЕЛЬГІЇ

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Реферат:

Актуальність: забезпечення якості професійної підготовки майбутніх фахівців є найголовнішим завданням професійної освіти; покращення результатів навчання скорочуватиме кваліфікаційний розрив і підвищуватиме довіру суспільства; за сучасних умов для реформування системи професійної освіти в Україні значний інтерес становить досвід професійної підготовки молоді у країнах ЄС; зокрема, цікавим є порівняльний аналіз підходів Ісландії та Бельгії до систематизації управлінських практик, виявлення спільного та відмінного у стратегіях забезпечення якості професійної освіти в обох країнах.

Мета: виявлення спільних рис та відмінностей у підходах до забезпечення якості професійної освіти в Бельгії та Ісландії.

Методи: систематизація та порівняльний аналіз практик забезпечення якості професійної освіти в Ісландії та Бельгії.

Результати: проведено порівняльний аналіз управлінських підходів до забезпечення якості професійної освіти у закладах професійної освіти Ісландії та Бельгії, що базувався на дослідженні національних рамок, законодавства, діяльності ключових організацій, внутрішніх/зовнішніх механізмів оцінювання та ролі національних/європейських кваліфікаційних рамок.

Висновки: Ісландія використовує Ісландську агенцію із забезпечення якості (IAQA) для зовнішніх перевірок та зобов'язує заклади до внутрішнього оцінювання; у Бельгійській Фландрії діє NVAO для акредитації освіти та система валідації набутих компетентностей (VAC); у бельгійських землях Валлонії та Брюсселі за оцінювання якості закладів освіти відповідає AEQES; виявлено спільні риси у практиках забезпечення якості освіти обох країн (гармонізація європейських традицій і національних особливостей; ефективне поєднання внутрішнього самооцінювання та зовнішнього оцінювання; наявність дієвих механізмів залучення до забезпечення якості освіти усіх зацікавлені сторони; орієнтація на результати навчання; відповідність європейським рамкам EQF, EQAVET); охарактеризовано відмінності (система управління в Ісландії централізована, а в Бельгії – децентралізована; у Бельгії діє двонаціональна агенція NVAO; в Ісландії для забезпечення якості освіти використовуються цифрові журнали, а в Бельгії – система VAC; водночас забезпечення якості освіти в обох країнах є складним, особливо в різних землях Бельгії).

Ключові слова: *забезпечення якості, порівняльний аналіз, Ісландська агенція забезпечення якості, професійної освіта в Ісландії, професійна освіта в Бельгії, законодавчі акти.*

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SYSTEMIC AND PEDAGOGICAL BARRIERS IN TEACHING ENGLISH AS A FOREIGN LANGUAGE: A COMPARATIVE ANALYSIS

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Abstract

Relevance of the study lies in the need to synthesize contemporary scientific approaches and formulate practical recommendations to enhance the effectiveness of English language teaching in higher education institutions.

Aim: a synthesis of contemporary scientific research dedicated to the challenges of teaching English as a foreign language in higher education institutions, and a systematization of recommendations based on empirical data.

Methods: theoretical analysis of scientific literature, content analysis of contemporary publications on the topic, synthesis and classification of approaches to teaching English, comparative analysis of pedagogical practices in higher education, and interpretation of results from previous empirical studies.

Results: main systemic and pedagogical factors complicating the effective teaching of English as a foreign language in higher education institutions have been identified. Problems related to insufficient teacher training, limited resources, and the mismatch of curricula with modern communicative needs have been revealed. The obtained results provide a foundation for developing practical recommendations aimed at improving the quality of language education.

Conclusions: analysis of contemporary scientific literature has shown that key problems include both external barriers (outdated curricula, standardized assessment, limited access to professional development) and internal factors related to pedagogical approaches and the level of teacher training. These factors reduce the quality of language education and hinder the development of students’ practical skills. Overcoming these challenges requires a comprehensive approach: reforming educational policy, updating curricula, ensuring continuous professional development for teachers, implementing flexible student-centered methodologies, and supporting the integration of authentic and digital resources.

Keywords: *higher education, English as a foreign language (EFL), language education, teaching methodology, teacher professional development.*

Introduction. The global spread of the English language has profoundly affected educational systems, particularly in the sphere of teaching English as a foreign language; however, the diffusion of English is accompanied by a series of challenges that vary according to regional context. Despite the emphasis on developing communicative competence, the scholarly literature lacks an in-depth analysis of the difficulties encountered by instructors.

These difficulties exhibit both a systemic nature (language-policy constraints, insufficient funding, low professional status, shortage of resources) and an individual one (student motivation, mixed-ability preparation, classroom management, internal pressure). Uneven access to educational resources further complicates the situation. Under such conditions, English is often perceived as a formal subject rather than as a means of genuine communication (Kayum, 2025).

Accordingly, there is an urgent need for context-sensitive, inclusive and resource-supported approaches to English language teaching that can respond to global as well as local challenges.

Sources of the study. An analysis of scholarly sources indicates a growing interest among researchers in the problems of teaching English as a foreign language amid globalisation and regional educational transformations. Attention is focused on systemic barriers—language policy, infrastructural limitations, standardised assessment—as well as on pedagogical challenges related to insufficient teacher preparation, limited use of the communicative approach, and the absence of personalised learning (Saito & Turner, 2025; Chanwaiwit & Kantisa, 2022; Rahimi, 2024). Individual studies emphasise the influence of sociocultural context on learning effectiveness, the role of digital technologies, and the need to update curricula in accordance with students' needs (Leon & Castro, 2025; Wang, 2025). Despite the abundance of publications, a comprehensive synthesis of these findings is required to formulate context-sensitive and empirically grounded teaching strategies.

The purpose of the article is to summarise contemporary research devoted to the problems of teaching English as a foreign language in higher education institutions and to systematise recommendations based on empirical data with a view to enhancing the effectiveness of the educational process.

Research methods comprise theoretical analysis of scholarly literature, content analysis of recent publications on the topic, synthesis and classification of approaches to English language teaching, comparative analysis of pedagogical practices in higher education, and interpretation of previous empirical findings.

Results and discussion. On the basis of the literature review, it has been determined that the teaching of English as a foreign language involves both external systemic barriers and internal pedagogical problems that affect learning effectiveness.

Excessive dependence on traditional teaching methods. In many educational contexts, traditional teacher-centred methodologies, including the grammar-translation approach, dominate. Large class sizes, inadequate teacher preparation and a lack of resources hinder the implementation of communicative and student-centred approaches, thus constraining the development of oral practice and written fluency (Saito & Turner, 2025). The emphasis often shifts to reading and writing, whereas speaking and listening remain neglected.

A system oriented toward standardised testing intensifies this imbalance by emphasising grammatical and lexical knowledge instead of the development of practical language skills and communicative competence (Rahimi, 2024; Zapotichna, 2024). As a consequence, the educational process is centred on predictability and control rather than on interaction and learner autonomy.

Despite the potential of modern technologies to create an interactive environment, many instructors adhere to traditional approaches that do not meet current educational needs (Al-wossabi, 2023). This reflects not only technical constraints but also cultural and institutional inertia that impedes the renewal of pedagogical practice (Rahimi, 2024).

Limited integration of the communicative approach. Communicative language teaching (CLT) remains restricted owing to insufficient teacher training (Mutolwa & Mwanza, 2025; Suwannatrai et al., 2023).

Traditional instruction is largely based on passive knowledge transmission, which fails to meet contemporary student expectations oriented toward interactivity and experience (Xie, 2025). Even when instructors recognise the advantages of CLT, curricula and institutional inertia hamper the transition to student-centred methods (Adhikari, 2021). This problem is compounded by standardised examinations that focus on grammar, even when instructors acknowledge the importance of developing communicative competence (Chanwaiwit & Kantisa, 2022).

CLT has a positive impact on student motivation and the development of their language skills (Leon & Castro, 2025), yet its implementation is constrained by resource shortages, curricular misalignment and limited support for out-of-class language use. Curricular imbalances lead to uneven development of language skills, thereby complicating the transfer of knowledge to real

situations. Moreover, there is a risk of superficial CLT implementation without regard to cultural context. Singh (2024) warns that mechanical application of communicative skills can diminish linguistic identity and critical thinking.

To realise the potential of CLT, instructors must deliberately adapt the methodology to the sociolinguistic realities of their students, taking into account classroom constraints. Given appropriate preparation and contextualised implementation, an integrated approach can greatly enhance learner autonomy, engagement and practical language abilities (Leon & Castro, 2025).

Absence of personalised and contextualised learning. The study by Chanwaiwit and Kantisa (2022) shows that success in learning English largely depends on both personal factors (learning goals, self-perceived proficiency, exposure through social media) and contextual factors (teacher experience, quality and availability of materials, learning environment). These aspects point to the need for flexible, adaptive teaching strategies.

However, many instructors encounter difficulties in adapting programmes to mixed-ability groups and diverse learning styles. Because of the absence of a quality needs analysis, one-size-fits-all programmes are created that are not linked to the students' real context, reducing their effectiveness.

In Thailand, instructors still adhere to an authoritarian teaching style that suppresses student autonomy (Suwannatrai et al., 2023). Xie (2025) calls for a personalised approach based on individual data such as pace and students' strengths and weaknesses, yet implementing this requires considerable resources and analytical teacher training.

Hussein and Alqassier (2024) draw attention to the harmfulness of teachers' stereotypical perceptions of student abilities—particularly by gender or social background—which generate unequal opportunities and widen learning gaps. Effective teaching requires that instructors be able to identify students' educational needs and adapt the methodology accordingly (Dr. C. Abirami & Chandrasekaran K, Abirami, 2025). At the same time, this presupposes high pedagogical qualifications and leadership support. The absence of strategies for working with different student types diminishes their engagement and learning outcomes.

Wang (2025) emphasises the importance of active student engagement as a means of increasing motivation and highlights the need for a balance between autonomy and support, especially for youth who require both freedom and structured guidance.

Mallillin and Mallillin (2024) urge the development of programmes aligned with students' achievement levels, focusing on the selection of methods tailored to their needs. According to them, effective teaching is possible only when pedagogical approaches correspond to the real educational context.

Outdated or inflexible curricula. In various educational contexts, curricula often fail to meet contemporary communicative goals and practical requirements for using English. A systemic problem is the excessive emphasis on rote memorisation, grammatical accuracy and examination preparation at the expense of developing communicative competence. For example, in Thailand, English-teaching curricula remain largely oriented toward native-speaker norms (particularly American or British English), which limits learners' exposure to English varieties and reproduces linguistic bias (Chanwaiwit & Kantisa, 2022). Traditional instruction in Thai classrooms likewise concentrates mainly on grammar and memorisation, neglecting functional language use and thus severely restricting students' real communicative ability (Suwannatrai et al., 2023).

Similar trends are observed in other Asian countries. In India, curricula focus on rote learning and grammar-oriented instruction, ignore the development of oral communicative skills, and do not provide structured opportunities for speaking and listening practice. In Nepal, curricula often omit components needed for practical language use—such as speaking and listening activities—and do not correspond to principles of contextualised learning, hindering the implementation of communicative English teaching methods.

In Saudi Arabia, limited contact hours further hinder the integration of communicative skills—especially speaking and listening—into curricula (Alfares, 2024). A similar mismatch is found in Pakistan, where curricula inadequately support both communicative and technology-enhanced learning, indicating the need for comprehensive reform. In Zambia, traditional

curricula and assessment practices are also poorly aligned with the principles of the communicative approach, restricting the implementation of communicative grammar teaching (Mutolwa & Mwanza, 2025).

Japan's English curriculum is frequently criticised for its late introduction and its outdated examination-oriented focus, which impedes the development of comprehensive language competencies (Saito & Turner, 2025). In Ukraine, speaking and listening skills often remain overlooked despite their increasing importance for employability in a globalised world (Zapotichna, 2024).

Taken together, these observations point to a widespread mismatch between curriculum design and contemporary requirements for communicative, contextual and competence-based English teaching.

Examination-centred English teaching. In many countries, language education is influenced by standardised assessment, which lowers the priority of meaningful language use. Exam-centrism often leads to rote learning of grammar and vocabulary, displacing the development of communicative skills.

In Iraq, the focus on grammar-based testing hinders the development of speaking and listening, which are critical for real communication (Hussein & Alqassier, 2024). A similar situation exists in Thailand, where instructors, while acknowledging the importance of communicative competence, nevertheless concentrate on accuracy and test-taking strategies (Chanwaiwit & Kantisa, 2022).

This exam-dependent approach is also typical of Japan, Yemen and China, where instruction is primarily oriented toward reading and writing, leaving oral skills unattended. Consequently, students often achieve high scores without acquiring functional language ability (Sharma & Kumar, 2024).

In Saudi Arabia, teaching is oriented toward examination content rather than authentic language use (Al-wossabi, 2023), whereas in India the absence of oral components in tests reduces motivation to develop speaking.

Systemic problems, including academic dishonesty, further complicate the situation. In Japan, cheating during examinations casts doubt on result validity and demotivates genuine learning (Saito & Turner, 2025).

Thus, the dominance of test-oriented practices in English teaching restrains the development of communicative skills, necessitating a revision of assessment approaches to create a more balanced and meaningful educational process.

Insufficient professional development of instructors. The lack of adequate teacher preparation and limited opportunities for professional growth remain serious issues in many educational contexts, complicating the implementation of modern teaching methods.

Integrated and communicative approaches require the ability to design tasks that develop multiple language skills simultaneously. However, instructors often lack sufficient preparation for this (Leon & Castro, 2025). A lack of confidence in their own English, especially in speaking, reduces their participation in communicative activities and limits the language environment for students. Moreover, inadequate understanding of curriculum objectives weakens the link between teaching and expected outcomes.

In rural areas, the situation is aggravated by limited access to training. In Afghanistan (Rahimi, 2024) and Indonesia, teachers require additional support to work with mixed-ability students and adapt to varied programmes. Similar difficulties are observed in Iraq, Saudi Arabia and China (Hussein & Alqassier, 2024; Alfares, 2024; Wang, 2025), where the absence of systematic upskilling hinders the application of interactive methods and the development of intercultural competence. In Japan, a lack of updated methodological training limits the use of innovative strategies (Saito & Turner, 2025).

In Ecuador and Tanzania, calls are voiced for targeted andragogical training that combines theory with practice. Ukrainian instructors likewise lack support in implementing cognitive-communicative and intercultural approaches (Buzdugan et al., 2025). Experts emphasise the importance of continuous access to resources and learning so that teachers can implement adaptive, inclusive and context-sensitive practices (Azad, 2024).

Therefore, without systematic preparation and support, instructors cannot effectively implement learner-centred approaches, which

substantially limits teaching quality across educational systems.

Excessive workload and burnout. Heavy workloads and staffing problems constitute serious obstacles to quality English teaching, especially in resource-constrained and rural settings. They complicate lesson planning, reduce student engagement and hinder adaptation to changes in instructional approaches.

In many countries, instructors are forced to combine teaching with administrative duties. For instance, in Mongolia, rural teachers perform several roles simultaneously owing to staff shortages, leaving little time for lesson preparation (Marav & Batsuuri, 2025). Low pay, regional isolation and limited language proficiency also negatively affect teaching quality. A similar situation is observed in Nepal, South Africa and Afghanistan, where a shortage of qualified personnel reduces the effectiveness of the educational process.

The COVID-19 pandemic further aggravated the situation: instructors faced new demands to move online without adequate preparation, considerably increasing workload (Kocha et al., 2022).

A shortage of qualified instructors in rural and remote areas, particularly in Mongolia and the Philippines, compels institutions to assign English teaching to unqualified specialists. This deteriorates instructional content and intensifies the burden on existing staff.

Educators are obliged to meet high demands without adequate institutional support, which causes stress, emotional burnout and demotivation. In some countries, the teaching profession holds low social prestige, further undermining teacher morale (Tkachenko et al., 2024).

Lack of ICT competence among instructors. The integration of digital technologies into teaching has significant potential to enhance student engagement and activity. Tools such as multimedia, online collaboration and gamified learning environments foster the development of all language skills, including pronunciation and listening, through the use of audiovisual media (Wang, 2025). Moreover, technology stimulates learner autonomy and transforms the instructor's role from traditional lecturer to facilitator and mentor (Xie, 2025).

Despite these advantages, successful implementation of such technologies as virtual reality, educational platforms and intelligent tools requires appropriate infrastructure, stable institutional support and ongoing teacher upskilling (Xie, 2025). Many educators lack sufficient training and confidence in using digital learning tools, complicating the creation of an interactive and meaningful digital learning environment (Ghafar, 2023; Qu, 2025). Teachers often face difficulties in selecting and applying suitable digital materials, and disparities in ICT proficiency produce uneven learning outcomes.

Enhancing instructors' digital competence requires urgent professional development (Qu, 2025). Without adequate preparation and institutional support, educators may struggle to use technological tools effectively (Adhikari, 2021; Wang, 2025). In some countries, notably Nepal, responsibility for technology integration is frequently placed on individual instructors who must use personal resources because of systemic limitations (Adhikari, 2021).

Furthermore, unstructured or excessive use of personal devices may diminish interaction between learners and instructors as well as among students themselves, causing a sense of isolation in the learning environment (Adhikari, 2021). Although technology opens transformational opportunities for English language teaching, its adoption should be grounded in pedagogical principles and accompanied by careful planning, appropriate training and institutional support to avoid risks such as overdependence on technology or neglect of fundamental language skills (Kumar, 2024).

Shortage of authentic and locally relevant teaching materials. Excessive reliance on outdated textbooks that often lack communicative relevance and cultural appropriateness limits the effectiveness of English teaching (Rahimi, 2024). In many educational contexts, there is a deficit of basic teaching resources, including textbooks, audiovisual media, language laboratories and other supplementary materials, which hampers the design and delivery of interactive and context-rich lessons (Ghafar, 2023; Alfares, 2024; Leon & Castro, 2025). In addition, weak infrastructure and the absence of diverse and authentic resources restrict opportunities

for full development of speaking and listening skills, reduce methodological variety and hinder the creation of an interactive learning environment (Al-Jaro et al., 2024; Mallillin & Mallillin, 2024).

Gaps in educational policy and its implementation. Despite the formal recognition of English as a strategic element of education, many countries display a substantial gap between policy declarations and their practical realisation. Policies that proclaim the importance of English often remain fragmented, inconsistent or lack an effective implementation mechanism.

In Nepal, the absence of coherent approaches that consider both global requirements and local educational realities confuses instructors and hampers the formation of a unified national strategy. A similar situation is observed in Algeria, where political recognition of English is not accompanied by clear or consistent actions in educational institutions.

Such challenges indicate the need to strengthen the connection between educational policy and practice, to develop clear implementation guidelines, and to establish effective monitoring systems that ensure context-relevant, high-quality teaching.

Conclusions. The study has revealed a series of systemic and pedagogical challenges that substantially influence the effectiveness of teaching English as a foreign language in higher education institutions. An analysis of contemporary scholarly literature showed that the key problems encompass external barriers (outdated curricula, standardised assessment, limited access to professional development) as well as internal factors related to pedagogical approaches and the level of instructor preparation. Overcoming these issues requires a comprehensive approach: reforming educational policy, updating curricula, ensuring continuous teacher professional development, implementing flexible learner-centred methodologies, and supporting the integration of authentic and digital resources. Only through systemic changes can more effective, contextually relevant and outcome-oriented teaching of English as a foreign language in higher education be ensured.

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СИСТЕМНІ ТА ПЕДАГОГІЧНІ БАР'ЄРИ У ВИКЛАДАННІ АНГЛІЙСЬКОЇ МОВИ ЯК ІНОЗЕМНОЇ: КОМПАРАТИВНИЙ АНАЛІЗ

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Реферат:

Актуальність дослідження полягає в необхідності узагальнення сучасних наукових підходів і формулювання практичних рекомендацій для підвищення ефективності викладання англійської мови у закладах вищої освіти.

Мета: узагальнення сучасних наукових досліджень, присвячених проблемам викладання англійської мови як іноземної у закладах вищої освіти, систематизація рекомендацій, заснованих на емпіричних даних.

Методи: теоретичний аналіз наукової літератури, контент-аналіз сучасних публікацій з теми, синтез і класифікація підходів до викладання англійської мови, порівняльний аналіз педагогічних практик у вищій освіті, інтерпретація результатів попередніх емпіричних досліджень.

Результати: виокремлено основні системні та педагогічні чинники, що ускладнюють ефективне викладання англійської мови як іноземної у закладах вищої освіти. Виявлено проблеми, пов'язані з недостатньою підготовкою викладачів, обмеженими ресурсами та невідповідністю навчальних програм сучасним комунікативним потребам. Отримані результати створюють підґрунтя для формування практичних рекомендацій, спрямованих на покращення якості мовної освіти.

Висновки: аналіз сучасної наукової літератури засвідчив, що ключові проблеми охоплюють як зовнішні бар'єри (застарілі навчальні програми, стандартизоване оцінювання, обмежений доступ до професійного розвитку), так і внутрішні чинники, пов'язані з педагогічними підходами та рівнем підготовки викладачів; ці фактори знижують якість мовної освіти та перешкоджають розвитку практичних навичок студентів; подолання зазначених проблем вимагає комплексного підходу: реформування освітньої політики, оновлення навчальних програм, забезпечення безперервного професійного розвитку викладачів, впровадження гнучких методик, орієнтованих на студента, та підтримки інтеграції автентичних і цифрових ресурсів.

Ключові слова: *вища освіта, англійська мова як іноземна, мовна освіта, методика викладання, професійний розвиток викладача.*

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ROLE-PLAYING TECHNOLOGY IN THE DEVELOPMENT OF PROFESSIONAL COMPETENCE OF PROFESSIONAL COLLEGE LECTURERS

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Abstract

Relevance: Modern professional pre-higher education is undergoing constant transformation, which requires lecturers not only deep subject knowledge but also the ability to communicate effectively, adapt to changes, and engage in pedagogical reflection; the competency-based approach actualizes the need for educational technologies capable of contributing to the formation of complex professional skills, which draws attention to the application of role-playing technology, combining elements of simulation, modeling, and emotional-behavioral immersion in the educational process, activating learning activities, contributing to the formation of social responsibility, empathy, and the ability to work in a team; however, in the Ukrainian educational context, sufficient conceptualization of this method has not yet been achieved, and the question of distinguishing between educational role-playing games and RPGs (role-playing games) as leisure activities remains open, complicating the development of methodological recommendations and the creation of effective scenarios for the implementation of the educational process; this determines the relevance of the theoretical substantiation of the pedagogical potential of role-playing technology and its integration into the structure of professional training for lecturers.

Objective: To analyze and generalize the theoretical foundations of role-playing technology, define its structural components and potential in forming the professional competence of professional college lecturers, considering the specifics of educational role-playing games and classic role-playing games.

Methods: The study used a complex of general scientific and pedagogical methods: analysis of scientific sources and theoretical approaches, comparative analysis of terminology and structures of role-playing games, modeling of pedagogical situations, and systematization of results to form a structural-component model of an educational role-playing game.

Results: The specifics of educational role-playing games are characterized; their ability to act as a tool for transformational learning is determined; the pedagogical potential of the diegetic narrative space in the formation of lecturers' professional identity is revealed; a model of role-playing activity is proposed that integrates cognitive, emotional, and social components of learning, with an orientation towards developing professional skills in simulated situations.

Conclusions: Role-playing teaching methods, including educational role-playing games and classic role-playing games, have high potential in forming the professional competence of lecturers; their effective implementation requires a clear understanding of the game structure, roles, and educational goals; further research should be aimed at developing practical recommendations for creating scenarios and integrating facilitation strategies into the role-playing educational process.

Keywords: *role-playing technology, educational role-playing game, professional competence, professional college, pedagogical reflection, transformational learning, diegetic space.*

Introduction. In the contemporary landscape of dynamic educational development, particularly within professional pre-higher education, there is a growing need for educators capable not only of effectively imparting knowledge but also of fostering professional, communicative, and social competencies in students. This necessitates the implementation of innovative educational technologies that ensure active participation of learners in the educational process, promoting the development of critical thinking, empathy, and the ability to reflect. One such technology is role-playing, which allows for the creation of a conditionally simulated professional environment where participants gain experience by performing socially significant roles.

Despite the increasing popularity of role-playing practices, there is still a lack of thorough research in Ukrainian pedagogical theory and practice that clearly distinguishes between educational role-playing games and classic role-playing games (RPGs), and systematizes their impact on the formation of lecturers' professional competence. Confusion in terminology often occurs in scientific literature, which reduces the effectiveness of implementing role-playing methods in the educational process and hinders the creation of a holistic pedagogical model for their use.

In this context, role-playing technology is considered a tool for integrating educational gaming practices into the training of professional college lecturers. It combines simulated, communicative, and creative elements that enable the formation of key professional qualities in lecturers: pedagogical flexibility, the ability to facilitate learning, reflection, adaptation to change, communicative and emotional competence. The application of structured educational scenarios based on role-playing games opens new opportunities for transformational learning, capable of changing pedagogical beliefs and contributing to professional self-determination.

Research Sources. Role-playing technology is a relatively new direction in professional education, but its potential in developing lecturers' professional competence is attracting increasing scientific interest. A number of studies demonstrate the positive impact of role-playing games on the educational process: they contribute to mastering academic disciplines (Zalka, 2012), stimulate the development of reading literacy (Kaylor, 2017), and also form social skills (Spinelli, 2018).

P. Shcherban explores the historical dynamics of using gaming forms in education – from ancient pedagogy (Socrates, Plato, Confucius), through the Middle Ages and the Renaissance, to modern educational approaches. Special attention is paid to educators who actively used game methods in educational practice, including J.-J. Rousseau, J. Korczak, M. Montessori, and A. Makarenko. The study proposes a definition of "gaming technology" as a structured pedagogical process aimed at achieving specific educational outcomes through organized gaming activity.

The leading functions of play in the educational process are outlined: personality development, critical thinking, communication skills, and team interaction. The author proposes a classification of gaming methods, which includes didactic, role-playing, imitation games, trainings, as well as digital and mobile applications. The specifics of applying each type of game are considered, taking into account the age characteristics of learners and the content of academic disciplines. The importance of adapting pedagogical strategies to the conditions of the digital environment and the increasing role of interactive technologies within the competency-based approach is emphasized (Shcherban, 2014).

Modern scientific literature sometimes demonstrates ambiguity in distinguishing between "educational role-play" and "classic role-playing game" (RPG). Some studies use the term "RPG" to describe methods that are essentially educational role-playing games, without considering the key game mechanics and structures characteristic of a classic role-playing game. This terminological inaccuracy can distort the understanding of methods and slow down the development of pedagogical approaches. For instance, in the study by S. Ivanova, L. Dimitrov, V. Ivanov, and L. Prokopovych (Ivanova, Dimitrov, Ivanov, & Prokopovych, 2021), dedicated to the training of future educators, a problematic application of terminology is observed. The authors characterize their "educational role-play method" as an example of implementing a classic role-playing game. Although the study effectively demonstrates the advantages of an imitative environment and role-taking, it essentially integrates

a classic educational role-play into a gaming context and presents this hybrid as a typical example of a classic role-playing game. Such conceptual confusion potentially blurs the essential differences between the two methods, complicating further development, validation, and effective application of both in professional pedagogical practice.

D. Polishchuk and M. Pryshchak (2019) consider the implementation of gaming technologies in higher education. The authors emphasize their relevance as a means of increasing student motivation, activating cognitive activity, and forming professional competencies. It is noted that gaming technologies differ significantly from traditional teaching methods, as they contribute to the formation of a favorable psychological climate, the development of critical thinking, creativity, and student engagement in the learning process. The study provides a classification of gaming teaching methods: business and role-playing games, trainings, brain-rings, etc. It is emphasized that the choice of a specific format depends on the goals of the lesson, the content of the discipline, and the level of student preparation.

Overall, both educational role-playing games and actual role-playing games are considered effective teaching methods that contribute to the development of educators' professional competence. For example, in her research, I. Westborg (Westborg, 2022a, 2022b) views these approaches as components of a broader concept of using role-playing practices in education. The author classifies role-playing actions based on two key parameters: the level of physical involvement and the degree to which participants use characters as masks. For instance, educational simulations can have a high level of physical activity but a low degree of identification with fictional characters, reflecting their focus on professional training.

Researchers J. Lean, J. Moizer, M. Towler, C. Abbey (2006) propose an alternative definition of role-playing in an educational context, treating it as a form of non-computer simulation game, divided into interactive and non-interactive forms of activity. Within this approach, simulation is considered a tool for imitating a specific system, object, phenomenon, or process with the aim of representing a particular problem being studied. Thus, the concept of educational role-playing game combines elements of both play and modeling two independent concepts rooted in human sciences.

Despite the common use of the term "role-playing game," role-playing games (RPGs) have significant differences in the definition of their structural elements compared to educational role-playing games. According to the definition proposed by J. Stenros and H. Hakkarainen (2003), a role-playing game emerges as a form of interaction that arises in the process of communication between players or between players and the game master within a clearly defined diegetic structure. This structure forms a unique world in which internally consistent rules of behavior and event progression are established.

L. Petrenko considers gamification as the integration of game elements into a non-game educational context. Its goal is to increase motivation through competition, scoring systems, rankings, and rewards. The researcher believes that the difference between gamification and full-fledged games lies in the fact that it does not replace learning but enhances it through emotional engagement and active participation (Petrenko, 2024).

Researchers O. Hrechanyvska and N. Kravets (2017) consider gaming technologies as an innovative form of organizing the educational process in higher education institutions. The authors emphasize the need to apply interactive approaches that stimulate cognitive activity, promote the development of independence, creative thinking, and professional self-realization of students. Gaming technologies are defined by them as a set of methods and techniques based on gaming activities and aimed at achieving specific educational results – forming a positive emotional mood, increasing motivation, and the effectiveness of learning.

The study by O. Nozdrova and I. Bartienieva (2021) examines the use of gaming technologies in the professional training of future teachers. It is emphasized that the application of business and role-playing games stimulates interest in pedagogical disciplines, contributes to the development of critical thinking, analytical skills, and pedagogical culture of students. The authors pay special attention to the integration of gaming elements into the modules of the "Pedagogy" course. For each module, appropriate educational games are selected that reflect the main problems of pedagogical

science, stimulate creative thinking, imagination, and independent cognitive activity skills. The importance of interactive trainings in shaping professionally important qualities, pedagogical culture, and communicative competence of future teachers is specifically highlighted.

V. Kyrylenko, N. Kyrylenko, and A. Kryzhanovsky (2023) analyze the potential of computer didactic games in the professional training of students in pedagogical specialties. The authors emphasize that combining gaming and digital technologies increases motivation, develops creative thinking, intuition, and the ability to solve pedagogical tasks in a non-standard way. The study provides examples of the practical application of gaming methods in teaching, which not only contribute to the assimilation of knowledge but also stimulate students to create their own gaming products. This approach is considered a means of active professional self-realization and the formation of an individual pedagogical style.

Based on the analysis of sources, role-playing technology is an extremely promising tool for developing the professional competence of professional college lecturers, especially in the area of developing their communicative, organizational, and creative competencies, as participation in gaming activities requires a high level of interpersonal interaction, understanding of roles, and the ability to function effectively under conditions of uncertainty – characteristics that are key in educational activities.

Objective. The article aims to analyze and generalize the theoretical foundations of role-playing technology, define its structural components and potential in forming the professional competence of professional college lecturers, considering the specifics of educational role-playing games and classic role-playing games.

Results and Discussion. Role-playing games have entered modern culture, gaining increasing popularity after the possibility of digital distribution and digital integration of previously analog media (White et al., 2019). Despite the widespread use of educational role-playing games and the current popularity of role-playing games, there is a large gap in the literature regarding bridging and comparing educational role-playing games and role-playing games. The lack of comparison of how both are used in education can lead to misrepresentation and misunderstanding of a specific element of a classic role-playing game that can aid the learning process.

Although role-playing games, in their primary sense, exist within a gamified environment, they demonstrate significant parallels with educational role-playing methods. For example, learning scenarios where students assume the roles of specialists such as future technologists or agricultural enterprise managers often share similar characteristics with classic role-playing games. These forms of active learning involve immersion in a specific role, which is realized in a simulated learning environment.

This observation raises a number of methodological questions. In particular, it is important to establish the distinctions and common features of role-playing games and educational role-playing games. How can both forms be adapted to enhance the professional skills of lecturers? Answers to these questions are crucial for the conscious use of interactive teaching methods in pedagogical practice, focused on transformational learning and the development of pedagogical reflection.

Researcher I. Westborg (2022a, 2022b) proposes a two-dimensional model for the application of role-playing games in education. The first axis is the gameplay design, which encompasses rules, mechanics, interaction structure, and plot elements. The second is the educational framework design, which includes preparation, the game itself, and post-game analysis. Both axes are presented as a continuum with poles of "leisure" and "education," allowing for flexible positioning of role-playing activity depending on the goal. I. Westborg's model demonstrates that educational role-playing games and role-playing games are different forms of implementing a single pedagogical paradigm based on role participation. For a deeper understanding of their potential, it is important to consider the multiplicity of interpretations that exist in the scientific literature regarding these concepts. This allows for a more holistic understanding of role-playing approaches as a tool for developing professional skills of lecturers, particularly in the context of simulated learning,

reflection, social interaction, and the formation of pedagogical identity.

J. Stenros and H. Hakkarainen (2003) expand on this vision, describing simulation as a representation of aspects of reality both empirical and fictional. The level of participant influence on the course of the simulation can vary: from passive observation to active modeling of event development. In this light, role-playing in the educational process emerges as a method that involves modeling conditions in which reality is reflected indirectly through a learning scenario within a specific game framework. It is important to note that such "reality" can belong to both the objective world and a consistent fictional context with clear internal rules. From a pedagogical perspective, this approach opens up wide opportunities for lecturers: from creating authentic learning situations to forming analytical thinking, empathy, and professional reflection key elements of the competency-based approach in education.

Scientists J. Lean, J. Moizer, M. Towler, C. Abbey (2006) and A. Bawa (2022) provide their own definitions of role-playing, however, both definitions point to the representative nature of role-playing: it reproduces a certain reality that does not appear in its direct form during the game. For example, during a training session on the basics of mechanization, students of professional colleges who play the roles of mechanics are not literally mechanics; they only perform this role in a transformed learning space that temporarily functions as an agricultural machinery repair workshop.

In the pedagogical context, role-playing is defined as a teaching approach in which learners perform the function of representing various social or professional roles within pre-designed, often reality-approximated scenarios (Bawa, 2022). Such a method requires a structured scenario that directly supports the learning objectives, clearly defined roles for participants, interrelationships between them, and the involvement of a facilitator who guides the dynamics of the process and ensures its relevance to the learning content.

Educational role-playing games are typically used as a means of preparing learners for real professional challenges. They promote both cognitive and social development, stimulating active learning through practical activity (Cherif & Somervill, 1995). This approach allows for the integration of several spheres of educational activity cognitive, emotional, and psychomotor which aligns with the principles of Bloom's Taxonomy (Rao & Stupans, 2012). In such a context, role-playing acts not only as a method of knowledge transfer but also as a tool for developing lecturers' professional competencies, as it requires them to have skills in facilitation, scenario planning, emotional support, and evaluation of learning interaction.

To gain a deeper understanding of the structure of role-playing, M. Hitchens and A. Drachen (2008) identified a number of key elements that allow it to be classified as such. These elements include: (1) game world – an imaginary reality within which participants can freely explore events, spaces, and interconnections; (2) participants, who are divided into players and game masters (judges); (3) characters – individual units within the game space that possess both quantitative (e.g., skills, characteristics) and qualitative (role, motivation) properties that can evolve as a result of interaction with the game environment; (4) game master – the person responsible for controlling the overall logic of the game world, formulating and implementing rules, and creating the narrative context; (5) interaction – the way players influence the game world through the actions of their characters, which occur within the proposed scenarios; (6) narrative – the sequence of events that structure the game, creating its plot dynamics.

Role-playing games function within diegetic frameworks – a unique system of representing reality that sets the rules of interaction and the logic of events within the game.

Thus, the main components of a role-playing game (RPG) include participants (players), game masters (facilitators), interaction mechanisms, and a diegetic system a specific narrative-symbolic space that defines the logic of events, the acceptability of character actions, and the general boundaries of the game. Such a complex architecture of a role-playing game creates prerequisites for immersion in an alternative reality, where participants not only interact with each other but also develop the ability to think strategically, react adaptively to changing conditions, and cultivate imagination.

This space acts not only as a backdrop but also as an active environment where players interact with each other and with the game conditions through their chosen roles. This model promotes the development of strategic planning, critical thinking, flexibility, and interpersonal communication skills in participants – competencies that are fundamental for the development of professional competence of professional college lecturers.

Diegesis, as a concept originating in theater and cinematography, encompasses not only the narrative content but also the entire fictional spatio-temporal structure, including characters, landscapes, events, and other narrative elements (Metz & Guzzetti, 1976). Although this concept was adapted by J. Stenros, H. Hakkarainen (2003) for the analysis of role-playing games, its application in an educational context is also possible, albeit in a modified form.

In the context of leisure role-playing games, the diegetic structure emphasizes the construction of an imaginary world and how players interact with its components through game mechanics. In contrast, in an educational role-playing game, the diegetic basis serves a different function: it acts as a tool to support educational goals, where the narrative component plays a role in structuring the learning experience.

Analyzing I. Westborg's position (2022a, 2022b), according to which both educational role-playing and actual role-playing games constitute part of a broader concept of pedagogical use of role-playing practices, and relying on a number of theoretical approaches to their definition, one can conclude that there is more in common than different between these forms. Many characteristics inherent in recreational RPGs are successfully applied to educational role-playing games. Thus, educational role-playing games can also unfold within a diegetic narrative space, where participants perform roles and interact with each other through narratives. In this sense, an educational role-playing game possesses almost all the features of an actual role-playing game. Conversely, an actual role-playing game involves the representation of reality both empirical and fictional within a game structure, which relates it to educational role-playing practices.

The main difference is, in essence, the purpose: an actual role-playing game is positioned as a form of leisure, while an educational role-playing game is a learning tool. In this context, the role of the facilitator acquires fundamental importance: it is he who defines the boundaries of permissible actions for participants in accordance with educational goals. For example, during a re-enactment of an international agricultural forum, where students represent the interests of Ukrainian agricultural producers, they must adhere to the scenario to preserve the educational value of the reconstruction. Deviation from the roles of a representative of a Ukrainian agricultural firm, a foreign investor, a trade attaché, a journalist, or a representative of a certification body can negate the educational potential of the exercise.

Paradoxically, to gain a deeper understanding of the differences between an actual role-playing game and an educational role-playing game, it is worth turning to their common elements. It is precisely by studying these parallels that lecturers can effectively adapt game models to educational needs, maintaining a balance between gaming and educational activities. Thus, in both educational role-playing games and role-playing games, the central categories are "role" and "game." Understanding the common features of these elements is an important step toward identifying the essential differences between the forms of role-playing activity and determining their potential in the educational process.

The concept of role in a social and pedagogical context implies a set of behavioral models expected from an individual according to their social status (Turner, 2001). A role is also defined by socio-cultural expectations that shape an individual's perception within a community (Lynch, 2007). Accordingly, one person can occupy several roles in different contexts for example, being a lecturer at a professional college and a representative of its administration. Each of these roles has its own set of social expectations, which can, in certain cases, come into conflict (Montgomery, 1998). L. Petrenko (2024) notes that according to K. Salen and E. Zimmerman's definition, a game is a system in which players engage in an artificial conflict, regulated by rules, with the possibility of quantitative evaluation of results.

In educational role-playing games, roles are assigned considering specific didactic tasks. For instance, a future agronomist might play the role of an agricultural consultant, simulating professional interaction with employees. Although such a situation is not authentic in its full sense, it creates conditions where the participant must adhere to professional norms and expectations inherent in the assigned role (Rønning & Bjørkly, 2019). Thus, the role, though conditional, carries real weight for the participant in the format of an educational game.

Similar mechanisms are observed in actual role-playing games. A created character functions within a fictional world, but their role is determined by both internal characteristics (in particular, gameplay parameters) and social interconnections that mimic real behavioral models.

Thus, in both educational role-playing games and recreational RPGs, the role performs a social function: it is structured, limited by certain norms, and accompanied by expectations. And although these roles exist in fictional or simulated contexts, their effectiveness is manifested in the reflective behavior of the participants. Importantly, the imaginary nature of both formats allows for a reduction in the level of risk and responsibility for actions, enabling free exploration of complex social scenarios (Deterding & Zagal, 2018). Participants can freely enter and exit a role without serious consequences, making these models particularly useful for developing pedagogical reflection, emotional intelligence, and lecturers' professional competence.

The presence of socially defined roles in both educational role-playing games and actual role-playing games indicates their potential as effective tools in the educational process, especially in shaping models of expected behavior within the context of social interaction. The act of imitating roles, inherent in youth, is a natural mechanism of socialization that can be successfully used in both education and therapeutic purposes (Biddle, 1986). In this context, both leisure role-playing games and educational role-playing games can be viewed as pedagogical constructs that implement all four core concepts of role theory formulated by W. Biddle: consensus, conformity, role conflict, and role.

First, the concept of consensus is realized through the need for consistency of expectations among participants. In educational role-playing games, this is manifested in a clear distribution of roles and definition of responsibilities that support the learning objectives of the simulation. For example, in a simulated laboratory where the quality of grain, milk, or meat is checked, practical application of knowledge from biochemistry, veterinary medicine, and food safety takes place.

Students must agree on who plays the roles of a laboratory assistant and who plays the representative of an agricultural firm, and build their interaction accordingly. Similarly, in leisure role-playing games, players must agree on role boundaries, game rules, and scenario expectations: a player acting as a State Food and Consumer Service inspector must care for the well-being of others, not act contradictorily to this role. Breach of consensus leads to a decrease in the effectiveness of group dynamics and disorientation of participants.

Second, role-playing technology contributes to the development of conformity the readiness to act in accordance with established norms. In an educational context, this involves adhering to behavioral patterns that correspond to the assigned role, and deviations from them can lead to constructive feedback. For example, future veterinary doctors participating in a role-playing game must adhere to professional ethics, otherwise they may receive critical remarks from lecturers or colleagues. In role-playing games, social conformity to the role is maintained through group expectations: failure to perform a function associated with the chosen role can cause dissatisfaction or in-game sanctions.

Third, both formats allow for effectively modeling role conflict a situation arising from incompatible expectations between roles or among participants. In an educational setting, this can be realized through scenarios of social conflict, forcing students to analyze and resolve contradictions by applying communication and adaptation skills. In role-playing games, similar conflict can arise when a character with a virtuous reputation is forced to make a morally difficult decision to achieve a game objective. Such situations serve as a model for real role conflict that professionals may face in their future careers.

Thus, educational role-playing games and classical RPGs not only help model behavioral

patterns but also create a space for understanding norms, expectations, and conflicts in the social environment, which is a valuable resource for developing professional and pedagogical maturity of lecturers.

The final fundamental component of role-playing technology is the very concept of "role." Adopting a role can be described as a cognitive process aimed at identifying and interpreting the expectations of other people in a specific social or simulated context. This requires developed skills in social thinking and empathy the ability to anticipate the reactions of others, considering their experience, motivation, and psycho-emotional state. These qualities form the basis of effective role performance in a learning environment.

Within educational role-playing games, students must rely on internal modeling of others' expectations, considering the roles played by other participants. For example, a student playing the role of an agrochemical laboratory employee must understand the actions and needs of another student who, in the same scenario, plays the role of a farmer facing reduced crop yields. This requires a precise understanding of both roles and appropriate behavior that ensures a successful simulation of the situation with maximum educational value.

This role-taking contributes to the development of the ability to adopt another's perspective the skill of imagining and comprehending the interlocutor's point of view. This is a key interpersonal skill that allows for constructive interaction, effective conflict resolution, and informed pedagogical decisions. Imagining another's experience, which is the core of role-playing methods, is directly linked to empathy, altruism, and social sensitivity (Hammer et al., 2018).

In actual role-playing games, this mechanism is also implemented. During sessions built around conflict or cooperative scenarios, participants must act in concert, relying on their understanding of other characters' roles. This requires not only knowledge of the game's narrative logic but also the ability to predict the actions of other players. Such practice strengthens cognitive flexibility, analytical thinking, and the ability to work in a team critically important qualities in the educational process and professional activities of educators. Thus, in both educational role-playing games and leisure role-playing games, the process of role-taking contributes to the development of deep social reflection, making these methods indispensable for forming pedagogical empathy, ethical sensitivity, and lecturers' emotional intelligence.

Conclusions. The conducted research confirmed the effectiveness of role-playing technology as a tool for forming the professional competence of professional college lecturers. The comparison of educational role-playing games with classic role-playing games revealed their conceptual kinship, particularly at the level of structural elements (role, diegetic space, interaction mechanics), while emphasizing the difference in target orientations: educational games serve to develop professional skills, whereas classic role-playing games primarily address leisure needs.

As a result of the analysis, it was found that educational role-playing games not only effectively simulate professional situations but also stimulate cognitive activity, form critical thinking, develop social and communicative skills, and contribute to pedagogical reflection. They allow for processing complex social scenarios under reduced risk conditions, enabling participants to experiment with various behavioral models, develop empathy, flexible thinking, and emotional intelligence.

Particular attention was paid to the concept of diegetic space as a key educational mechanism that creates conditions for participants' immersion in a simulated professional reality. The application of gaming methods within such a space allows for maintaining a balance between the realism of the simulation and the freedom of pedagogical experimentation. In the context of forming a lecturer's professional competence, role-playing practices act as an effective tool for transformational learning, capable of changing the system of values and pedagogical vision.

Thus, role-playing technology is a promising means of modern pedagogy, combining interactivity, interdisciplinarity, and an orientation towards the development of a holistic lecturer personality. Further research should focus on creating standardized models of educational scenarios, forming mechanisms for evaluating the effectiveness of role-playing methods, and integrating digital solutions into the simulation process.

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ТЕХНОЛОГІЯ РОЗІГРУВАННЯ РОЛЕЙ У РОЗВИТКУ ПРОФЕСІЙНОЇ КОМПЕТЕНТНОСТІ ВИКЛАДАЧІВ ФАХОВИХ КОЛЕДЖІВ

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Реферат:

Актуальність: сучасна фахова передвища освіта перебуває в умовах постійної трансформації, що вимагає від викладачів не лише глибоких предметних знань, а й здатності ефективно комунікувати, адаптуватися до змін та здійснювати педагогічну рефлексію; компетентнісний підхід актуалізує потребу в освітніх технологіях, здатних сприяти формуванню комплексних професійних умінь, що зумовлює увагу до застосування технології розігрування ролей, яка поєднує елементи симуляції, моделювання та емоційно-поведінкового занурення в навчальний процес, активізує навчальну діяльність, сприяє формуванню соціальної відповідальності, емпатії та здатності до роботи в команді; однак в українському освітньому контексті ще не

досягнуто достатньої концептуалізації цього методу, залишається відкритим питання розмежування освітніх рольових ігор та RPG (role-playing games) як дозвіллєвих форм діяльності, що ускладнює розробку методичних рекомендацій та створення ефективних сценаріїв для реалізації освітнього процесу; це зумовлює актуальність теоретичного обґрунтування педагогічного потенціалу технології розігрування ролей та її інтеграції в структуру професійної підготовки викладачів.

Мета: проаналізувати та узагальнити теоретичні засади технології розігрування ролей, визначити її структурні компоненти та потенціал у формуванні професійної компетентності викладачів фахових коледжів, з урахуванням специфіки освітніх рольових ігор і класичних рольових ігор.

Методи: у дослідженні використано комплекс загальнонаукових та педагогічних методів: аналіз наукових джерел і теоретичних підходів, порівняльний аналіз термінології та структур рольових ігор, моделювання педагогічних ситуацій, а також систематизація результатів з метою формування структурно-компонентної моделі освітньої рольової гри.

Результати: охарактеризовано специфіку освітніх рольових ігор; визначено їх здатність виступати інструментом трансформаційного навчання; розкрито педагогічний потенціал дієгетичного наративного простору у формуванні професійної ідентичності викладачів; запропоновано модель рольової діяльності, що інтегрує когнітивний, емоційний і соціальний компоненти навчання, з орієнтацією на розвиток професійних навичок у змодельованих ситуаціях.

Висновки: рольові методи навчання, у тому числі освітні рольові ігри та класичні рольові ігри, мають високий потенціал у формуванні професійної компетентності викладачів; їх ефективне впровадження потребує чіткого розуміння ігрової структури, ролей та освітньої мети; подальші дослідження доцільно спрямовувати на розробку практичних рекомендацій щодо створення сценаріїв та інтеграції фасилітаційних стратегій у рольовий освітній процес.

Ключові слова: *технологія розігрування ролей, освітня рольова гра, професійна компетентність, фаховий коледж, педагогічна рефлексія, трансформаційне навчання, дієгетичний простір.*

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MODEL OF EXPERT ASSESSMENT OF PEDAGOGICAL RESEARCH RESULTS

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Abstract

Relevance: in the conditions of rapid development of scientific and technological progress, there is an urgent need to use expert evaluation in pedagogical research, which is an effective tool for establishing the possible impact of developed innovations on higher education applicants and the educational process as a whole.

Purpose: experimental verification of the developed model of the expert evaluation process in pedagogical research.

Methods: theoretical; empirical: praxemetric, survey-diagnostic, self-assessment and expert evaluation; mathematical and statistical.

Results: based on theoretical analysis, a number of factors that complicate the process of scientific research have been identified, and the need to improve the quality of pedagogical research has been substantiated. The need for the use of expert evaluation in pedagogical research is confirmed as one of the effective tools for determining the possible impact of the developed innovations on higher education applicants and the educational process as a whole. The developed model reproduces the general sequential process of conducting the research, but allows the researcher to independently choose the options for its application, depending on the unique features of his specific research. The effectiveness of the model is demonstrated on the example of determining the significance of the proposed innovations in improving the training of specialists in the specialty "Environmental Protection Technologies". 54 experts were involved in the experimental study, of which: 22 doctors and 25 candidates of sciences. Thanks to the use of a number of statistical criteria during the expert evaluation of the proposed innovations aimed at improving the training of specialists in the field of "Environmental Protection Technologies", compliance of the proposed innovations with didactic, informational and scientific and technical requirements, as well as their readiness for testing in real conditions of the educational process, which are also prospects for further scientific research, was established.

Conclusions: currently, expert assessment has unequivocally emerged as a vital component of contemporary pedagogical research, significantly contributing to the quality and validity of pedagogical practices and decision-making. Our study included a quantitative assessment of expert competence, yielding an average competence coefficient (K) of 0.79. This value surpasses the normative threshold of 0.67, indicating a high level of qualification among the experts involved in evaluating the innovations. All participating experts provided positive assessments of the updated educational program for "Environmental Protection Technologies." Moreover, with a calculated coefficient of variation of 8.45% (which is < 10%), this assessment can be considered highly reliable, signifying a strong consensus among the experts' opinions.

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Keywords: *pedagogical research, innovations, expert assessment, model, educational environment.*

Introduction. Continuous improvement of the higher education system amidst rapid scientific and technological progress involves not only enhancing teaching methods and conditions but also addressing a range of urgent problems. These include: developing and updating standards, ensuring academic integrity, providing opportunities for student and faculty mobility, building an inclusive educational environment, and fostering global cooperation. To solve these outlined tasks, researchers constantly develop innovative approaches to organizing the educational process. However, before implementing proposed innovations in the educational process, their potential impact on higher education students must first be determined. It's worth noting that in pedagogical research specifically, a number of factors complicate the scientific inquiry process:

- Multiplicity of variables influencing the educational process, limited knowledge about their interaction, and the dynamic nature of the educational environment.
- Lack of a sufficient sample size or a deficit of empirical data to formulate generalized statements about a particular object.
- Existence of multiple alternative approaches to solving this problem, which, in turn, requires detailed analysis and the development of clear criteria for selecting the optimal solution.
- Uniqueness of each pedagogical study, which makes it impossible to accurately predict results, even when reproducing similar circumstances of pedagogical influence.

Consequently, this necessitates the use of expert evaluation in pedagogical research, which serves as an effective tool for establishing the possible impact of developed innovations on higher education students and the educational process as a whole.

Sources: Modern higher education pedagogy requires a scientifically sound approach to teaching and learning, which, in turn, demands thorough pedagogical research for the development and implementation of innovative methodologies, the evaluation of their effectiveness, and the continuous improvement of educational quality in higher education institutions. Pedagogical research forms the foundation for enhancing educational systems and programs, as well as for identifying students' educational needs. Furthermore, such research contributes to the development of creative teaching approaches and the use of interactive methods and innovative technologies in education, thereby fostering an increase in educational quality and the training of highly qualified specialists (Figure 1).

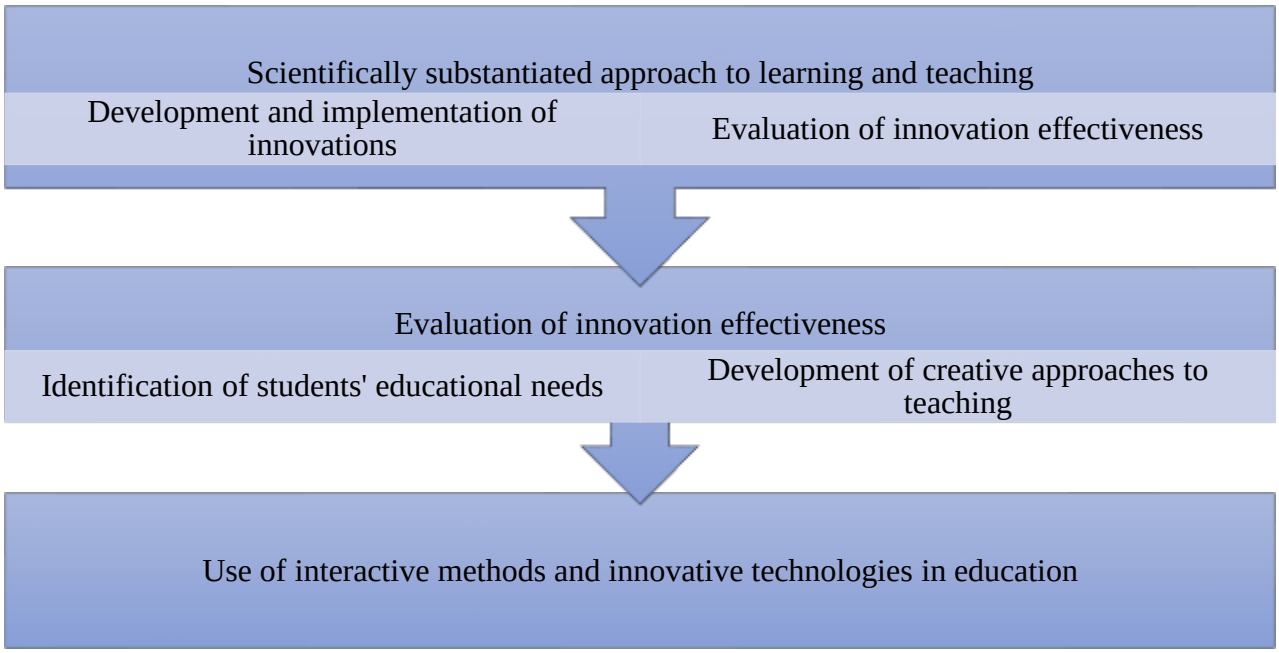

Figure 1. Algorithm for Improving Educational Process Quality

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According to P. Wood and M. O'Leary (2019), ensuring teaching quality is only possible through continuous pedagogical inquiry. This involves analyzing modern trends in education, innovative teaching approaches, implementing advanced technologies and methodologies, and continuously monitoring educational outcomes and student reactions to these innovations. Such an approach allows teachers and lecturers to adapt their work to the constantly changing needs of pupils and students, ensuring increased effectiveness of the educational process amidst rapid societal development and scientific advancements. However, disciplinary and contextual nuances in pedagogical research prevent a full assessment of the effectiveness of these innovations.

Researchers F. Ferretti, Â. G. Pereira, D. Vértesy, and S. Hardeman (2018) noted that there are problems regarding the reliability of processes and procedures in pedagogical research that require resolution. We agree with the scholars' statement and believe that researchers should pay attention to the following issues:

- Ensuring measurement reliability in pedagogical research: In many pedagogical studies, it is difficult to determine how accurately and consistently certain indicators or parameters are measured and controlled, particularly student knowledge or test results. Developing reliable and valid measurement instruments is a crucial aspect of research.
- Adhering to internal consistency in diagnostic tools: It is important that the measured indicators are logically related and do not contradict each other, which, overall, will positively impact the quality of the research.
- Mandatory use of test-retest reliability procedures: This will address the problem of ensuring the stability of measurement results when the same instrument is applied repeatedly after a certain period.
- Ensuring inter-rater reliability: In pedagogical research where interpretation or evaluation results may depend on the interpreter, such as the evaluator of a final project, conditions must be ensured so that different interpreters make similar decisions.
- Adhering to external validity: It is important to ensure that research results correspond to real phenomena and can be generalized to other groups or situations.
- Diverse data types in pedagogical research: Pedagogical studies use various types of data (quantitative and qualitative); therefore, determining reliability for each data type requires the use of different methods and approaches.

According to C. Evans, C. K. Howson, and A. Forsythe (2018), there is a gap between research and practice, and effective mechanisms for their interaction are lacking. In this context, it is worth noting that a number of pedagogical studies focus on developing theoretical concepts and methodologies rather than solving specific practical problems in education. This leads to research results not always being easily implementable in the educational process. Furthermore, many education systems lack clear mechanisms both for implementing research results into pedagogical practice and for collecting feedback from practitioners. This results in the isolation of researchers and educators. Overcoming this gap requires developing effective mechanisms for collaboration between researchers and practitioners, creating platforms for exchanging ideas and experiences, increasing the significance of practical research, and implementing research results into real pedagogical practice. Only by strengthening interaction and cooperation can this gap be reduced and greater effectiveness achieved in the educational system (Figure 2).

The presented diagram shows that the gap between research and practice in education is a serious problem with a significant negative impact on the effective functioning of the educational system. Overcoming this gap requires developing effective mechanisms for collaboration between researchers and practitioners, creating platforms for exchanging ideas and experiences, increasing the significance of practical research, and implementing research results into real pedagogical practice. Only through strengthening interaction and cooperation can this gap be reduced and greater effectiveness achieved in the educational system.

E. Cleaver, M. Lintern, and M. McLinden (2014) hold a similar view, believing that a number of pedagogical studies are too formalized, making it unclear what impact they will have in real educational settings. Specifically, this is related to the fact that many studies concern specific conditions or groups that are not representative of general pedagogical practice. The results of such studies may be difficult or even impossible to apply in other contexts. Improving this situation is possible by developing a system for evaluating pedagogical research (Kaynardağ, 2019).

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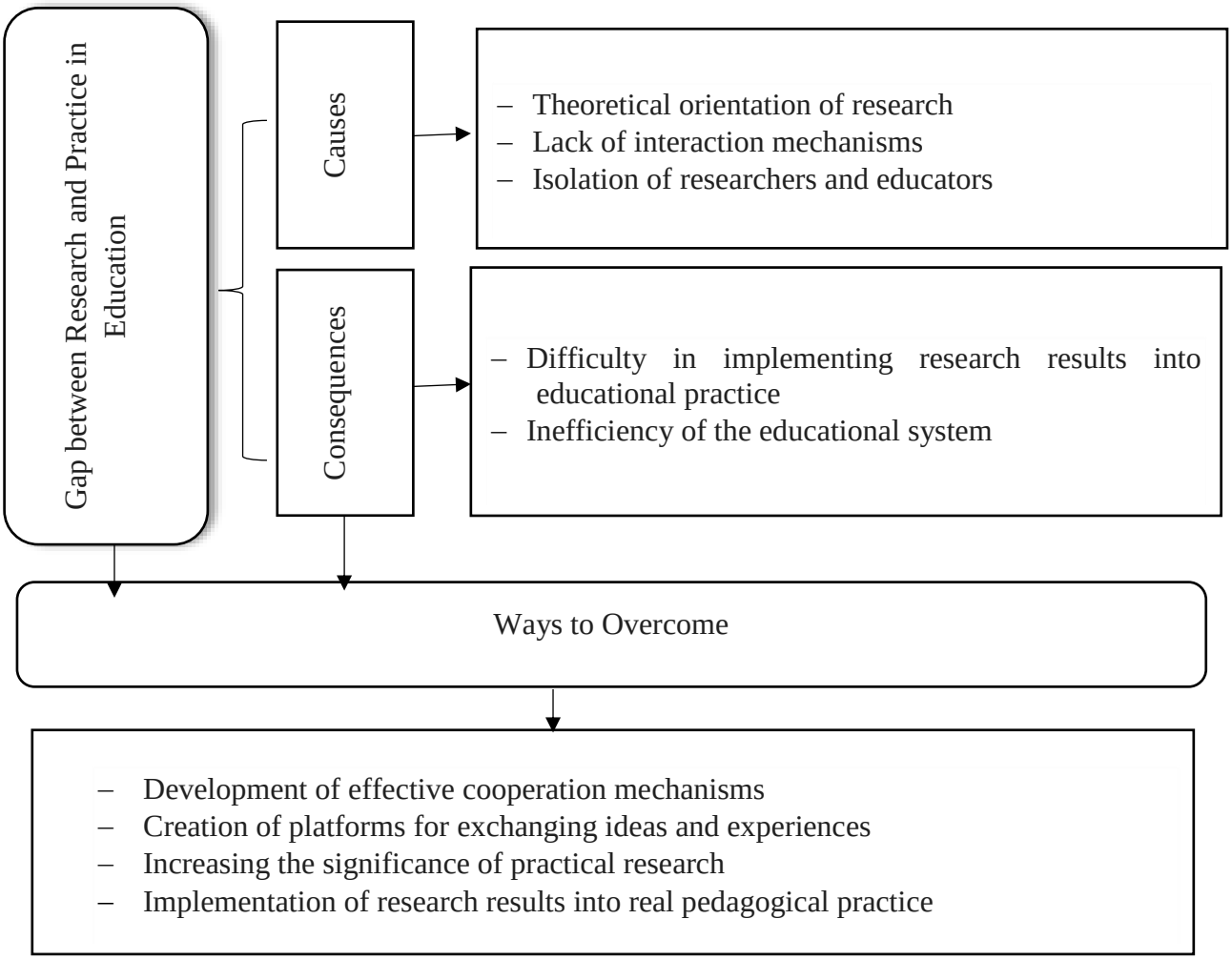

Figure 2. Algorithm for Ensuring the Effectiveness of the Educational System

– C. Evans, X. Zhu, N. Winstone, K. Balloo, A. Hughes, and C. Bright (2019) emphasized the importance of creating research communities of practitioners to validly evaluate proposed innovations. Such communities can unite teachers, administrators, pedagogical researchers, and other interested participants in the educational process with the goal of jointly studying, testing, and adapting new pedagogical approaches and methods into pedagogical practice.

The aim of this article is the experimental verification of the author's model for expert evaluation of pedagogical research results.

Research Methods: Theoretical: synthesis and generalization, modeling. Empirical: Praximetric: analysis and study of pedagogical experience, educational and training programs for specialists, etc. Survey-diagnostic: questionnaires, testing, etc. Self-assessment methods. Expert evaluation (commission method). Mathematical and statistical: graph-analytical, scaling and ranking; expert argumentation coefficient based on self-assessment; expert competence coefficient, coefficient of variation of expert opinion agreement.

Results and Discussion. During the research, it was proven that the opinion of researchers C. Evans, X. Zhu, N. Winstone, K. Balloo, A. Hughes, and C. Bright (2019) regarding the creation of communities of all educational process participants is valid. The creation of such communities will allow for the fulfillment of five main tasks to increase the effectiveness of pedagogical research for improving the educational process in modern dynamic societal conditions.

1. Uniting the Interests of Educational Process Participants:

– *diversity of participants*: The community should include participants with different roles in the educational process to ensure a diversity of perspectives and experiences. This can help ensure that research is more comprehensive and relevant;

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– *shared interest:* participants should have a shared interest in implementing innovations to ensure that research is aimed at solving real problems in education;

– interaction: The community should promote interaction among participants with different roles to ensure the exchange of ideas and experiences. This can help increase the effectiveness of research.

2. Effective Research Planning. Requirements for research planning:

– defining research goals: The community should define specific goals it wants to achieve through the research. This will help determine which methods and tools need to be applied.

– defining resources needed for the research: The community should determine what resources should be involved for conducting the research, such as time, finances, and human resources. This will help avoid unjustified resource expenditures.

– defining research methodology: The community should develop a research methodology that will be applied for data collection and analysis of results. This will help ensure the objectivity of the research.

3. Data Collection and Analysis of Pedagogical Research Results. Requirements for research organization:

– choosing data collection methods: The community should choose the data collection methods that will be used to evaluate the effectiveness of innovations, including surveys, observations, comparative analysis, expert surveys, etc.

– data collection: The community should collect data according to the chosen methodology, including conducting surveys, observing students, comparing learning outcomes, etc.

– data analysis: The community should analyze the data to determine the effectiveness of innovations, including statistical analysis, group comparisons, trend identification, etc.

– reporting results: The community should present the research results in the form of a report that will be accessible to all participants in the educational process.

4. Defining Feedback Mechanisms and Ways to Improve Research. Requirements for feedback:

– creating a platform for experience exchange: The community should create a platform where educational process participants can exchange experiences and opinions about innovations, such as an online platform, forum, conference, etc.

– collecting feedback from participants: The community should regularly collect feedback from educational process participants about innovations, including through surveys, focus groups, interviews, etc;

– analyzing feedback: The community should analyze feedback from educational process participants to determine how it can be applied to improve innovations.

– making adjustments to the innovation process: The community should use the results of feedback analysis to make adjustments to the innovation process, including changes in methodology, content, or approaches to implementing innovations.

5. Dissemination of Positive Results. Overall, we agree with the opinion of Cotton D. R. E., Miller W., Kneale P. (2018) that, given the lack of clear mechanisms for determining the effectiveness of pedagogical research results, they have a lower level of recognition and respect than other fields of research and scientific inquiry. We explain this situation as follows:

– subjectivity in evaluation: Evaluating the effectiveness of pedagogical research often relies on subjective judgments, as pedagogical phenomena and processes are complex to measure objectively. This raises doubts about the reliability of the results.

– specificity of the educational environment: In the pedagogical sphere, research often takes place in a complex, dynamic sociocultural environment where many variables are difficult or impossible to control. This complicates the establishment of cause-and-effect relationships and the isolation of the specific impact of innovations on the formation of the studied characteristic in students.

– ambiguity of results: Pedagogical studies do not always yield unambiguous results due to the individuality of each educational institution, student group, teachers, and teaching methods.

– significant influence of time on research results: The positive impact of some pedagogical innovations may only become apparent over time, when the children who participated in the study complete their education. This significantly complicates the evaluation of results in the short term. At the same time, innovations that showed positive results may have no impact on students after 5 years.

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– importance of context: In pedagogical research, the conditions under which the research was conducted are of great importance. Such specific features significantly complicate the generalization of the obtained results and their interpolation in the educational environment.

– pragmatism in other sectors of Ukraine's economy: In a number of such sectors, like medicine or engineering, research results are more concrete, expressed in clear numerical indicators, and direct practical application only increases their weight.

Given the above, it is necessary to improve methodologies for evaluating pedagogical research, make them more objective and practically oriented, and foster comprehensive interaction between educators and researchers to enhance the quality of education and increase the impact of pedagogical research on practice.

The method of expert evaluation, as a systematized procedure for collecting and processing subjective opinions of experts, is an effective tool for forecasting the development of complex systems. It allows for the evaluation of a phenomenon that takes into account the expert's point of view, confidence, and experience, and objectively considers the totality of individual opinions.

Expertise is a systematized process of analyzing and evaluating the results of activities, carried out by competent specialists, with the aim of determining their compliance with established criteria.

In pedagogical research, this method is not used very often, usually in its simplest form (expert surveys, generalization of their opinions, summarizing results). We explain this by a number of reasons:

– *subjectivity of evaluation*: Pedagogical phenomena and processes are often subjective and difficult to measure objectively; evaluation is carried out based on expert opinions, which may raise doubts about the reliability of the results.

– *significant influence of social aspects on pedagogical research results*: In pedagogy, a number of variables related to social, cultural, and individual factors are applied; expert evaluations can vary depending on the context, which reduces their objectivity.

– *insufficient objectivity*: In pedagogy, there is often a lack of clear objective considerations that can be used to evaluate the effectiveness of pedagogical methods or innovations; the effectiveness of pedagogical innovations is determined using various indicators (student motivation, level of satisfaction with learning), which are contradictory.

– *measurement complexity*: Evaluating pedagogical results can be complex due to the large number of variables affecting student learning and development.

– *time constraints*: In pedagogical research, decisions need to be made and pedagogical practices improved in a timely manner, and expert evaluation can be a costly and time-consuming process.

Despite the existing difficulties, we believe that proposed pedagogical innovations should undergo expert evaluation using appropriate statistical methods before implementation. Only in such a case can researchers reliably confirm the correctness of the theoretical study and proceed to organize a pedagogical experiment. This type of evaluation can become a tool for making scientific and practical improvements in curricula, teaching methodologies, and innovative approaches to pedagogical practice. Expert opinions are valuable for improving the quality of teaching and achieving desired pedagogical results.

Through properly organized expert evaluation, valuable recommendations and insights can be obtained from specialists with significant experience in pedagogy. Such feedback helps solve problems and improve the pedagogical process to achieve better results. Therefore, we consider expert evaluation an important component of pedagogical research that can contribute to the continuous improvement of the educational system. Analysis of theoretical studies shows that expert evaluation is considered a certain accompanying control of activity that allows the researcher to adjust the pedagogical process.

Generalizing the findings on this problem allowed for the creation of an expert evaluation model for pedagogical research, which is presented in Figure 3.

The proposed model is a concept that describes and explains the features of using expert evaluation in pedagogy. The created model reflects the general steps taken in the research process. At the same time, the researcher chooses the implementation options depending on the specifics of the initiated research. The elaboration of the goal identified in the pedagogical research and the attempt to determine the optimal ways for further development that will lead to the planned result, in fact, determine the need for expert evaluation. To create an expert evaluation program in a specific study, we clarify the purpose

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and methodological foundations of the research. The methodological foundations of expert evaluation include the following aspects:

– selection of the expert group: The composition of the expert group should be representative and include specialists with the necessary qualifications and experience in the relevant field;

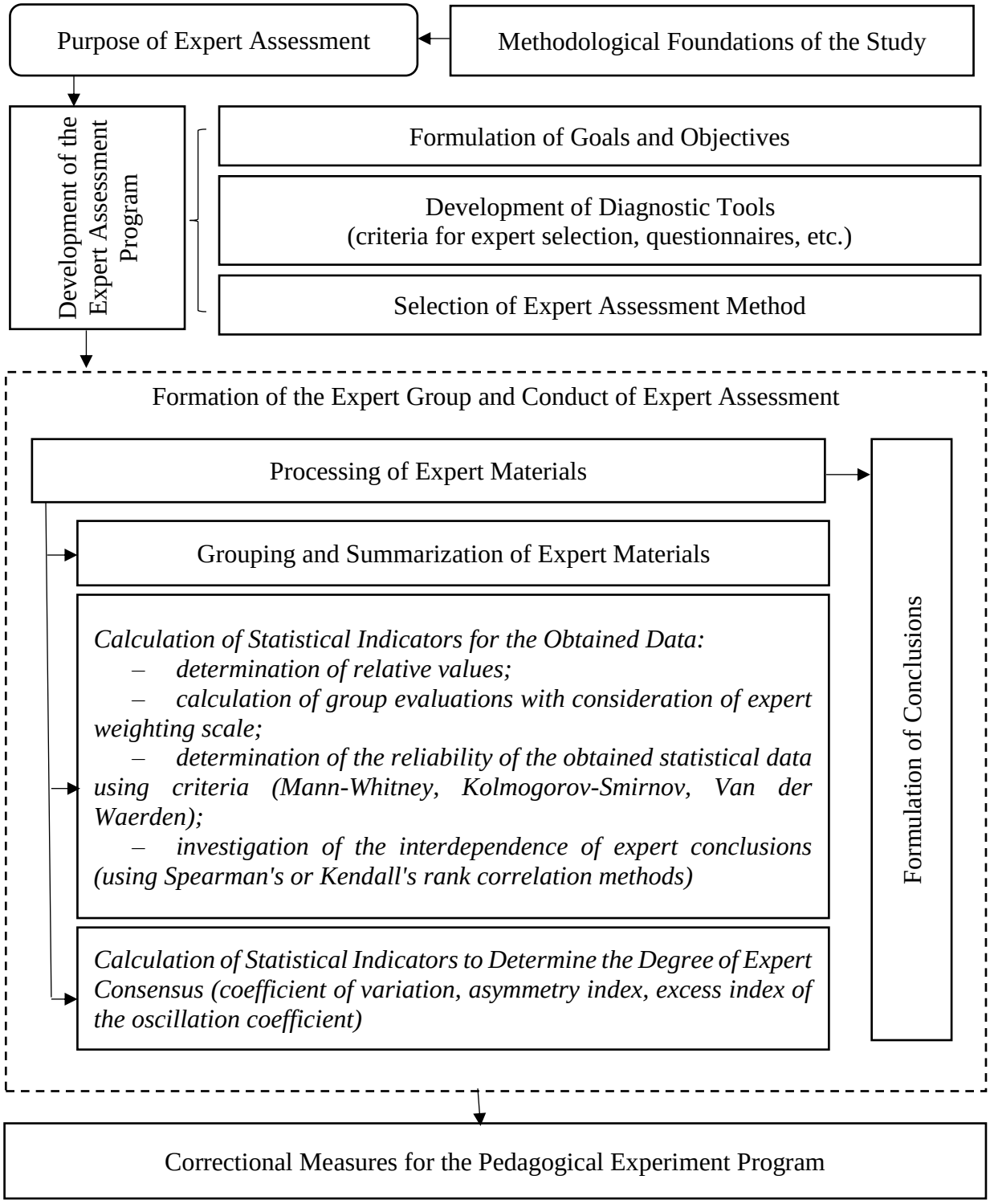

Fig. 3. Model of the expert assessment process in pedagogical research

– defining criteria and evaluation scales: experts should have access to clear evaluation criteria and scales to determine the quality level or importance of the parameters being assessed;

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– determining methods and means of information gathering;

– analysis and generalization of data: processing and analyzing information obtained from experts is typically performed using statistical methods and software;

– ensuring reliability and objectivity: this includes avoiding the influence of personal preferences and excluding systematic errors;

– defining feedback mechanisms.

The methodology of expert evaluation may vary depending on the specific task and research context. However, its primary goal is to obtain high-quality information that can be used for decision-making and to improve certain aspects of the pedagogical process.

The final, yet equally crucial, stage involves formulating conclusions based on the obtained results. Key aspects to consider during this process include:

– General characterization of the results: This provides a comprehensive overview of the findings, establishing the overall context of the study.

– Identification of contradictory aspects and their causes: If experts presented differing viewpoints, these discrepancies must be noted, and an overview of the various positions provided.

– Formulation of recommendations based on the results: This may involve developing strategies, improving processes, or making specific decisions.

– Identification of limitations and shortcomings of the pedagogical study: This helps in understanding the objectivity and reliability of the obtained results.

– Determination of the need for additional research: If the results are ambiguous, further research or adjustments to the experimental design may be necessary.

Given current conditions, and with the aim of determining the significance of the proposed innovations for improving the training of specialists in the "Environmental Protection Technologies" specialty, an expert assessment was conducted. This assessment involved academic staff experienced in training specialists in technical fields. The purpose of the expert assessment was to obtain objective information, based on expert opinions and knowledge, for making informed decisions and developing a strategy for improving the educational program for training specialists in the "Environmental Protection Technologies" specialty, considering modern challenges.

The expert group that evaluated the results of the pedagogical experiment included 54 researchers, among whom were Doctors of Sciences (22 individuals) and Candidates of Sciences (25 individuals). Among the experts, 18 individuals held the academic title of professor, and 26 – associate professor. The expert group also included representatives of the administrative staff of higher education institutions (4 heads of educational and methodical departments) and 3 specialists from the academy of continuous education.

To ensure the objectivity of the research results, an analysis of expert competence was conducted, taking into account key factors influencing their professional qualifications and the quality of expert assessments, specifically:

– duration of pedagogical activity aimed at the professional training of future specialists in the field of "Production and Technologies";

– presence of an academic degree and academic title;

– position held by the expert;

– awareness in the studied subject area (development of professional competence of specialists in the field of "Production and Technologies");

– practical experience (availability of methodological and scientific developments) in the studied subject area.

All the listed properties can be quantitatively assessed, which allows for the quantitative assessment of expert competence. The competence of an expert is assessed using the formula: Given contemporary conditions, and with the aim of determining the significance of the proposed innovations for improving the training of specialists in the "Environmental Protection Technologies" specialty, an expert assessment was conducted. This assessment involved academic staff with experience in training specialists in technical fields. The purpose of the expert assessment was to obtain objective information, based on expert opinions and knowledge, for making informed decisions and developing a strategy for improving the educational program for training specialists in the "Environmental Protection Technologies" specialty, considering modern challenges.

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– practical experience (availability of methodological and scientific developments) in the studied subject area.

All the listed properties can be quantitatively assessed, which allows for the quantitative assessment of expert competence. Expert competence is assessed using the formula:

$$К = \alpha_{кв} \cdot К_{кв} + (1 - \alpha_{кв}) \cdot К_{\alpha}\ , \quad (1)$$

where $\alpha_{кв}$ – the coefficient that determines the level of expert qualification ($\alpha_{кв} \in [0{,}5 \ldots 1]$). Considering the specific characteristics of the phenomenon under investigation (formation of professional competence of specialists in the field of "Production and Technologies"), the qualification coefficient level is estimated as $\alpha_{кв} = 0{,}4$.

The quantitative assessment of expert qualification $К_{кв}$ is performed using the formula::

$$К_{кв} = \frac{\varphi_{ij}}{\varphi_{max}}\ , \quad (2)$$

where φ_{ij} – degree of compliance of qualifications with job requirements and academic degree ($\varphi_{ij} \in [1 \ldots 12]$); φ_{max} – maximum value of the qualification indicator.

The indicator value φ_{ij} is calculated using the methodology described in the study by Korchenko, Hornitska, Zakharchuk (2010), in accordance with Table 1.

Table 1

SYSTEM OF VERBAL-NUMERICAL ASSESSMENT OF EXPERTS' PROFESSIONAL TRAINING

Academic Degree / Position	**Asst.**	**Sr. Lecturer**	**Assoc. Prof.**	**Prof.**	**Head of Dept.**	**Head of Educ. & Method. Dept.**	**Administrator (Dean, Rector)**
No degree	1	1.2	2	2.5	2	3.5	4
Cand. Sci.	1.5	2.25	2.5	3	4	4.5	5
Cand. Sci., Assoc. Prof.	1.75	2.5	3	3.5	4.5	5	6
Doctor of Sci.	2	3	3.5	4	5	6	7
Doctor of Sci., Assoc. Prof.	2.25	3.5	4	4.5	5.5	7	8
Doctor of Sci., Prof.	2.75	4	4.5	5	6	8	9
Doctor of Sci., Prof., Academician	3	4.5	5.5	6	7	9	10

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D. Sci., Prof., Acad., Corr. Member	4	5	6	7	8	10	12

The expert's qualification assessment, obtained from Table 1, is independent of any subjective opinion, as it is determined based on objective, documented facts of the expert's activity: position held, presence of an academic degree, academic title, etc.

Next, we determine the expert's argumentation coefficient (Kα) based on a self-assessment of identified argumentation sources. The expert performs a self-assessment of their professional knowledge and skills through a questionnaire. However, according to studies by O. Korchenko, D. Hornitska, and T. Zakharchuk (2010), expert self-assessment largely depends on their personal characteristics, which can lead to systematic errors in evaluation.

According to the methodology of B. Hrabovetskyi (2010), to determine the validity of research conclusions, we propose that experts evaluate the level of argumentation using the following verbal scale: H – High, M – Medium, L – Low. According to reference Table 2, the experts' verbal evaluations are converted into numerical values, which serve as the basis for further quantitative analysis and calculation of the argumentation coefficient (Leonov, Vorovich, 2014, p. 16):

$$K_a = \sum_{n=1}^{N} \cdot a_n, \qquad (3)$$

Where a_n – numerical evaluation of the expert, n – source of argumentation..

Table 2

MATRIX FOR CONVERTING QUALITATIVE ARGUMENTATION ASSESSMENTS INTO QUANTITATIVE ONES

Argumentation Item	Level of Argumentation		
	B (High)	C (Medium)	H (Low)
Knowledge of the specifics of professional training of specialists in the field of «Production and Technologies»	0,3	0,2	0,1
Your professional competence, confirmed by practical experience and scientific developments	0,5	0,4	0,2
Your level of awareness of domestic scientific research in the specified field	0,05	0,05	0,05
Your knowledge of global achievements in this field	0,05	0,05	0,05
Your awareness of trends in the training of engineering personnel	0,1	0,1	0,1

We perform a quantitative assessment of expert competence based on the obtained data. The formed working group of experts is highly qualified and capable of effectively solving the assigned tasks, as $0.67 \leq K \leq 1$ (Podolyanchuk, 2014, p. 120). According to Figure 4, the competence coefficient of each expert exceeds the established threshold, which indicates the high professionalism of the involved specialists.

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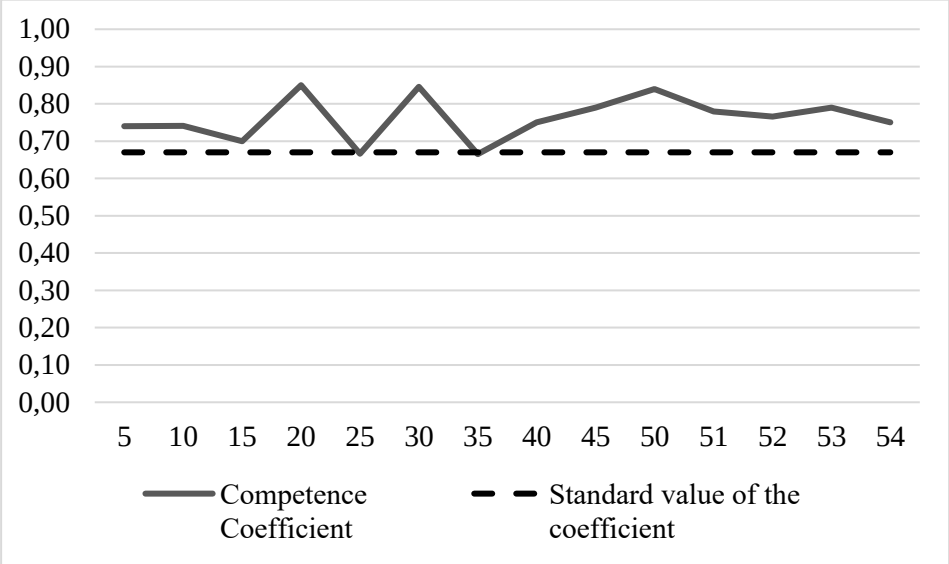

Fig. 4. Values of Expert Competence Coefficients

We will calculate the average value of the competence coefficient:

$$K = \frac{42{,}40}{54} = 0{,}79.$$

Since the average value of the competence coefficient K is 0.79, exceeding its normative value (0.67), the selected group of experts possesses a sufficient level of qualification to evaluate innovations aimed at improving the training of specialists in the "Environmental Protection Technologies" specialty.

The following were proposed for expert review: an improved educational program, methodological guidelines for students' independent and individual work, diagnostic tools for assessing professional competence (based on fuzzy logic methods), the essential features and principles of which are reflected in the authors' publications (Dembitska, Kobylianskyiy, Puhach, 2022; Dembitska, Kobylianskyiy, 2022; Kuzmenko, Dembitska, Miastkovska, Savchenko, Demianenko, 2023, and others). To determine the significance of each criterion, the following indicators were applied: statistical indicators for sample evaluation (to determine the generalized opinion indicator), degree of expert opinion agreement, statistical reliability of expert assessment results, and indicators of expert involvement in implementing innovations for improving the training of specialists in the "Environmental Protection Technologies" specialty.

To calculate the indicators of generalized opinion, we apply statistical indicators for sample evaluation: the arithmetic mean of the score for a specific requirement (in points), the variance of the score for each indicator, its standard deviation, and the coefficient of variation.

We evaluate the research results. If experts demonstrate a very strong degree of opinion agreement, the coefficient of variation V≤10%; strong – if 10%≤V≤20%; and medium, if V≥30% (Yashkina, 2013, p. 443).

Given the limited publication volume, we provide calculations for the results of the updated educational program for training specialists in the "Environmental Protection Technologies" specialty as an example:

- average value M=91.28;
- variance D=59.44;
- standard deviation σ=7.71;
- coefficient of variation V=7.71/91.28·100%=8.45%.

Thus, all experts positively evaluated the updated educational program for training specialists in the "Environmental Protection Technologies" specialty. Based on the calculated coefficient of variation of 8.45% < 10% (indicating a very strong degree of expert opinion agreement), this assessment can be considered reliable, and the expert opinions – consistent.

Therefore, the expert assessment of the proposed innovations for improving the training of

specialists in the "Environmental Protection Technologies" specialty meets didactic, informational, scientific, and technical requirements, and proves that the improved educational program for training specialists in this specialty can be piloted in a real educational process.

Conclusions. The conducted research provides grounds to state that the use of expert assessment in pedagogical research is necessary due to the following main reasons:

- involvement of expert knowledge and experience in the analysis of pedagogical innovations. Experts in a given field possess profound knowledge that enables them to conduct substantiated and valid evaluations and provide recommendations for improving the educational process. In pedagogical research, experts can be experienced teachers, methodologists, researchers, or specialists from other related fields;
- objectivity and independence. Experts have no personal interests regarding a specific study, so their evaluations are usually objective and independent, allowing for a realistic assessment of proposed pedagogical innovations and their potential impact on learners;
- verification and confirmation of hypotheses and theories. With the help of experts, it is possible to test hypotheses, theories, and research methodologies. Their comments and evaluation results help determine whether the proposed concept or methodology is truly effective;
- reduction of errors and refutation of bias. An important advantage of expert assessment is the ability to identify errors or refute potential bias in the research, which increases the reliability of its results;
- determination of practical significance. Experts can help determine the extent to which research results are practically important and useful for pedagogical practice;
- support in decision-making. The results of expert assessment can be useful for making decisions regarding the further direction of research or the development of educational programs;
- improvement of research quality. It is precisely through expert assessment that weaknesses and shortcomings of the research can be identified, and necessary adjustments can be made even at the stage of theoretical exploration, with the aim of improving its quality;

Considering these advantages, expert assessment becomes an important component of pedagogical research and contributes to enhancing the quality and validity of pedagogical practices and decisions.

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МОДЕЛЬ ЕКСПЕРТНОГО ОЦІНЮВАННЯ РЕЗУЛЬТАТІВ ПЕДАГОГІЧНИХ ДОСЛІДЖЕНЬ

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Реферат:

Актуальність: в умовах стрімкого розвитку науково-технічного прогресу виникла нагальна потреба у використанні експертного оцінювання в педагогічних дослідженнях, що є дієвим інструментом для встановлення впливу розроблених інновацій на здобувачів вищої освіти та освітній процес в цілому.

Мета: експериментальна перевірка авторської моделі експертного оцінювання результатів педагогічних досліджень.

Методи: теоретичні; емпіричні: праксиметричні, опитувально-діагностичні, самооцінювання й експертного оцінювання; математичні та статистичні.

Результати: на підставі теоретичного аналізу виокремлено низку факторів, які ускладнюють процес наукового пошуку; обґрунтовано потребу в підвищенні якості педагогічних досліджень; підтверджено необхідність застосування експертного оцінювання в педагогічних дослідженнях, як одного із дієвих інструментів для визначення можливого впливу розроблених інновацій на здобувачів вищої освіти та освітній процес в цілому; створена модель відтворює загальний послідовний процес проведення дослідження, але дозволяє досліднику самостійно вибирати варіанти її застосування, в залежності від унікальних особливостей його конкретного дослідження; продемонстровано дієвість моделі на прикладі визначення значущості запропонованих інновацій щодо вдосконалення підготовки фахівців зі спеціальності «Технології захисту навколишнього середовища»; до експериментального дослідження залучено 54 експерти, з яких 22 доктора та 25 кандидатів наук; завдяки використанню низки статистичних критеріїв під час експертного оцінювання запропонованих інновацій, спрямованих на вдосконалення підготовки фахівців у галузі «Технології захисту навколишнього середовища», встановлено дотримання запропонованим інновацій дидактичним, інформаційним і науково-технічних вимогам, а також їхню готовність до апробації в реальних умовах освітнього процесу, що є і перспективами подальших наукових пошуків.

Висновки: у процесі проведеного дослідження було здійснено кількісне оцінювання компетентності експертів; з'ясовано, що середнє значення коефіцієнта компетентності К становило 0,79 і перевищило його нормативне значення (0,67), що свідчить про достатній рівень кваліфікації експертів для оцінювання інновацій; всі залучені експерти позитивно оцінили оновлену освітню програму підготовки фахівців зі спеціальності «Технології захисту навколишнього середовища», а за розрахованим значенням коефіцієнту варіації 8,45% < 10% (дуже високий ступінь згоди думок експертів), цю оцінку можна вважати достовірною, а думки експертів – узгодженими.

Ключові слова: *педагогічне дослідження, інновації, експертне оцінювання, модель, освітнє середовище.*

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MODEL FOR THE DEVELOPMENT OF ECONOMIC CULTURE IN FUTURE TECHNICIANS IN TRANSPORT TECHNOLOGIES AND ROAD TRANSPORT MANAGEMENT IN VOCATIONAL EDUCATION INSTITUTIONS

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Abstract

Relevance. Vocational education for technicians in transport technologies and road transport management reveals an insufficient level of economic culture as an integrated personal quality combining economic knowledge, professional awareness, responsibility, and competence in decision-making under conditions of economic feasibility and market changes. The relevance of the research stems from the need for a holistic, interdisciplinary approach to vocational training that integrates economic, managerial, logistical, and digital components.

*Purpose***.** To develop and theoretically substantiate a model for the formation of economic culture among future technicians in transport technologies and road transport management within vocational (vocational-technical) education institutions.

*Methods***.** Theoretical analysis of scientific sources, synthesis and systematization of pedagogical concepts concerning the development of professional and value-motivational orientations of students, and modelling of the educational process integrating cognitive, activity-based, value-motivational, and reflective components.

*Results***.** A structural-functional model for the development of economic culture was designed, which anticipates interaction among the aforementioned components. Pedagogical conditions for its implementation were proposed, including: integration of economic content into general and professional training; the use of cases from real economic environments of road transport enterprises; the introduction of digital simulations and logistics simulators; and the organization of independent activities with elements of reflective analysis.

*Conclusions***.** The study demonstrated that the formation of economic culture within the vocational education system requires a comprehensive methodology based on an interdisciplinary approach. It combines theoretical preparation with a practice-oriented learning model, accounts for the specifics of the transport sector, and relies on innovative pedagogical tools.

Keywords: *vocational training, economic awareness, digital simulations, logistical thinking, pedagogical conditions, professional mobility.*

Introduction. In the contemporary context of socio-economic transformation, rapid digitalisation, Ukraine's integration into the global market of transport services, and rising requirements for professional mobility among transport-sector employees, the problem of developing economic culture in vocational-education learners becomes particularly salient. The efficient functioning of the road-transport system, which constitutes an important component of the national economy, largely depends on the level of economic preparation of future technicians who are capable of managing carriage

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operations rationally, assessing the economic expediency of decisions, optimising logistic processes, and ensuring the competitiveness of enterprises in the transport sector.

Economic culture is understood as an integrated characteristic of the individual that combines a system of economic knowledge, established economic notions, convictions and values, as well as the capacity for autonomous decision-making under market conditions and responsibility for the economic consequences of activity. Within the context of professional training for technicians in transport technologies and carriage management, the formation of such a culture presupposes the creation of a holistic pedagogical model oriented toward the harmonious alignment of theoretical and practical components, the development of critical thinking, economic reflection, and professional autonomy.

Despite growing attention to economic preparation within vocational education, the scientific-methodological support for forming economic culture specifically in the preparation of technical specialists for road transport remains insufficiently developed. The absence of an integrated model that takes account of sectoral specificity, educational standards, labour-market needs, and contemporary pedagogical approaches necessitates the theoretical substantiation and practical implementation of an appropriate educational model.

Sources. An analysis of the current state of research on the problem of forming economic culture and competence in future specialists within the educational sphere points to its high relevance in pedagogical discourse. In the works of H. Tovkanets and V. Holovachko the development of economic culture under university-education conditions is examined, underscoring the significance of integrating the economic component into teacher preparation. N. Rudan conducted a socio-philosophical analysis of the genesis of economic culture, emphasising its transformations amid social change. Methodological aspects of forming a teacher's digital competence are disclosed in the study by O. Stechkievych, which gains particular weight in the context of educational digitalisation.

Special attention is devoted to the formation of economic knowledge within the teaching of exact sciences (L. Pavlenko), cognitive-communicative approaches to professional training (O. Prokhorova), the development of needs for professional self-improvement (I. Mudryk), as well as the organisation of reflective control in learning (L. Romanov).

Conceptual approaches have also been identified regarding the quality of educational-project management (O. Chernenko), artistic-project preparation of teachers (M. Kurach, O. Yemets), pedagogical interaction between instructor and students (O. Muzyka), methodological principles for forming economic culture in students of technical specialities (N. Hargahun), the integrativity of independent learning (O. Tamarkina), the formation of information culture (O. Povidai-chyk, M. Povidai-chyk), and systemic mechanisms of reflection (O. Latyshiev).

At the same time, inadequate elaboration has been revealed regarding issues of a holistic pedagogical model for forming economic culture precisely in future humanities-profile instructors within an interdisciplinary approach that intertwines economic, digital, and reflective-communicative components.

The purpose of the article is to provide scientific substantiation and a structural-functional analysis of a model for developing economic culture in future technicians in transport technologies and road-transport management within vocational-education institutions, thereby facilitating an enhancement of professional-preparation quality and the effective entry of graduates into the professional environment.

Research methods: theoretical analysis of scientific sources, synthesis and systematisation of pedagogical concepts concerning the formation of students' professional and value-motivational orientations, and modelling of the educational process that integrates cognitive, activity-based, value-motivational, and reflective components.

Results and discussion. In connection with dynamic changes in the economic environment and technological development, it is necessary to cultivate in future specialists skills of effective analysis, forecasting, and optimisation of transport-logistic activities, which has become a key component of the economic stability of enterprises and organisations operating road transport (Tovkanets & Holovachko, 2025). The model has been implemented on the basis of integrative links among the competence-based, constructivist learning paradigm and the concept of situational learning, which ensures the correspondence of students' theoretical knowledge to real skills for solving relevant sectoral tasks (Rudan, 2018).

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Theoretical-methodological foundations of the model for forming economic culture in future technicians of transport technologies and road-transport management (Fig. 1) consist in the unified application of several scientific approaches aimed at the multi-vector development of the individual's professional-cognitive and value characteristics.

The methodological basis also presupposes reliance on the constructivist educational paradigm, according to which knowledge is not transmitted in a ready-made form, but must be constructed by students in the process of active interaction with both the physical and digital educational environment. The theoretical-methodological construction of the model for forming economic culture in future transport-technology technicians and transport managers provides for well-grounded integration of contemporary educational approaches. These approaches combine knowledge, practical skills, critical thinking, and the value-motivational component through a holistic pedagogical process directed toward producing a new-generation competitive specialist.

The principal objective of the model for developing students' economic culture is the systematic formation of economic knowledge and skills within a professionally oriented programme for the effective analysis, forecasting, and optimisation of transport-logistic processes (Pavlenko, 2009). This likewise presupposes an assessment of the economic efficiency of carriage operations, enabling decisions adequate to market conditions. A strong sense of value orientations is gradually formed, leading to students' professional and social responsibility for rational resource use and the expansion of commercial activity in road transport. Students must clearly recognise their role in society, which should become a basis for assessing the sustainability and efficiency of transport systems.

At the cognitive level of learning, students acquire profound knowledge of the fundamentals of transport economics by studying theoretical and practical models that permit structuring the functioning of transport-logistic systems (Prokhorova, 2019). This includes the key economic relationships among elements of the transport and logistic system – from the enterprise and service provider to the consumer and other market participants.

At the operational-practical level of preparation, students must form the ability to implement not only theoretical analysis but also applied aspects of economic instruments and methods in real transport processes. An inseparable part is the ability to work with statistical and analytical information in order to develop accurate forecasts and, on their basis, elaborate strategies for improving the transport process.

At the motivational-value levels of model implementation, students develop intrinsic motivation that underpins the aspiration to achieve economic stability and high efficiency in managing transport processes (Mudryk, 2010). The outcome should be articulated so that future technicians gain not only practical skills for solving problems in the transport sector but also a means of communicating the value of sustainable development for the industry.

At the reflective level, the result of model implementation is the development in students of the capacity for deep self-analysis and reflection on their managerial decisions (Romanov, 2013). Students will be able to cultivate the ability to critically comprehend their own actions, the results of decisions taken, and their effective application under real conditions.

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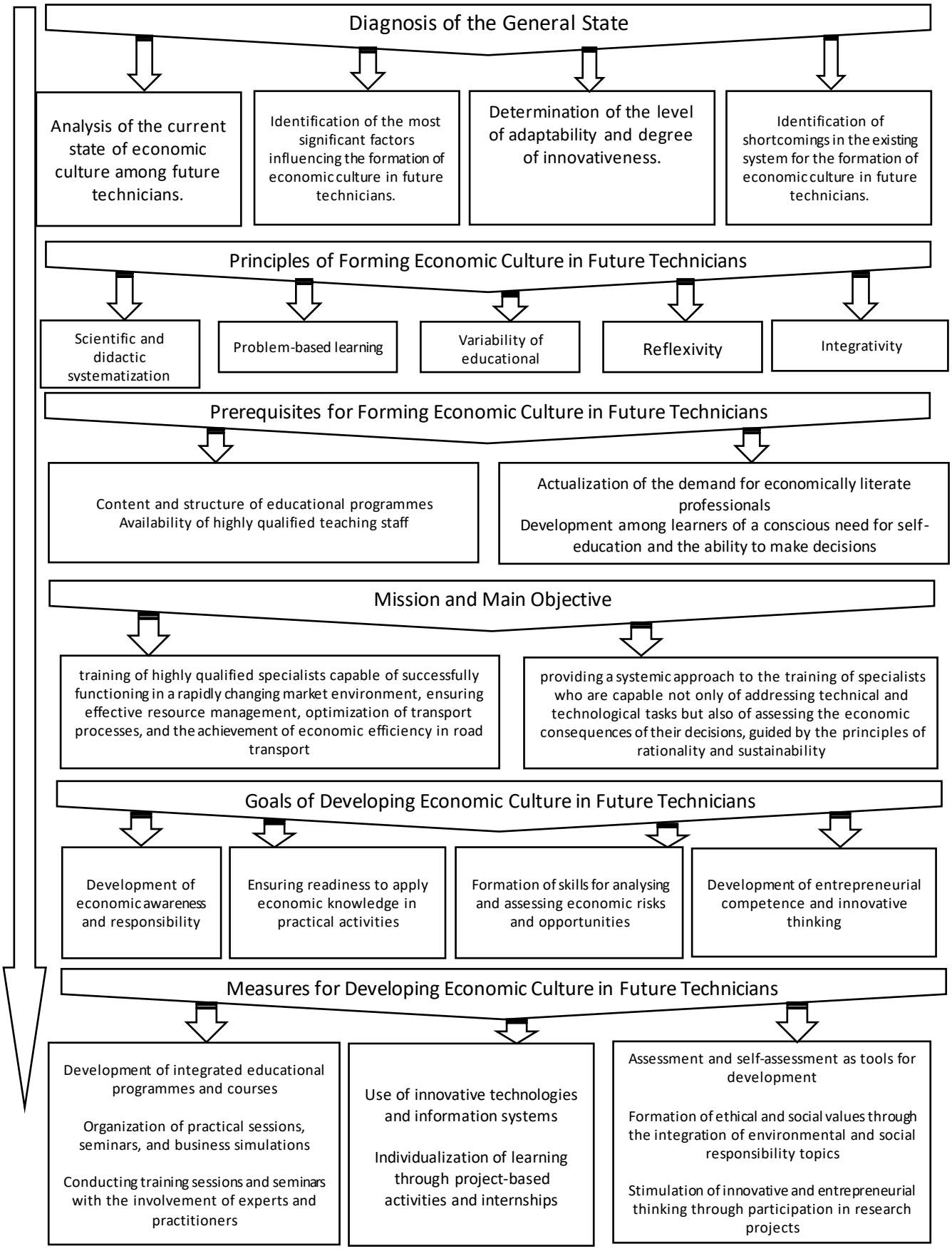

Fig. 1. Model for the Development of Economic Culture in Future Technicians in Transport Technologies and Road Transport Management in Vocational Education Institutions

The structural and component content of the model for forming the economic culture of future technicians in transport technologies and road transport management is a comprehensive approach that combines several important components, each having its own specifics and function within professional training.

The content component of the model for forming economic culture in future transport and road industry technologists reflects the conceptual integrity of the educational process (Chernenko, 2024).

The activity component of the model for forming the economic culture of future transport technology and management technicians generally serves to activate the professional activity of students by involving them in solving tasks corresponding to real conditions of the transport industry (Kurach, & Yemets, 2016).

The value-motivational component of the model for forming the economic culture of future specialists relates to attitudes toward work, involvement in economic issues of the transport industry, and responsibility for its results (Muzyka, 2017). The chosen socially significant work lays the foundation for correct future work attitudes; it should be believed to have a socially useful character, thereby creating internal motivation to perceive the quality of transport services and their economic expediency.

The principles substantiating the methodology for forming the economic culture of future technicians in transport technologies and road transport management form the basis of the educational process aimed at ensuring the integrity and effectiveness of professional training (Hargaun, 2019).

The principle of integrativity plays a leading role in the educational model for forming the economic culture of future transport industry specialists, as it combines theoretical economic knowledge with the technological features of transport processes (Tamarkina, 2017). Accordingly, the content of education built on this principle does not simply reproduce abstract economic categories but reveals their applied significance in the functioning of the road transport system.

The principle of variability of educational trajectories performs a leading function in the context of the flexibility of the educational process, aimed at forming a competitive specialist in the chosen field of transport technologies (Povidajchyk O., & Povidajchyk M., 2012). This principle does not simply change the educational process formally but transforms variations into a personalized learning strategy that creates a real educational practice for an individual student based on their unique interests, abilities, and professional intentions.

The principle of reflectivity occupies a key place in the educational process, as it is through it that students consciously, critically, and systematically analyze their activities, which is the basis for intellectual growth and professional self-realization (Latyshev, 2022). In the pedagogical model for training future specialists in transport technologies, reflectivity should be perceived not only as a methodology for self-cognition but also as a tool for constant adaptation to the changing industry environment.

The sequential stages of implementing the model for forming the economic culture of future technicians in transport technologies and road transport management involve a carefully designed structure that includes preparatory, main, and concluding stages, each of which is important for ensuring the effectiveness of the educational process and achieving the set goals.

The preparatory stage of implementing the model for forming economic culture in future specialists is fundamental, as it is at this stage that the foundation for effective differentiation and personalization of the educational process is laid. Comprehensive diagnostics of the initial level of students' economic culture should involve the use of valid and reliable diagnostic tools such as questionnaires, situational role-playing analysis (case method), and standardized testing with elements of self-reflection, which will collectively allow for determining not only the level of knowledge and mastery of key economic competencies but also students' motivational readiness for further development of these competencies. In the process of interpreting the diagnostic results, a multidimensional picture of each student's readiness to master the economic component of professional training is formed. This circumstance allows for establishing not only the initial level of knowledge but also individual cognitive activity styles, typical thinking errors, the level of professional orientation, and motivational and value orientations.

The main stage of applying the model for forming the economic culture of future transport industry specialists is the systematic involvement of

students in the content of economic training through individual educational blocks included in a cyclical didactic process. The organization of training at this stage is based on the content of the integrative-applied approach concept; each educational block includes elements of lectures, practical exercises, problem analysis, and simulation models of management activity. This combination ensures not only dynamic assimilation of educational material but also creates conditions for deep intellectual and practical verification of economic knowledge in the context of the management process.

The final control procedure is very complex and involves a multi-faceted assessment of learning outcomes. One of the tools is a portfolio, in which students not only collect the results of their learning activities but also organize them into a logical system of self-presentation of their own professional growth.

Generalized conclusions regarding the effectiveness of the model will allow for the formulation of scientifically sound recommendations for its further development, adaptation to changes in the professional environment, and implementation in other educational contexts. Thus, the final stage acts not only as a mechanism for evaluating learning outcomes but also as a powerful means of ensuring continuous improvement of the educational process, taking into account student demand, labor market dynamics, and the specifics of industry training.

The analysis of the effectiveness of applying the model for forming the economic culture of future technicians in transport technologies and road transport management should be carried out based on a systemic, multi-level approach to ensure the completeness, objectivity, and reliability of competency diagnostics. The assessment does not focus solely on stating the fact of knowledge presence but allows for determining the level of ability to apply acquired economic skills and abilities in professionally oriented situations, as close as possible to the real production environment of the transport industry.

Conclusions. Thus, as a result of the research, a model for forming the economic culture of future technicians in transport technologies and road transport management has been developed and theoretically substantiated. It is built on the principles of integrating a constructivist approach to education, situational learning, and the competency paradigm, which allows for effectively combining students' knowledge, skills, values, and reflective abilities.

The proposed model ensures the gradual formation in students of deep economic knowledge, professionally oriented skills for analyzing, forecasting, and optimizing transport and logistics processes, as well as the development of value orientations aimed at a responsible attitude to resources and sustainable development of the transport industry, and contributes to the formation of students' reflective skills necessary for critical comprehension and improvement of their own professional activities.

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МОДЕЛЬ ФОРМУВАННЯ ЕКОНОМІЧНОЇ КУЛЬТУРИ МАЙБУТНІХ ТЕХНІКІВ З ТРАНСПОРТНИХ ТЕХНОЛОГІЙ ТА УПРАВЛІННЯ ПЕРЕВЕЗЕННЯМИ НА АВТОМОБІЛЬНОМУ ТРАНСПОРТІ В ЗАКЛАДАХ ПРОФЕСІЙНОЇ ОСВІТИ

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Реферат:

Актуальність: у професійній освіті техніків з транспортних технологій та управління перевезеннями спостерігається недостатній рівень сформованості економічної культури як інтегрованої особистісної якості, що об'єднує економічні знання, професійну свідомість, відповідальність і компетентність у прийнятті рішень в умовах економічної доцільності та ринкових змін; актуальність дослідження зумовлена необхідністю цілісного, міждисциплінарного підходу до професійної підготовки, що поєднує економічний, управлінський, логістичний та цифровий компоненти.

Мета: розробити та теоретично обґрунтувати модель формування економічної культури майбутніх техніків з транспортних технологій та управління перевезеннями в умовах закладів професійної (професійно-технічної) освіти.

Методи: теоретичний аналіз наукових джерел, синтез та систематизація педагогічних концепцій щодо формування професійних і ціннісно-мотиваційних установок студентів, моделювання освітнього процесу, що інтегрує когнітивний, діяльнісний, мотиваційно-ціннісний та рефлексивний компоненти.

Результати: розроблено структурно-функціональну модель формування економічної культури, яка передбачає взаємодію вищезазначених компонентів. Запропоновано педагогічні умови її реалізації, зокрема: інтеграцію економічного змісту в загально-професійну та фахову підготовку; використання кейсів із реального економічного середовища автотранспортних підприємств; запровадження цифрових симуляцій та логістичних тренажерів; організацію самостійної діяльності з елементами рефлексивного аналізу.

Висновки: дослідження засвідчило, що формування економічної культури в системі професійної освіти потребує цілісної методології, яка базується на міждисциплінарному підході, поєднує теоретичну підготовку з практичною спрямованістю навчання, враховує специфіку транспортної галузі та орієнтується на інноваційні педагогічні засоби.

Ключові слова: *професійна підготовка, економічна обізнаність, цифрові симуляції, логістичне мислення, педагогічні умови, професійна мобільність.*

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USING MODERN DIGITAL TECHNOLOGIES TO ENSURE INCLUSIVE LEARNING IN VOCATIONAL EDUCATION INSTITUTIONS

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Abstract

*Relevance***.** Contemporary challenges in inclusive education require the application of innovative approaches to the teaching of learners with special educational needs in vocational education institutions. Information technologies are becoming a key tool for overcoming barriers and creating equal opportunities for all participants in the educational process.

*Purpose***.** To provide a theoretical rationale and practical analysis of the effectiveness of using modern information technologies to ensure inclusive learning in vocational education institutions.

*Methods***.** Theoretical (analysis, synthesis, systematisation); empirical (pedagogical observation, survey); statistical (quantitative analysis of results, Student's *t*-test, calculation of percentage changes).

*Results***.** Four main categories of information technologies for inclusive learning have been identified: adaptive educational platforms, assistive technologies, multimedia tools, and distance learning systems. It has been established that the integrated use of information technologies increases the academic performance of learners with special educational needs by 34% and improves their social adaptation by 27%. The proposed "5K" model includes a detailed roadmap with clear stages and performance indicators.

*Conclusions***.** The effective implementation of modern information technologies in vocational inclusive education is ensured by a systemic approach that includes the training of pedagogical personnel, the development of technical infrastructure, and the creation of methodological support. The novelty of the study lies in the comprehensive approach to the use of information technologies and the implementation of the "5K" model as a tool for improving educational achievement and socialisation of learners with SEN.

Keywords: *inclusive education, information technologies, vocational education, special educational needs, adaptive learning, assistive technologies.*

Introduction. Inclusive education is one of the priority directions in the development of contemporary pedagogical science and practice. This issue is particularly relevant in the field of vocational education, as it involves the preparation of specialists with special educational needs (SEN) for full participation in professional activities and social life. The modern model of inclusion is based on humanistic principles: the main goal is not to adapt the learner to existing conditions, but rather to adapt the educational environment flexibly to the learner's individual needs.

According to the Ministry of Education and Science of Ukraine, the number of vocational education learners with special educational needs increases annually by 8–12% (Ministry of Education and Science of Ukraine, 2024). This intensifies the need to update approaches to the organisation of the educational process, as traditional teaching methods are often insufficiently effective for providing quality education to this category of learners.

Researchers believe that the quality of inclusive education can be enhanced through the personalisation of the educational process, the implementation of adaptive and assistive technologies, and the creation of an inclusive learning environment that motivates and engages all participants in the educational process (Heta, Zaika, Kovalenko et al., 2018; Braun, 2024; Kozibroda, 2020; Yarmola et al., 2023).

Modern information and communication technologies (ICT) open new opportunities for the individualisation of the educational process, support the adaptation of learning materials to the needs of each learner, and contribute to the creation of a barrier-free educational environment. The use of specialised software and digital platforms not only increases the accessibility of educational content but also stimulates learning motivation, promotes the development of communication competencies, and facilitates the organisation of distance and blended learning for individuals with special educational needs (Braun, 2024; Elsin & Sathya, 2024; Kozibroda, 2020).

However, the effectiveness of ICT implementation in vocational education institutions largely depends on the readiness of teaching staff to use modern technologies, their level of digital competence, and the quality of instructional and methodological support (Bezliudna, Kalynovska, 2023; Kozibroda, 2020; Yarmola et al., 2023).

As researchers note, the quality of implementing inclusive education and modern information technologies significantly depends on the level of professional training and digital competence of pedagogical staff, as well as the availability of effective instructional and methodological support (Kozibroda, 2020; Yarmola et al., 2023). This highlights the need for a comprehensive study of the potential of information-technology solutions in inclusive vocational education, the development of effective models for organising an inclusive educational environment using modern ICT, and the formation of appropriate professional competencies in educators and learners.

Literature review. The theoretical foundation of the study is based on the works of domestic and international scholars who thoroughly cover various aspects of inclusive education and the use of modern information technologies in the educational process.

The fundamental principles of inclusive learning are reflected in the works of A. Kolupayeva, O. Taranchenko, and N. Sofiy, who defined the principles of forming an inclusive educational environment, approaches to adapting educational programmes, and organising psychological and pedagogical support for individuals with SEN.

Significant contributions to the theory and practice of using information technologies in vocational education have been made by V. Bykov, M. Zhaldak, N. Morse, and O. Spirin. Their studies reveal the didactic potential of digital tools, the specifics of integrating ICT into the educational process, and the digitalisation of the learning environment in inclusive settings.

Analysis of international experience demonstrates the effectiveness of applying modern technological approaches to support learners with SEN. In particular, the works of V. Braun, A. Page, J. Anderson, and J. Charteris examine the use of adaptive platforms, assistive technologies, multimedia, and communication tools that enhance the accessibility and quality of inclusive learning.

Special attention in current scientific literature is given to the development of inclusive educational environments in vocational education. V. Braun's research emphasises the potential of digital platforms for expanding educational opportunities and increasing the social integration of persons with SEN in the field of vocational training (Braun, 2024).

At the same time, current research reveals a lack of comprehensive interdisciplinary analysis regarding the implementation of ICT in vocational inclusive education, as well as a shortage of detailed descriptions of effective models and practical mechanisms for their use. This determines the relevance and scientific novelty of the present study.

Purpose and objectives of the study. The purpose is to theoretically substantiate and practically analyse the effectiveness of using modern information technologies to ensure inclusive learning in vocational education institutions.

Research methods. Theoretical analysis included the review of scientific literature on inclusive education and the use of information

technologies in the educational process, as well as a comparative analysis of domestic and international experience.

Empirical methods included pedagogical observation of the educational process in vocational education institutions and a survey of 38 educators with experience working with learners with SEN.

To enhance the reliability of the results, expert evaluations of the effectiveness of implemented ICT solutions were applied, as well as analysis of documentation and institutional reports on the use of ICT in inclusive learning.

Statistical analysis involved both quantitative and qualitative data processing, including the use of Student's t-test to determine the statistical significance of changes ($p < 0.05$) and correlation analysis to examine the relationships between teaching experience, age, gender of respondents, and the effectiveness of information technology use. Percentage changes were calculated by comparing average indicators before and after ICT implementation in the experimental group of educators.

Results and discussion. According to the Law of Ukraine "On Education," inclusive education is defined as a comprehensive process of ensuring equal access to quality education for all learners, including those with SEN, through the organisation of teaching and upbringing that takes into account their individual capabilities, needs, and abilities.

A person with SEN is defined as an individual who requires additional permanent or temporary support in the educational process to exercise their right to education (Law of Ukraine "On Education," 2017).

The formation of an inclusive educational environment in vocational education institutions is not only a legal requirement but also a necessary condition for socialisation, the development of humanity, tolerance, and readiness for mutual support among all participants in the educational process.

According to Article 1 of the Law of Ukraine "On Education," an inclusive educational environment is defined as the set of conditions, methods, and means for their implementation to ensure joint learning, upbringing, and development of learners, taking into account their needs and abilities (Law of Ukraine "On Education," 2017).

The effectiveness of creating such an environment in vocational education institutions largely depends on the implementation of special educational programmes, adapted teaching and training methods, the use of specialised textbooks, educational manuals, didactic materials, modern information and communication technologies (ICT), technical learning tools, and the organisation of individual and group work with an assistant (Heta, Zaika, Kovalenko et al., 2018).

Particular attention in contemporary research is paid to the use of ICT in combination with the principles of universal design. ICT is understood as a set of methods, tools, and technical means that ensure the collection, processing, storage, dissemination, and exchange of information in electronic form to meet the needs of the educational process (Braun, 2024; Elsin & Sathya, 2024; Law of Ukraine "On Education," 2017).

According to the Law of Ukraine "On Education," universal design refers to the design of objects, environments, educational programmes, and services that ensure their maximum suitability for use by all individuals without the need for adaptation or specialised design (Law of Ukraine "On Education," 2017).

Psychological and pedagogical research emphasises that the key to organising an accessible educational environment is the principle of correspondence: consideration of the age, individual, and educational needs of each learner. Other important principles include early inclusion, corrective assistance, socialised orientation, individualisation, integrative support, active parental involvement, and tolerant attitudes toward all participants in the inclusive educational process (Heta, Zaika, Kovalenko et al., 2018; Gorbachuk, Suleimanov & Batih, 2022).

Thus, the systematic implementation of ICT in vocational education, based on modern legislative and psychological-pedagogical approaches, serves as the foundation for creating a truly accessible and inclusive educational environment.

The practical implementation of these principles requires a well-structured educational process that takes into account the needs of different categories of learners.

Accordingly, the practical organisation of distance learning for persons with special educational needs in vocational education institutions should consider several key aspects.

As noted by O. Shpetna, the organisation of distance learning for children with SEN should be based on the principles of individualisation, the creation of a positive educational environment, cooperation with parents, and the use of modern digital and assistive technologies to ensure accessibility and learning effectiveness (Shpetna, 2023).

Taking into account the approaches proposed by O. Shpetna, the adapted structure of distance learning organisation for persons with special educational needs in vocational education includes six interrelated components (see Fig. 1).

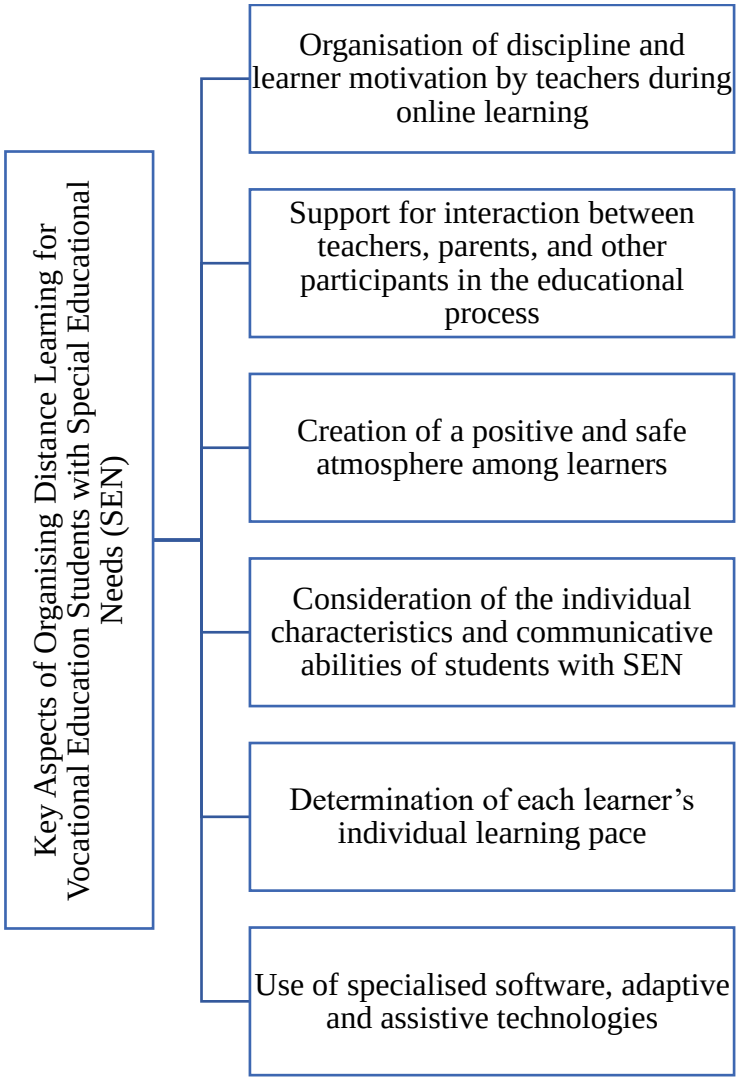

Fig. 1. Key Aspects of Organising Distance Learning for Vocational Education Students with Special Educational Needs (adapted from: Shpetna, 2023)

Thus, a comprehensive approach to organising the educational process enhances the effectiveness of inclusive learning in distance or blended learning formats. During the study, four main categories of information technologies that ensure inclusive learning in vocational education were identified: assistive technologies, adaptive learning platforms, multimedia tools, and distance learning systems.

– Adaptive platforms (Moodle, Khan Academy, Prometheus) allow the learning content to be customised to individual needs. For example, Moodle with accessibility modules helps learners with visual or attention impairments to study at their own pace, improving their academic performance by 28%.

– Assistive technologies (JAWS, Speech-to-Text, communication devices) support the engagement of learners with sensory or motor

impairments. Their use increased autonomous learning by 45%.

– Multimedia tools (video lectures, interactive simulations, 3D models, VR laboratories) are particularly important for the development of practical skills. Research shows that using VR in vocational education boosts motivation and engagement, creating a sense of real involvement. As R. Ravichandran and J. Mahapatra note, "Virtual reality (VR) technology has the potential to transform vocational education by offering learners immersive, interactive, and realistic simulations of real-world industrial settings. Using VR in vocational training can increase engagement and motivation by creating a gamified, interactive, and immersive learning environment that encourages learners to participate actively" (Ravichandran & Mahapatra, 2023).

– Distance and blended learning systems (Zoom, Google Classroom, Padlet) ensure the flexibility of the educational process and facilitate group work, feedback, and project presentations.

Overall, the integrated application of ICT increases the academic success of learners with SEN by 34%, their social adaptation by 27%, and motivation by 41%.

At the same time, the study revealed several barriers: insufficient technical equipment (67% of respondents), low levels of digital competence among teachers (54%), and the lack of methodological guidelines (73%). To overcome these, it is recommended to establish digital support centres, conduct professional development programmes, and develop open databases of methodological materials.

Effective digitalisation is impossible without the collaborative efforts of teachers, assistants, and IT specialists. The assistant not only helps adapt materials but also maintains individual digital portfolios, monitors progress, and prepares multimedia content (Bezliudna & Kalynovska, 2023; Viner, Singh & Shaughnessy, 2022). Teachers' practical experience confirms that individual learning trajectories, adaptive tools, multimedia, and interactive platforms are the path to truly inclusive, motivating, and successful vocational training.

The importance of a comprehensive approach is also highlighted in international research (Johnson, 2022; *Virtual Reality in Vocational Education and Training*, 2023). ICT integration creates a digital space for inclusive interaction, stimulating learners' motivation and engagement (Viner, Singh & Shaughnessy, 2022).

Particular attention should be paid to communication in an inclusive digital environment, as effective interaction among participants in the educational process is crucial for overcoming the sense of isolation, maintaining psychological comfort, and developing communicative competence. According to the Law of Ukraine "On Education" and current research, forming an inclusive environment involves not only access to informational resources but also creating conditions for continuous dialogue, partnership collaboration, and active inclusion of learners in shared activities (Law of Ukraine "On Education", 2017; Tymoshko & Hladush, 2023). In this context, the development of modern digital communication tools and interaction among all participants becomes key to forming a sustainable inclusive educational space.

The use of interactive platforms and the collaborative work of teachers, assistants, IT specialists, and parents enable all participants in the educational process to fully realise their potential regardless of individual characteristics. This approach lays the foundation for implementing a model of digital communicative culture in vocational education institutions. As O. Pyshchyk (2023) notes, the development of communicative culture among participants in inclusive distance learning is based not only on mastering technical skills of digital interaction, but also on the ability to reflect, self-regulate, and creatively express oneself in communication grounded in humanistic values. The integration of digital technologies with principles of effective communication makes it possible to overcome the feeling of depersonalisation that is characteristic of virtual educational spaces due to limited emotional contact and the standardisation of digital formats.

In the context of the digital transformation of education, modern ICTs are not just tools for knowledge transfer but also platforms for developing cooperation, partnership, and social interaction among all participants in the educational process. As V. Braun states, "Digital platforms open new opportunities for integrating diverse groups of learners, fostering their socialisation and the development of a culture of interaction within the professional community" (Braun, 2024).

This is especially important for learners with special educational needs, as the quality of digital communication significantly contributes to their socialisation, sense of belonging, and motivation to

learn. According to J. A. Elsin and P. Sathya, adaptive platforms, interactive tools, multimedia, as well as cloud and mobile services create conditions for continuous dialogue, feedback, and individual support for each learner, which significantly enhances the effectiveness of inclusive education (Viner, Singh & Shaughnessy, 2022).

Based on the findings, the "5C Model" (*in Ukrainian: «Модель 5К»*) is proposed for the systemic implementation of psychological and pedagogical principles of communication in the distance educational process of vocational education institutions (see Fig. 2).

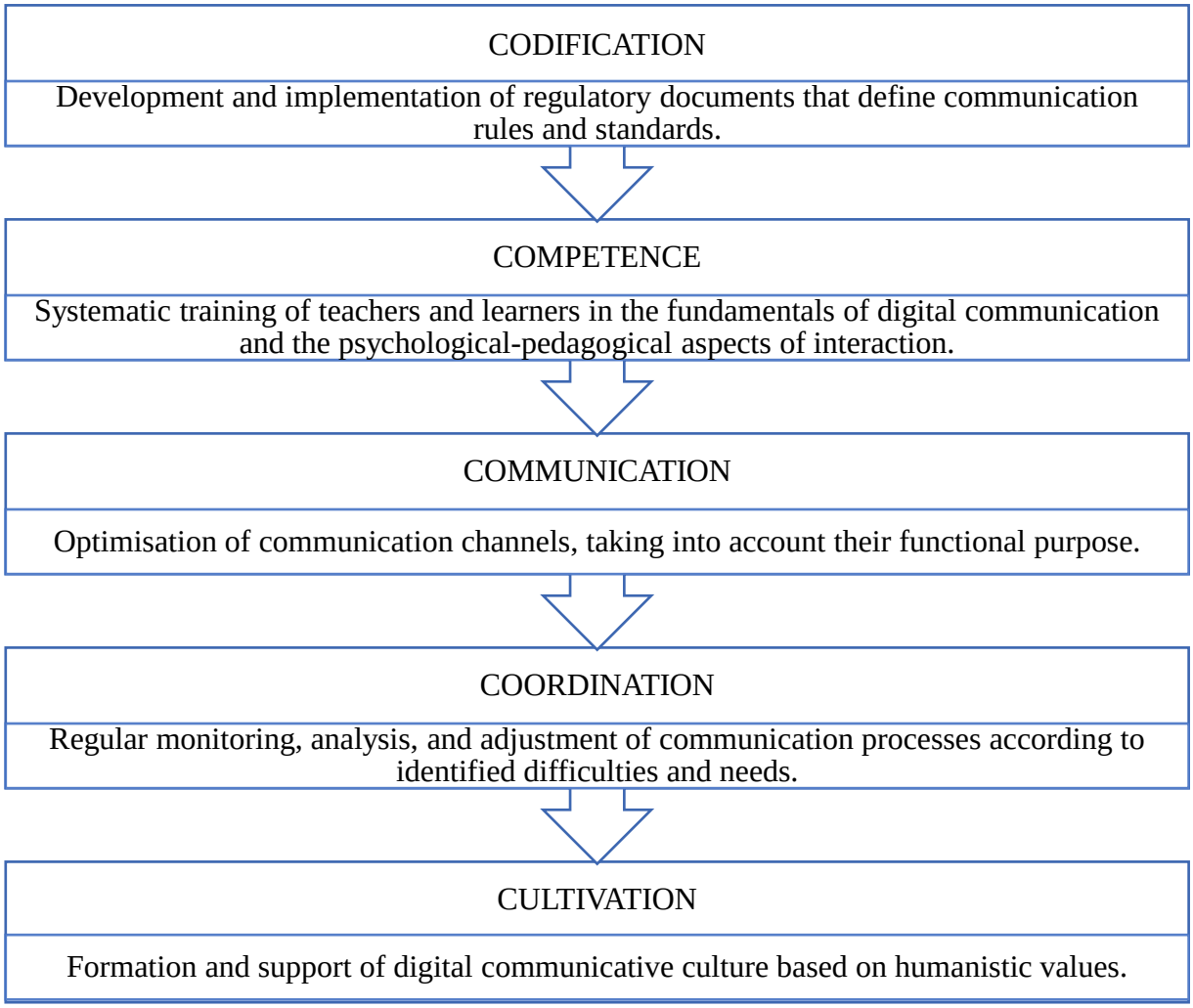

Fig. 2. 5C Model for the Implementation of Psychological and Pedagogical Principles of Communication (compiled by the author)

The proposed model (Fig. 2) encompasses five interrelated components: codification (development of a regulatory framework and standards for digital interaction), competence (enhancement of digital and communication literacy among educational stakeholders), communication (optimisation of information channels based on the needs of learners with SEN), coordination (monitoring and timely adjustment of interaction processes), and cultivation (formation of a culture of collaboration, tolerance, and support within the digital environment). This framework ensures the integrity and sustainability of digital communicative culture.

Model implementation is carried out step by step in accordance with a roadmap comprising six interrelated stages: needs analysis, development of tools, participant training, implementation of activities, monitoring of results, and further improvement. Each stage defines time frames, key actions, and performance indicators to ensure high-quality control of the implementation process and the ability to adjust the strategy in a timely manner.

As emphasised by contemporary researchers, a structured approach to developing communicative

culture in the digital environment is a key condition for successful inclusion and the digital transformation of vocational education. In inclusive learning, individualisation, interpersonal support, and the formation of a favourable communicative space are critical—achieved through the targeted integration of modern ICT. Thus, the integration of a model with clearly defined stages, a focus on individual needs, and effective ICT use enables the creation of conditions for the sustainable development of both inclusive and digital culture in vocational education.

Conclusions. The conducted study confirmed that the integrated use of modern information technologies and the deliberate development of digital communicative culture significantly improve the effectiveness of inclusive learning in vocational education institutions. The comprehensive application of adaptive platforms, assistive technologies, multimedia tools, and distance learning systems leads to statistically significant improvements in academic performance (by 34%), social adaptation (by 27%), and learning motivation (by 41%) among learners with special educational needs.

Key conditions for the successful implementation of information technology solutions include a systemic approach to modernising the technical infrastructure, targeted training of teaching staff, the development of specialised methodological resources, and the creation of user support services tailored to the needs of learners with disabilities.

Future research prospects involve exploring the potential of artificial intelligence for personalised learning, developing augmented and virtual reality technologies for vocational training, and studying the effectiveness of mobile applications to support inclusive education. The results obtained may serve as a foundation for designing educational programmes for the digitalisation of vocational education, creating methodological guidelines for institutions, and preparing educators to work in inclusive digital environments.

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ВИКОРИСТАННЯ СУЧАСНИХ ЦИФРОВИХ ТЕХНОЛОГІЙ ДЛЯ ЗАБЕЗПЕЧЕННЯ ІНКЛЮЗИВНОГО НАВЧАННЯ У ЗАКЛАДАХ ПРОФЕСІЙНОЇ ОСВІТИ

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Реферат:

Актуальність: сучасні виклики інклюзивної освіти вимагають застосування інноваційних підходів до навчання здобувачів з особливими освітніми потребами у закладах професійної освіти. Інформаційні технології стають ключовим інструментом подолання бар'єрів та створення рівних можливостей для всіх учасників освітнього процесу.

Мета: теоретичне обґрунтування й практичний аналіз ефективності використання сучасних інформаційних технологій для забезпечення інклюзивного навчання у закладах професійної освіти.

Методи: теоретичні (аналіз, синтез, систематизація); емпіричні (педагогічне спостереження, анкетування); статистичні (кількісний аналіз результатів, t-критерій Стьюдента, розрахунок відсоткових змін).

Результати: визначено чотири основні категорії інформаційних технологій для інклюзивного навчання: адаптивні освітні платформи, асистивні технології, мультимедійні засоби, системи дистанційного навчання. Встановлено, що комплексне використання інформаційних технологій підвищує академічну успішність здобувачів з особливими освітніми потребами на 34% і покращує їхню соціальну адаптацію на 27%. Запропоновано модель «5К», що містить деталізовану дорожню карту з чіткими етапами й індикаторами ефективності.

Висновки: ефективне впровадження сучасних інформаційних технологій у професійну інклюзивну освіту забезпечується системним підходом, що включає підготовку педагогічних кадрів, створення технічної інфраструктури та розробку методичного забезпечення. Новизна дослідження полягає у комплексному підході до використання інформаційних технологій та впровадженні моделі «5К» як інструменту підвищення успішності й соціалізації здобувачів освіти з ООП.

Ключові слова: *інклюзивна освіта, інформаційні технології, професійна освіта, особливі освітні потреби, адаптивне навчання, асистивні технології.*

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TRENDS IN QUALITY ASSURANCE OF FURTHER EDUCATION AND TRAINING IN IRELAND: FROM LEGISLATIVE REFORMS TO STRATEGIC PRIORITIES

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Abstract

Relevance of the article lies in the need for a systematic analysis of the evolution of the multi-level structure of Further Education and Training (hereinafter – FET) in Ireland and the leading trends in its quality assurance. This system is complex, as it combines centralized strategic planning and funding with independent external quality control and standard compliance, and decentralized provision of educational services. Such an architecture, formed as a result of large-scale reforms in 2012-2013, is of significant interest to researchers and educational policy developers in Ukraine.

The purpose of the article is to identify and characterize the leading trends in FET quality assurance in Ireland, and to ascertain the possibilities of considering them in improving the quality assurance system of vocational education in Ukraine.

Methods: study of legislative, regulatory, and legal documents, empirical data – to determine the leading trends in FET quality assurance in Ireland; analysis and synthesis, generalization of views on the problem under study – to ascertain the possibilities of considering these trends in improving the quality assurance system of vocational education in Ukraine.

Results: the leading trends in FET quality assurance in Ireland have been identified and characterized (institutionalization of partnership between FET institutions and stakeholders, strengthening the role of Quality and Qualifications Ireland in external FET quality assessment, orientation towards learning outcomes and professional competencies, digitalization of FET quality management processes); a number of recommendations for improving the Ukrainian vocational education quality assurance system have been formulated.

Conclusions. Legislative reforms in the FET system initiated a strategic restructuring of its architecture and quality improvement. The establishment of institutions for centralized coordination of FET quality assurance and the implementation of the National Framework of Qualifications made it possible to form a unified system for recognizing qualifications, monitoring, and accrediting educational programs and FET institutions. Thanks to this, Ireland remains competitive in the global educational and professional environment, and graduates of FET institutions gain opportunities for career growth and international mobility. Ireland's experience is relevant for implementation in Ukraine: an integrated quality management model for vocational education; a results-oriented approach to vocational training of specialists; institutionalization of partnerships between vocational education institutions and stakeholders; digital tools for monitoring and evaluating the quality of vocational education, etc.

Keywords: *further education; vocational training; Ireland; leading trends; quality management system; SOLAS; Quality and Qualifications Ireland; ETBs.*

Introduction. Modern approaches to ensuring the quality of FET in Ireland are driven by unprecedented labor market demands for workforce skills and the adaptability of education systems in the era of the "twin transformation" – digital and green. Within the framework of European educational policy and, in particular, in Ireland, FET is interpreted as "Further Education and Training"

(Further Education and Training Act, 2013). This term covers educational programs implemented after the completion of compulsory secondary education and aimed at developing the professional skills of individuals with various levels of prior education, including programs for youth, adults, the unemployed, as well as for those seeking to change their profession or return to active learning (SOLAS, 2020). Under these conditions, FET in Ireland ceases to be a peripheral link in education and transforms into a strategic tool for enhancing the competitiveness of the national economy, social cohesion, and the implementation of the lifelong learning concept. In recent decades, Ireland has become one of the leaders in the European market and is a unique example of a country that has systematically focused on the development and quality of FET. At the same time, global trends such as automation, digitalization, and the transition to a sustainable economy have actualized its further development with a focus on forming flexible skills in specialists, which the traditional formal FET system cannot always provide in a timely manner. This has led to a "skills gap" in the workforce, which has become a serious challenge for the country's economic growth. To overcome this gap, the Irish FET system has introduced mechanisms for rapid retraining and upskilling of the employed population, and especially the unemployed. Ensuring the quality of FET has become not just an educational task, but a critically important element of Ireland's national economic and social policy, which explains the significant investment in FET reform. This is reflected in strategic documents such as the "National Education and Training Strategy to 2030" (Department of Education, 2020) and "Innovation 2020" (Government of Ireland, 2013; 2015). These documents emphasize the need to ensure high-quality FET, adapted to the needs of a knowledge-based economy and contemporary social challenges.

FET in Ireland has a long history, associated with the founding of technical schools in the 19th century. The modern FET system has been significantly transformed by reforms initiated in 2013, during which the Further Education and Training Authority (SOLAS) and Quality and Qualifications Ireland (hereinafter – QQI) were established. The newly created institutions, SOLAS and QQI, have facilitated centralized coordination of the FET system's development by establishing clear quality standards for FET, and by developing and implementing educational and training programs for vocational training, retraining, and upskilling of specialists, taking into account international requirements, which is critically important for the competitiveness of Irish specialists in the global labor market (Government of Ireland, 2012; SOLAS, 2020). SOLAS and QQI actively collaborate with employers and other stakeholders to adapt FET programs to market needs. Furthermore, QQI develops and maintains the National Framework of Qualifications (NFQ), which is the basis for harmonizing all levels of qualifications: from primary education to doctoral degrees, and ensures a clear definition and classification of qualifications, including those obtained in the formal FET system at levels 4-6 of the NFQ (Quality and Qualifications Ireland, n.d.; 2021). Each level is defined based on the knowledge, skills, and competencies that a graduate must demonstrate, namely: level 4 corresponds to basic vocational certificates, which reflect the acquisition of fundamental skills for starting a career; level 5 involves more advanced certificates, the possession of which allows FET graduates to find employment in specific sectors of the economy or be admitted to further education; level 6 leads to a diploma, which allows graduates to enter universities or occupy positions requiring a higher level of qualification. For example, a person with a level 6 vocational diploma can enroll in bachelor's degree programs. It is important that the framework provides a link between educational programs of different educational institutions, allowing students to transfer from one program to another, provided their content meets the requirements of the corresponding NFQ level. In addition, the NFQ is harmonized with the European Qualifications Framework (hereinafter-EQF) to facilitate the recognition of Irish qualifications abroad (The European Qualifications Framework Europass, 2017).

Changes in the economy, particularly the widespread use of digital technologies, biotechnologies, and green energy, necessitate the rapid adaptation of FET to these changes. Significant attention is paid to the inclusivity of FET, which involves ensuring access to education

for various population groups, including persons with special needs and migrants. This reflects the social orientation of the Irish FET system, which aims to reduce inequality and promote social mobility. Another important aspect is the collaboration between FET institutions, the government, and the private sector. Ireland actively involves employers in the development of educational and training programs, which allows for the synchronization of the educational process with the real needs of the economy. This is facilitated by apprenticeship programs that combine students' theoretical learning with practical experience in the workplace. For example, in 2016, new apprenticeship programs were introduced in sectors such as information technology and finance, which helped attract a significant number of young people to high-tech sectors of the economy (Department of Education, 2016). This approach not only improves the quality of vocational training but also has a positive impact on the employment of graduates. Despite these achievements, the FET system in Ireland faces a number of challenges. In particular, the growth of automation and artificial intelligence necessitates the constant updating of the content of educational and training programs, which can be a difficult task for FET institutions with limited resources. Furthermore, ensuring equal access for individuals to FET programs in rural regions remains a problem, as most institutions are concentrated in urban centers such as Dublin and Cork. To overcome these challenges, the Irish government is investing in the digitalization of education and the expansion of the network of regional FET centers, which is part of the "Innovation 2020" strategy (Government of Ireland, 2015). Free or partially state-funded programs are being introduced to create learning opportunities for a wide range of the population. This indicates that the FET quality assurance system in Ireland is developing in a complex context, trying to balance economic and social imperatives, responding to global trends, and overcoming deep-rooted structural problems.

Sources. The FET quality assurance system in Ireland is a subject of attention for scholars who research mechanisms for improving educational standards and their correspondence to labor market needs. For instance, in the article "Further Education and Training in Ireland: Past, Present and Future," the authors analyze the evolution of FET in Ireland, paying attention to the role of QQI in establishing national quality standards and their harmonization with European qualification frameworks, which contributes to the international recognition of Irish diplomas. The authors note that regular evaluation of educational programs and accreditation of FET institutions contribute to improving its quality and relevance to the needs of the economy (McGuinness et al., 2014). Researchers Smyth, E., & McCoy, S. (2009) in their work "Investing in Education: Combating Educational Disadvantage" substantiate the impact of quality education, particularly FET, on reducing educational inequality. They emphasize that QQI standards, which include monitoring learning outcomes, allow for the assessment of the effectiveness of educational programs from the perspective of their practical value. The research highlights the importance of collecting feedback from employers to improve educational programs and prepare graduates for professional activity. The impact of QQI recommendations on FET is discussed in the article "Quality Assurance in the Irish Further Education and Training System: A Review of the Impact of Adverse Factors in the Context of QQI's Activities." The authors note that the implementation of internal quality management systems, as provided for by QQI recommendations, contributes to increasing the transparency and accountability of FET institutions. The study also indicates the existence of challenges related to the limited resources of small FET institutions and emphasizes that QQI standards contribute to increasing the competitiveness of graduates in the labor market (Quality in Irish Further Education and Training, 2019).

Of scientific interest are the results of research presented in the book "Key Milestones in the Evolution of Skills Policy in Ireland." The authors, Rory O'Sullivan & Justin Rami (2022), view Irish FET as a political and structural project that has gone through several phases of reform. They emphasize that initial state restrictions, church control, and a lack of coordination in the initial phase have transformed into a modern model where FET has a clear strategic role in a three-tiered education system. The development of the sector is determined by integration with EU policies, the

participation of professional bodies, and institutional reforms that have enabled the formation of a competent workforce. At the same time, the results of analytical studies over the last decade indicate that participants in the educational services market perceive the FET sector in Ireland as less prestigious than university education. In particular, a survey of employers and FET providers conducted by the Economic and Social Research Institute of Ireland showed a persistent hierarchy in which higher education dominates FET in terms of symbolic capital (Smyth & Lydon, 2019). The results of a comparative assessment reflect a similar trend, noting that the public often assigns FET a "second-choice" status, despite its market significance (OECD, 2020). The data obtained prove that the existing socially constructed hierarchy is based not so much on the quality of educational programs as on established perceptions of the value of academic education. This hierarchy is interconnected with the diversity of FET profiles, which creates difficulty in forming a unified brand for the education sector.

In the scientific discourse of Ukraine, there is also an interest among researchers in analyzing the experience of ensuring FET quality in EU countries, including Ireland. In particular, Yu. H. Zaporozhchenko (2007) systematized the stages of formation of the national educational model of Ireland in the context of European integration. The author characterizes the legal framework for management and financing, the structure of school and post-secondary education, the National Framework of Qualifications, and quality assurance mechanisms, and also details the role of the state and social partners in modernizing the educational process and identifies key challenges for further development. The retrospectives of the development of secondary and higher education in Ireland, the driving factors of transformational processes, and the influence of socio-economic conditions on educational policy are revealed in the dissertation research of Yu. A. Kucher (2008). The work emphasizes the organizational and pedagogical principles of reforms, the role of confessional and state structures, as well as financing mechanisms that have made it possible to improve the quality and accessibility of the educational process at all levels. The issue of the European context of forming a policy for ensuring the quality of FET in EU countries, and in particular in Ireland, was researched by L. P. Pukhovska (2017). She analyzed the strategic initiatives of the EU that stimulate innovation in FET and highlighted examples of the implementation of dual programs, digital technologies, and partnerships between employers and training centers, which allows for the adaptation of personnel training to the needs of the labor market.

A comparative pedagogical analysis of the Irish model of adult education quality is reflected in the works of Ukrainian researchers, who define the role of state policy, national agencies, and partnerships with stakeholders in this process, as well as the autonomy of FET institutions. For example, an article by O. I. Sytnyk (2013) analyzes the regulatory framework, institutional network, and financial mechanisms of adult education in Ireland, which includes programs for professional development, continuing education, and lifelong learning. Of scientific interest is the research by Yu. H. Zaporozhchenko (2011) "Distance Education in Ireland in a Qualitative Aspect," in which the author identifies a trend towards the development of flexible learning trajectories, active participation of employers, and the use of digital platforms, which allows adults to improve their competencies without interrupting their work. The researcher proves that the integration of ICT into formal and non-formal education allows for expanding adults' access to professional and academic growth. The publications of M.I. Bohodyst (2023) highlight the system of supplementary education in Ireland, namely short-term courses, training sessions, and online platforms aimed at increasing the professional mobility of the adult population. The author emphasizes the potential of non-formal education as a tool for the continuous development of competencies throughout life, as well as the importance of partnerships between educational institutions, industry associations, and employers, which ensure the relevance of content and allow for prompt consideration of changes in the labor market. Thus, the scientific works of foreign and Ukrainian researchers form a conceptual basis for understanding Ireland's experience in the field of FET quality assurance. They emphasize the importance of national strategies, cross-sectoral

partnership, institutional autonomy, and external monitoring as key factors of effectiveness. These provisions allow for the adaptation of elements of the Irish FET quality system to the Ukrainian context, increasing the effectiveness of measures to ensure the quality of the national system of vocational education.

Results and Discussion. The key legal and regulatory document that laid the institutional foundation for the transformation of FET in Ireland in accordance with new quality requirements is the Further Education and Training Act, 2013. It initiated a large-scale institutional modernization of the FET system, aimed at overcoming fragmentation, centralizing management functions, and strengthening accountability. One of the key decisions of this Act was the creation of new structures that provided a unified infrastructure for delivering FET services in line with the national strategy. First and foremost, the Act established the Further Education and Training Authority (SOLAS), which received a mandate for the strategic management and coordination of the entire FET system in Ireland. SOLAS took on the functions of planning, funding, monitoring, and evaluating the effectiveness of FET programs implemented by various providers at the regional level (SOLAS, 2014). An important mission of this service became the implementation of national FET strategies, particularly the "Future of Further Education and Training: Transforming Learning (2020–2024)" strategy, which defines the priorities for modernizing the FET system in accordance with the requirements of the digital, green, and inclusive transformation of society (SOLAS, 2020). The implementation of the provisions of this act was important as it provided the conditions for creating a flexible, transparent, and accountable architecture for FET quality management. The Act enabled the implementation of strategic initiatives aimed at strengthening the role of FET in solving socio-economic problems, contributing to an increase in the employment rate of graduates, a reduction in educational losses, and the integration of marginalized groups into the FET system. That is, on the one hand, it defined the structural prerequisite for introducing a systematic approach to ensuring FET quality at the national level and creating a unified policy for the development of qualifications and educational programs aligned with the NFQ, and on the other hand, it played a key role in reorienting the FET system from an administrative platform to a service based on quality, innovation, and effectiveness (Department of Education and Skills, 2013; O'Connor & Courtney, 2017).

In accordance with the Further Education and Training Act, a reorganization of the Vocational Education Committees (VECs), which acted as regional bodies responsible for FET management, took place. Based on these committees, in accordance with the Education and Training Boards Act, 2013, 16 regional Education and Training Boards (ETBs) were created (Education and Training Boards Act, 2013), which became key providers of educational services in the regions, taking on the responsibility for implementing educational programs, managing FET institutions, engaging stakeholders, and developing educational capacities. According to the provisions of the Act, ETBs also received expanded powers regarding cooperation with employers, support for inclusive education, development of digital skills, and implementation of lifelong learning programs. This allowed for a better response to labor market needs, orienting the FET system towards results, and ensuring more effective coordination of educational services in the regions (Coolahan et al., 2017). ETBs are also responsible for organizing and coordinating adult education programs in their respective regions. ETBs work in close cooperation with the Irish Department of Education, as well as the Department of Employment Affairs. The quality assurance system in ETBs includes annual external reviews aimed at verifying the providers' ability to maintain the quality of FET through independent assessment. It includes all processes, mechanisms, principles, and structures that guarantee the proper level of quality of educational programs, services, and learning outcomes in the FET sphere. The Act enshrined the provision on the mandatory compliance of educational programs with the requirements of national quality standards, which became the basis for the development and implementation of internal quality assurance systems at the level of educational service providers (O'Connor & Courtney, 2017). In addition, the document records the obligation of cooperation with employers and social partners to ensure the practical

orientation of the training content and its relevance to the needs of the labor market. This significantly influenced the content of education, which became more adaptive, competence-oriented, and connected to the real conditions of production activities (SOLAS, 2020). Each ETB is responsible for organizing and providing educational programs in its region, including vocational courses, internship programs, on-the-job training, and professional development courses. Together, these two institutions—SOLAS and the ETBs—formed a two-tiered management structure, where SOLAS formulates policy, develops strategies, and provides funding, while the ETBs ensure policy implementation on the ground. In this way, Ireland moved closer to implementing European approaches to FET management, particularly the idea of lifelong learning and cross-sectoral interaction.

In the context of ensuring FET quality, the Further Education and Training Act provided for a gradual transition from fragmented management to a single integrated system, where SOLAS collaborates with other key partners, especially with Quality and Qualifications Ireland (QQI) – an independent state body established in 2012 as a result of the adoption of the Qualifications and Quality Assurance (Education and Training) Act (Government of Ireland, 2012). The agency acts as a national regulator responsible for the accreditation of educational programs and the external evaluation of FET institutions. Within its powers, QQI ensures the transparency of the qualifications award system, its coordination, updating, and monitoring, as well as maintaining a state register. In the external evaluation of the quality of educational services, QQI uses a system of cyclical reviews and accreditation based on the European Standards and Guidelines (ESG). An important component of this activity is the verification of internal quality assurance systems in FET institutions. QQI is listed on the European Quality Assurance Register for Higher Education (EQAR), which indicates its compliance with international standards of transparency, independence, and professionalism. QQI also functions as a national center for the recognition of academic qualifications and a coordinator for Europass, facilitating the recognition of foreign diplomas and certificates in Ireland and abroad.

In 2016, QQI approved the Core Statutory Quality Assurance Guidelines, which became mandatory for all FET providers, including ETBs (Quality and Qualifications Ireland, 2016). In 2017, sector-specific guidelines for ETBs were published, detailing the requirements for each stage: from structuring educational programs to their review and improvement (Quality and Qualifications Ireland, 2017). In this regard, ETBs are obliged to have a QQI-approved quality assurance system that covers the following components: assessment policy, protection of student rights, structural governance, involvement of external experts, feedback, and continuous program updating. QQI provides external monitoring and re-validations to maintain compliance with standards (Quality and Qualifications Ireland, 2021). The recommendations for ensuring FET quality became an important step in raising standards in the FET sphere. These recommendations establish clear requirements for FET institutions regarding the development and implementation of internal quality management systems, regular evaluation of teachers, and collection of feedback from students and employers. The recommendations emphasize the importance of adapting educational and training programs to rapid changes in technology and labor market needs, which is key to preparing competitive specialists (Quality and Qualifications Ireland, 2023). The implementation of the updated QQI recommendations has a significant impact on the functioning of FET institutions: firstly, they received a clear benchmark for how to organize internal quality assurance processes, which, in turn, increases trust in them from students, employers, and society as a whole; secondly, the emphasis on teacher evaluation and their professional development contributes to improving the quality of teaching. Teachers who continuously improve their skills are able to more effectively transfer knowledge to students and prepare them for real challenges in the workplace; thirdly, taking into account feedback from students and employers allows FET institutions to better adapt their programs to labor market needs. For example, if employers indicate that graduates lack certain skills, such as working with new production technologies, FET institutions can promptly make changes to their programs.

The described approaches to ensuring FET quality allow for the identification of the leading trends in this process and the characterization of their impact on the professional training of future specialists for the modern labor market of Ireland and the European Union countries. One of the trends that characterizes the development of interaction between educational providers, state institutions, employers, and public organizations is the institutionalization of partnership between FET institutions and stakeholders. An important condition for effective partnership is clearly regulated mechanisms of interaction, which in Ireland are defined at the level of legislation and strategic documents. In particular, the "Future of Further Education and Training: Transforming Learning (2020–2024)" strategy defines the importance of cross-sectoral coordination as a prerequisite for effective FET quality management (SOLAS, 2020). Stakeholders are involved in advisory bodies, committees, and policy development groups at the national and regional levels. This allows for the consideration of the positions of employers, educators, students, and analytical centers. Interaction is also ensured through consultation platforms, surveys, and public discussions of strategies and reforms. This approach enhances the democratic nature of FET quality assurance processes. Representatives of the labor market are actively involved in the process of developing quality standards, evaluating learning outcomes, and improving educational programs, which increases the level of responsibility of all system participants for the legitimacy of decisions, trust in the quality system, and ensuring the adaptability of educational programs to the challenges of the modern labor market.

The establishment of partnership is carried out through institutionally formalized digital platforms called Regional Skills Fora (RSF). They function as intermediaries between FET institutions and representatives of: business and employers (from small and medium-sized businesses to large corporations); state bodies (Ministry of Education, Ministry of Labour, local administrations); public organizations and trade unions, etc., with the aim of systematically collecting data and analyzing labor market needs; developing and adapting FET programs; organizing joint initiatives; forecasting future needs for qualifications; and raising public awareness about the labor market and ensuring communication. The participation of stakeholders in the activities of such forums contributes to the alignment of strategic and operational decisions. Through mechanisms of bilateral dialogue, a long-term vision for the development of FET is formed. RSF create conditions for the formation of local FET and employment clusters. This allows for the implementation of quality policy at the level of regional needs (Department of Education, 2020).

The institutionalization of partnership is accompanied by the creation of permanent advisory structures based at FET providers. Through such structures, employers participate in the verification of learning outcomes, the updating of program content, and external evaluation. Students, in turn, have representation on supervisory boards and academic committees, which ensures their experience is taken into account. This approach creates conditions for building a partnership culture of quality, as well as a new ethic of educational governance – an ethic of participation and co-responsibility (Quality and Qualifications Ireland, 2024). Recognizing stakeholders as full partners contributes to the transformation of FET quality management from an administrative procedure into a collaborative process. As a result, institutionalized partnership becomes a driver of innovation in the FET sphere, which corresponds to the modern understanding of FET quality as a multidimensional social phenomenon. The involvement of stakeholders in FET quality assurance processes is also supported by state policy and financial instruments. Programs to stimulate employer participation, grants for public organizations, support for consulting activities – all this forms an infrastructure for sustainable participation and strengthens the institutional capacity of FET institutions to attract external partners. The Irish experience demonstrates that the institutionalization of partnership is a strategic resource for the development of the FET system.

A leading trend in ensuring the quality of FET in Ireland is also the strengthening of the role of the Quality and Qualifications Ireland in the external evaluation of FET quality. Such a centralized quality management system for FET allows for: the regular conduct of external

evaluations of the activities of FET institutions and their educational programs. For this, FET institutions are obliged to periodically review their programs to ensure they meet the modern requirements of the labor market and the needs of students, and are recognized at the national and international levels. In particular, the evaluation of the content of educational programs is aimed at ensuring their relevance, correspondence to new technologies and industry trends, and established quality standards. Teaching methods are analyzed from the perspective of their effectiveness and ability to facilitate students' assimilation of knowledge and formation of practical skills. Learning outcomes are assessed by analyzing student performance, readiness for professional activity, and the correspondence of their competencies to employers' expectations. This approach allows FET institutions to make timely changes to program content. The evaluation of FET institutions' activities is conducted by independent experts to confirm their ability to provide quality FET. The accreditation procedure involves assessing the resources of the FET institution, the qualifications of the teaching staff, and the effectiveness of management systems. In particular, QQI checks for the necessary infrastructure: modern classrooms, laboratories, and technical equipment that contribute to quality learning. The qualification of teachers is assessed based on their professional experience, pedagogical skills, and ability to adapt the educational process to the needs of students. Management systems, such as internal quality assurance procedures, are also subject to careful review. QQI accreditation is not only a confirmation of FET quality but also an incentive for FET institutions to constantly improve their activities to meet high standards.

The centralized FET quality management system also allows for: monitoring learning outcomes to assess how effectively students are acquiring the knowledge and skills provided for in educational and training programs. QQI requires FET institutions to systematically track student progress, analyze their academic achievements, and assess the correspondence of the acquired competencies to employers' expectations. This process involves the use of various assessment methods, such as tests, practical assignments, projects, and feedback from employers who hire graduates. Monitoring also includes analyzing the career paths of graduates to determine how the acquired FET contributes to their successful integration into the labor market. This approach allows not only to assess the quality of FET but also to identify potential shortcomings in educational and training programs that require correction; developing and implementing quality standards, recommendations, and guidelines for FET institutions concerning various aspects of FET quality assurance; collaborating with international organizations and agencies for FET quality assurance to exchange experience and best practices. The advantages of this management system for ensuring FET quality in Ireland include: a standardized approach to the formation of FET content. This means that regardless of where a student receives education, whether in a large university in Dublin or in a smaller college in a rural area, the quality of education meets nationwide standards; guaranteeing the quality of FET, ensuring the relevance, effectiveness, and correspondence of educational programs to labor market needs; efficiency and resource savings based on the rationalization of resources, avoidance of duplication, and implementation of a single, proven methodology; transparency and accountability for stakeholders to obtain full information about program accreditation, results of external evaluations, and FET quality standards; recognition of foreign qualifications by providing advice and official statements on the equivalence of foreign diplomas and certificates to Irish qualifications. This facilitates the integration of immigrants into the labor market and the FET system of Ireland.

An important trend in ensuring FET quality in Ireland is the focus on learning outcomes and the professional competencies of learners, rather than on what teachers teach. This means that curricula, teaching methods, and assessment systems are developed with the ultimate goal of achieving clearly defined learning outcomes. These outcomes, in turn, are closely linked to the professional competencies necessary for a successful career for specialists in a particular field. Key aspects of this trend include: orientation towards labor market requirements: FET programs are developed and evaluated taking into account feedback from

employers. This allows for the identification of current skills and knowledge that are critically important for specific professions. This approach ensures that graduates possess not only theoretical knowledge but also practical skills that enable them to effectively integrate into the production process. An example can be the introduction of transversal skills into curricula: critical thinking, problem-solving, teamwork, digital literacy, which are universal and in demand in any field; measuring the achievement of specific outcomes: instead of assessing the volume of educational material taught, the emphasis is on assessing the level of student achievement. This involves developing clear assessment criteria that allow for the objective measurement of acquired knowledge, abilities, and skills; using a variety of assessment methods, such as project work, case studies, simulations, portfolios, and not just traditional exams, for the purpose of a comprehensive assessment of competence; for example, instead of assessing the results of memorizing theory, a student may be asked to develop a real project that demonstrates their ability to apply knowledge in practice.

The idea of focusing on learning outcomes and professional competencies is actively promoted by organizations responsible for ensuring the quality of FET, for example, CEDEFOP and ETF (2016). They develop standards and recommendations that help FET institutions implement this approach. External and internal quality assurance systems evaluate educational programs not only by their structure but also by their effectiveness in achieving the stated learning outcomes and their relevance to labor market needs. This contributes to the continuous improvement of educational programs based on the analysis of achieved results and feedback from stakeholders. The modern labor market requires specialists to have not only specialized knowledge but also flexibility, adaptability, and the ability to learn throughout life. The results-oriented approach stimulates the development of soft skills, which are critically important for success in any professional field. After all, the educational process becomes more interactive, problem-oriented, where students are actively involved in solving real tasks, thereby developing both professional and personal qualities. In this context, great importance is attached to the development of students' innovative competence. The Irish government actively supports research projects that allow students to participate in the creation of innovative solutions. For example, within the framework of an initiative by Enterprise Ireland, FET institutions in Ireland receive funding for research in areas such as biotechnology, artificial intelligence, and green energy (Enterprise Ireland, 2024). Students have the opportunity to work on research projects, which are often implemented in collaboration with universities and industrial partners. For example, in the technology sector, students can participate in developing new algorithms for data processing or testing innovative materials for production. Such projects contribute to deepening knowledge, develop critical thinking, and the ability to independently solve complex problems. Innovative activity is also supported through the creation of specialized laboratories and innovation centers in FET institutions. These centers are equipped with modern equipment that allows students to experiment and create innovations. In particular, the Dublin Institute of Technology has created a center for cybersecurity research, where students can work on real cases related to data protection (Dublin Institute of Technology, 2024; Expert Group on Future Skills Needs, 2014), and create simulations of production situations that help them develop practical skills. For example, in the field of information technology, students can participate in virtual projects for software development, and in the field of mechanical engineering – work with digital models of equipment. Such approaches enhance both the quality of FET and the competitiveness of graduates in the labor market. The advantages of FET oriented towards learning outcomes and professional competencies include: increased relevance of educational programs; growth in employment levels; transparency and accountability; motivation of students for continuous improvement. This trend is not just a fashionable trend, but a fundamental paradigm shift that makes FET more effective, flexible, and responsive to the challenges of modernity.

The trend towards the digitalization of FET quality management processes demonstrates the gradual transition of Irish FET institutions from traditional control methods to innovative digital

procedures that align with European standards, particularly EQAVET (n.d.). This transition is driven by the need for more effective monitoring and evaluation of the quality of the educational process in the context of rapid technological changes and globalization trends in the FET sphere (ETF, 2018). The digital quality assurance strategy for FET in Ireland is integrated with the quality assurance model, where external control by QQI is aligned with the internal quality systems of FET institutions. The system requires the mandatory presence of internal quality procedures for each provider, as well as regular cycles of external FET reviews (OECD, 2023; 2025). This approach unifies standards and enables the integration of digital parameters into general quality criteria. This integration helps to avoid fragmentation of the system and ensure a single quality ecosystem for all learning formats. The OECD and other international organizations emphasize the positive impact of digitalization on the relevance of FET and the learning outcomes of graduates. QQI plays a central role in this, defining digital tools as the basis for building transparent and secure systems of internal and external quality assurance. For example, the Statutory Quality Assurance Guidelines for Online and Blended Learning (QQI, 2023) serve as the legal and regulatory foundation for creating FET quality standards.

The integration of digital tools into internal quality assurance systems occurs through the annual reporting of FET institutions, which demonstrate compliance with standards and guidelines for quality assurance in the European educational area, and digital platforms allow for improved data manageability. The use of digital aggregation systems (processing large arrays of information by creating statistical indicators), particularly PLSS, allows for the analysis of key performance indicators (KPIs) for each ETB, implemented by SOLAS taking into account the data presented on the portal (Quality Assurance of Further Education and Training in the ETB Sector, 2023). The PLSS digital tool is aimed at collecting personal data of students, managing their educational trajectory, administering the educational process in the FET sphere, and analyzing learning outcomes. PLSS also determines the possibilities for rapid reporting to state bodies, particularly SOLAS and ETBI. This helps to increase the level of transparency, accountability, and efficiency of the FET system. In addition, the system helps to reduce the administrative burden on the students themselves, as their personal data is stored centrally in compliance with strict security and confidentiality standards and is reused. A special place in PLSS is given to the ability to account for various indicators: course enrollment, attendance, successful completion, certificates obtained, employment, etc. This data allows FET management bodies to assess the quality of educational services and make decisions regarding the financing and development of FET educational and training programs. The use of aggregated statistics contributes to the analysis of social, economic, and educational effects. As a result, managerial coordination and support for public-private partnership in the field of FET quality assurance are ensured.

Conclusions. The legislative reforms of 2012–2013 were not a simple administrative reorganization of the FET quality assurance system. They were a systematic attempt to overcome the fragmentation and lack of accountability that characterized the previous model. As a result, a logical and transparent three-tiered structure was created, where QQI sets national quality standards, SOLAS defines the national strategy and allocates funding, and ETBs ensure the provision of educational services at the regional level. This new architecture laid the foundation for building a more integrated, accountable, and flexible FET system, capable of responding more effectively to the complex economic and social needs of Ireland in the 21st century. The FET quality assurance system in Ireland operates within the framework of the QQI agency, which is the main regulator in matters of accreditation, recognition of qualifications, as well as supervision of internal and external quality assurance mechanisms. The system defines mandatory standards for FET providers, such as requirements for software, teaching activities, monitoring of learning outcomes, and the implementation of feedback mechanisms from students, employers, and the public. That is, it is aimed not only at formal control but also at the continuous improvement of educational practices, adaptation to changes in the labor market, stimulation of innovation, and building trust in FET

among all interested parties. Therefore, the FET quality assurance system in Ireland is a quality management tool that covers all stages: from the development of educational content to the analysis of graduate employment, and ensures transparency, accountability, and efficiency of the entire educational process.

In the context of the modern development of FET in Ireland, several leading trends in ensuring its quality are identified. Firstly, the role of the national agency QQI is strengthening, which coordinates the external evaluation of FET quality, the accreditation of educational programs and FET institutions, as well as the development of the qualifications framework. Such a centralized management system for quality assurance allows for the maintenance of a standardized approach to FET content, regardless of the region or type of institution (Quality and Qualifications Ireland, 2022; Education and Training Monitor: Ireland, 2024). Strengthening the role of QQI in ensuring the quality of FET and its compliance with European standards allows Ireland to maintain its competitiveness in the global educational space and provide students with high-quality qualifications recognized by employers. Secondly, the focus is shifting to learning outcomes and professional competencies, and not just on the teaching process. Programs are evaluated based on the criterion of achieving specific results that meet the requirements of the labor market. This orients FET towards the development of skills demanded in the modern economy and integrates the concept of a results-oriented approach to quality assurance. Thirdly, the institutionalization of partnership with stakeholders, implemented through the activities of regional skills fora, allows for the adaptation of educational programs to the specific needs of the local labor market, taking into account changes in the demand for qualifications and ensuring the relevance of FET content to the labor market. This approach contributes to increasing the employment rate of graduates and trust in the FET system (Department of Further and Higher Education, Research, Innovation and Science, 2019). This trend is extremely promising. It allows for the creation of a flexible and adaptive FET system, increases the competitiveness of the workforce, and contributes to the sustainable economic development of the country. Fourthly, the digitalization of FET quality assurance processes, particularly in the context of implementing the "Future of Further Education and Training: Transforming Learning (2020–2024)" strategy, is based on increasing investment in digital infrastructure, electronic assessment, and online monitoring of learning outcomes, which ensures the transparency and accuracy of data collection on the effectiveness of educational programs (SOLAS, 2020). Thus, the FET quality assurance system in Ireland is oriented towards the unification of requirements, the flexibility of educational programs, social partnership, and digital tools. It functions within the framework of integration into the European Qualifications Area, adhering to the requirements of ESG and EQAVET, which ensures mutual recognition and mobility within the EU (European Commission, 2019).

Based on the results of studying the experience of ensuring FET quality in Ireland and the peculiarities of the functioning of Quality and Qualifications Ireland (QQI), it is advisable for Ukraine to implement: an integrated model of quality management for vocational education. The central element of such a system should be a National Agency for the Quality of Vocational Education, responsible for developing and implementing quality standards, accrediting educational programs and vocational education institutions, professional expertise, and acting in accordance with European requirements. At the strategic level, an organization should be envisaged that defines policy and allocates resources, and at the executive level – a network of regional vocational education providers responsible for providing quality educational services; a results-oriented approach to the professional training of specialists, according to which attention is focused not on the teaching process, but on the achieved learning outcomes of vocational education seekers. The standard of vocational education should define specific learning outcomes in terms of knowledge, skills, and attitudes that meet the needs of the labor market. Educational programs should be aimed at forming and developing competencies demanded by the modern economy, including critical thinking, digital literacy, entrepreneurship, and the ability to learn throughout life. Such a transformation requires updating assessment methods, which should include project activities, portfolios, case studies, and

simulations; the institutionalization of partnership between vocational education institutions and stakeholders to increase the relevance of vocational education to labor market requirements. Similar to the Irish regional skills fora, it is advisable to create regional digital platforms in Ukraine that would unite employers, educators, representatives of authorities, and civil society to ensure the quality of vocational education. Such platforms would enable a link between the regional vocational education system and the labor market, particularly based on joint forecasting of demand for professional qualifications, adaptation of educational and training programs, and organization of internships and mentoring programs. The participation of business in the development and evaluation of educational programs will contribute to increasing trust in the vocational education system and the quality of specialist training; digital tools for monitoring and evaluating the quality of vocational education as a basis for building transparent and secure systems of internal and external quality assurance, creating a single digital platform for data collection, monitoring, self-assessment, and accreditation. The introduction of electronic portfolios for vocational education seekers, electronic assessment systems, and analytical dashboards will allow for the objective tracking of progress and the effectiveness of learning for vocational education seekers. Such digital tools should be integrated with state and industry databases to obtain more complete information about the results of educational activities. It is also necessary to ensure the digital literacy of pedagogical workers in the vocational education system and support for IT infrastructure. The development of digital tools will contribute to ensuring the quality of vocational education even in conditions of blended learning. This will open up new opportunities for personalized learning as well. No less important is the alignment of the National Qualifications Framework with the European one to ensure transparency, mobility, and recognition of Ukrainian qualifications in EU countries. It is advisable to introduce micro-credentials as a mechanism for rapid response to changes in technology and the economy, which allows for the confirmation of individual competencies and the integration of the results of non-formal and informal learning. A harmonized qualifications framework should have clearly defined level descriptors, award procedures, and updating mechanisms. To ensure the sustainable quality of vocational education, it is necessary to provide for the continuous professional development of pedagogical workers. Professional development programs should cover topics of digital transformation, a results-oriented approach, assessment methodology, and the implementation of innovations. It is worth promoting the academic mobility of teachers, their participation in international projects, internships, and exchanges. This will allow the pedagogical community to take an active part in shaping a culture of quality in vocational education and disseminating best practices through national cooperation platforms.

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ТЕНДЕНЦІЇ ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ПІСЛЯСЕРЕДНЬОЇ ОСВІТИ І ПРОФЕСІЙНОЇ ПІДГОТОВКИ В ІРЛАНДІЇ: ВІД ЗАКОНОДАВЧИХ РЕФОРМ ДО СТРАТЕГІЧНИХ ПРІОРИТЕТІВ

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Актуальність статті полягає в необхідності системного аналізу еволюції багаторівневої структури післясередньої освіти і професійної підготовки (далі – ПОП) в Ірландії та провідних тенденцій забезпечення її якості. Ця система є складною, оскільки поєднує централізоване стратегічне планування та фінансування із незалежним зовнішнім контролем якості освіти й дотримання стандартів та децентралізованим наданням освітніх послуг. Така архітектура, що сформувалася внаслідок масштабних реформ 2012-2013 рр., представляє значний інтерес для дослідників і розробників освітньої політики в Україні.

Метою статті є визначення та характеристика провідних тенденцій забезпечення якості ПОП в Ірландії, з'ясування можливостей їх урахування у вдосконаленні системи забезпечення якості професійної освіти в Україні.

Методи: вивчення законодавчих, нормативно-правових документів, емпіричних даних – для визначення провідних тенденцій забезпечення якості ПОП в Ірландії; аналіз і синтез, узагальнення поглядів щодо досліджуваної проблеми – для з'ясування можливостей урахування означених тенденцій у вдосконаленні системи забезпечення якості професійної освіти в Україні.

Результати: визначено та схарактеризовано провідні тенденції забезпечення якості ПОП в Ірландії (інституціоналізація партнерства закладів ПОП зі стейкхолдерами, посилення ролі Національного агентства якості та кваліфікацій у зовнішньому оцінюванні якості ПОП, орієнтація на результати навчання та професійні компетентності, цифровізація процесів управління якістю ПОП); сформульовано низку рекомендацій для вдосконалення української системи забезпечення якості професійної освіти.

Висновки. Законодавчі реформи у системі ПОП започаткували стратегічну перебудову її архітектури та вдосконалення якості. Створення інституцій для централізованої координації забезпечення якості ПОП й упровадження Національної рамки кваліфікацій дало змогу сформувати єдину систему визнання кваліфікацій, моніторингу та акредитації освітніх програм і закладів ПОП. Завдяки цьому Ірландія залишається конкурентоспроможною в глобальному освітньому та професійному середовищі, а випускники закладів ПОП отримують можливості для кар'єрного зростання та міжнародної мобільності. Досвід Ірландії є актуальним для запровадження в Україні: інтегрованої моделі управління якістю професійної освіти, результатоорієнтованого підходу до професійної підготовки фахівців; інституціоналізації партнерства закладів професійної освіти зі стейкхолдерами; цифрових інструментів моніторингу та оцінювання якості професійної освіти тощо.

Ключові слова: *післясередня освіта; професійна підготовка; Ірландія; провідні тенденції; система управління якістю; SOLAS; Quality and Qualifications Ireland; ETBs.*

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PEDAGOGICAL CONDITIONS FOR THE DEVELOPMENT OF ENERGY-EFFICIENT COMPETENCE IN FUTURE CONSTRUCTION INDUSTRY PROFESSIONALS

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Abstract

Relevance The urgency of developing energy-efficient competence in construction specialists at the current stage is determined by several factors: economic – the implementation of investments in infrastructure reconstruction requires significant financial resources, but increasing energy efficiency will lead to reduced energy consumption in the future; environmental – reducing energy consumption contributes to a decrease in carbon dioxide emissions through the transition to renewable energy sources and other low-carbon technologies.

Objective: To determine the pedagogical conditions for the development of energy-efficient competence in future construction industry professionals.

Methods: Theoretical analysis of pedagogical literature and educational-methodological documentation regarding the formation of energy-efficient competence in construction industry specialists; surveying pedagogical staff and methodologists of vocational education institutions – to determine the list of pedagogical conditions for the development of the studied phenomenon; expert evaluation – to select the most significant pedagogical conditions for the formation of energy-efficient competence in future construction industry professionals.

Results: Through the analysis of theoretical sources, educational and methodological literature, legislative acts, and surveys of teachers, masters, and industrial training instructors, a list of pedagogical conditions for the development of energy-efficient competence in future construction industry professionals was identified; to optimize the identified factors influencing the development of the studied phenomenon, their ranking and expert evaluation were conducted.

Conclusions: According to experts, the main pedagogical conditions influencing the development of energy-efficient competence in future construction industry professionals are: "Availability of teachers who possess energy-efficient competence and improvement of their qualifications in the field of energy-efficient technologies," "Use of active learning methods (project-based learning, case methods, etc.) for the formation of energy-efficient competence," "Creation of an appropriate educational creative environment that will influence the formation of energy-efficient competence in students."

Keywords: *vocational education, energy-efficient competence, active learning methods, pedagogical conditions, energy literacy.*

Introduction. To achieve carbon neutrality in the energy sector and ensure the country's energy security, with the aim of economic development and reducing dependence on external energy sources by 2050, Ukraine has introduced a new Energy Strategy (Energy Hub of Europe: Ukraine approved its energy strategy..., 2025). It reflects the goals of the European Green Deal and is based on the provisions of a comprehensive approach to the formation and implementation of effective energy policy and the

creation of a foundation for the development of renewable energy and energy-efficient modernization of existing infrastructure in the Ukrainian economy. This Strategy, for example, takes into account: the consequences of the Russian Federation's war against Ukraine, i.e., a significant increase in the importance of the country's energy security and strengthening the resilience of our energy system; the integration of Ukraine's energy system into the pan-European one; the introduction of the latest technologies and innovations into the country's energy system; the fulfillment of Ukraine's international obligations regarding the use of renewable energy and carbon neutrality policy; decentralization of electricity generation to ensure energy independence (Energy Hub, 2023).

The urgency of the problem of developing energy-efficient competence in construction specialists at the current stage is determined by several factors: economic – the implementation of investments in infrastructure reconstruction requires significant financial resources, but increasing energy efficiency will lead to reduced energy consumption in the future; environmental – reducing energy consumption contributes to a decrease in carbon dioxide emissions through the transition to renewable energy sources and other low-carbon technologies.

The military actions of the Russian Federation against Ukraine have led to the disruption of natural ecosystems: destruction of housing, industrial, municipal, and energy facilities. Aggressors regularly attack Ukraine's energy facilities, and as of August 2024, as stated in a study by Top Lead company with partners, the losses of power system capacities due to the full-scale war amounted to 54%. Post-war reconstruction of Ukraine must be "green," i.e., environmentally friendly, considering its impact on the environment and the social well-being of the population, and offer a unique opportunity to diversify existing energy sources towards the use of renewable energy and strengthen the country's energy security (Russo-Ukrainian ..., 2024).

Sources. The solution to the post-war "green" reconstruction of the country is to train a competitive construction industry specialist with established energy-efficient competence. Considering this and the international practice of implementing the European Union Development Strategy, as well as in accordance with Ukraine's approved Energy Strategy until 2050, the environmental education of future construction industry professionals should be a continuous interdisciplinary process of forming ecological competence in students of this industry in solving key environmental problems by reducing energy consumption during their practical activities, which will contribute to environmental protection.

Energy literacy is an understanding of how energy is produced, transported, stored, distributed, and used; awareness of its impact on the environment and social well-being; and knowledge of its efficient use. Researchers O.S. Santillán and K.G. Cedano (2023) analyzed 138 scientific papers on the development of energy literacy, the application of educational methods, and tools for its improvement. We used a number of ideas developed by modern scientists, particularly regarding: the development of energy literacy among high school students in Vietnam and the identification of factors influencing their energy-saving behavior (Lee, Nguyen, & Sung, 2022); the existence of four types of household energy literacy (appliance energy literacy, action energy literacy, financial energy literacy, multifaceted energy literacy) (Van den Broek, 2019); key factors for successful energy transition (strong policy frameworks, technological progress, economic incentives, international cooperation) (Awolesi, Salter, & Reams, 2024); the formation of energy-efficient competence among graduates of domestic vocational education institutions (Glushchenko, 2017; Kulalaieva, 2018, Kupriievych, 2025); the formation of energy-saving competence in students of general secondary education institutions (Tsapenko, 2019). In 2025, the Ministry of Education and Science of Ukraine introduced the "Energy Efficiency Lessons" project, aimed at forming students' skills in smart use of energy resources (MES integrates energy efficiency topic..., 2025).

Article objective: To determine the pedagogical conditions for the formation of energy-efficient competence in future construction industry professionals. In accordance with the objective, the following tasks were defined: to identify a list of pedagogical conditions and experimentally determine the most significant among them for the

development of energy-efficient competence in future construction industry professionals.

Research Methods: Theoretical analysis of pedagogical literature and educational-methodological documentation regarding the formation of energy-efficient competence in construction industry specialists; surveying pedagogical staff and methodologists of vocational education institutions – to determine the list of pedagogical conditions for the development of the studied phenomenon; expert evaluation – to select the most significant pedagogical conditions for the formation of energy-efficient competence in future construction industry professionals.

Results and Discussion. Let's start with the definition of "pedagogical conditions." The Explanatory Dictionary of the Ukrainian Language, edited by D. Hrynchyshyn (1999, p. 278), interprets the term "condition" as: a necessary, obligatory circumstance, a prerequisite that determines or causes the existence or realization of something; the situation in which something takes place, the circumstances under which something is carried out; an agreement or understanding between two or more persons about something; requirements, obligations, or proposals put forward in a contract with respect to the contracting parties. The Philosophical Encyclopedic Dictionary defines the concept of "condition" as a philosophical category "in which the universal relations of a thing to the factors by which it arises and exists are reflected" (Shynkaruk, 2002, p. 482). The concept of "condition" is also identified with necessary circumstances or factors that ensure the achievement of a certain goal; features of real reality to ensure the possibility or optimal circumstances for the purpose of implementing changes. The Great Explanatory Dictionary of the Modern Ukrainian Language further specifies the concept of "condition" as "a necessary circumstance that makes possible the realization, creation, or formation of something or contributes to something" (Busel, 2009, p. 1506), as "a factor, a driving force of any process or phenomenon; an agent" (Busel, 2009, p. 1506).

A. Semenova's (2006, p. 193) dictionary-handbook on professional pedagogy interprets the lexeme "pedagogical conditions" as "circumstances under which the integral productive pedagogical process of professional training of specialists depends and takes place, mediated by the activity of an individual or a group of people." Ye. Khrykov (2011, p. 13), analyzing pedagogical conditions within the structure of scientific knowledge, argues that these are "circumstances that determine a certain direction of development of the pedagogical process. One can also agree with the opinion that pedagogical conditions are a set of objective possibilities of content, forms, methods, techniques, and means of pedagogical activity." It should be noted that factors "exist objectively, independently of activity," while pedagogical conditions "are created by educators" (Khrykov, 2017, p. 60). However, the assertion that objective possibilities of the material-spatial environment can be considered pedagogical conditions requires more detailed analysis.

Indeed, the educational space, its resourcefulness, technical equipment, and architectural features can influence the learning process, creating certain prerequisites for its organization. In accordance with the Energy Strategy of Ukraine for the period up to 2050, in educational institutions of the construction industry, the pedagogical conditions for the formation of energy-efficient competence must meet the following requirements:

– pedagogical conditions are an integral element of a holistic eco-oriented pedagogical process of forming energy-efficient competence in future construction industry professionals; – pedagogical conditions reflect the totality of opportunities of the modern educational and material-spatial environment of a construction educational institution that can positively or negatively affect the formation of energy-efficient competence in future professionals;

– the structure of pedagogical conditions includes both internal elements (ensuring influence on the development of the personal ecological sphere of subjects of the educational process in a construction educational institution) and external ones (contributing to the formation of the procedural eco-oriented component of the system);

– the implementation of correctly chosen pedagogical conditions ensures the formation and development of energy-efficient competence in future construction industry professionals.

Thus, by pedagogical conditions, we understand an interconnected set of objective possibilities, content, forms, methods, and pedagogical techniques aimed at achieving the goals and objectives set in the study.

In the first stage, through the analysis of pedagogical, scientific, and methodological literature, legislative acts, and surveys of lecturers, vocational training teachers, educators, practical training masters, and vocational education instructors, a list of pedagogical conditions for the development of the studied characteristic of construction industry specialists was determined. In the next stage, from the compiled list of pedagogical conditions, experts (researchers from the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine, lecturers, vocational training teachers) specified those that, firstly, contained scientific novelty, and secondly, were circumstances that increase the likelihood of effective formation of all components of energy-efficient competence in future construction workers.

Based on the results of the first stage regarding the determination of pedagogical conditions for the formation of energy-efficient competence, the following list was compiled:

1. Formation of stable motivation in future construction industry students for the judicious use of energy resources.

2. Updating the content of professional training for construction industry students to include modern energy-efficient technologies.

3. Integration of energy efficiency into professional disciplines of construction industry institutions.

4. Use of active learning methods (project-based learning, case methods, etc.) for the formation of energy-efficient competence.

5. Formation of practical skills through laboratory work and training sessions; development of ecological awareness and responsibility in future construction workers.

6. Availability of teachers who possess energy-efficient competence and improvement of their qualifications in the field of energy-efficient technologies.

7. Creation of an appropriate educational creative environment that will influence the formation of energy-efficient competence in students.

8. Interaction of construction vocational education institutions with scientific institutions, educational and methodological centers, and other educational institutions regarding joint projects, grants, organization of competitions, Olympiads, webinars, trainings, and conferences on energy efficiency.

9. Establishment, generalization, implementation, and dissemination of innovative pedagogical experience regarding the formation of energy-efficient competence in future construction industry professionals.

10. In construction vocational education institutions, the priority should be the application of modern eco-oriented pedagogical technologies with equal access for all participants in the educational process to electronic resources used to facilitate the educational process.

The specified list of pedagogical conditions includes circumstances that increase the likelihood of effective formation of all components of energy-efficient competence in future construction workers. However, the list also contains pedagogical conditions that give efficacy to the same factors, and also significantly influence the development of individual components of energy-efficient competence.

In the second stage, to optimize the identified factors influencing the formation and development of energy-efficient competence in future construction workers, their expert evaluation was conducted. The expert group (7 people) consisted of specialists with experience in forming energy-efficient competence in future construction workers, specifically: research fellows from the Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine, lecturers, and methodologists from vocational education institutions (three doctors of pedagogical sciences, three candidates of pedagogical sciences, and one doctor of philosophy). Based on the results of the first stage, an expert list with a list of ten pedagogical conditions for the formation of energy-efficient competence in future construction industry professionals and detailed instructions for its completion for the purpose of expertise was compiled. The study applied a method of expert

evaluation of the quality and effectiveness of pedagogical conditions, namely ranking – arranging these conditions, identified in the first stage, by their degree of importance. Each expert assigned a natural number – a rank (ordinal number determining the place of each factor in the overall set of factors) – to each of the aforementioned conditions. A pedagogical condition that, in the expert's opinion, most positively influences the development of energy-efficient competence in future construction industry professionals, is assigned rank 1, a less significant one – 2, an even less important one – 3, and so on. If, in the expert's opinion, the pedagogical conditions are identical in their impact on the formation and development of energy-efficient competence, they should be assigned the same numerical values (Table 1).

Based on the results of the ranking, a matrix was created to determine the position of each pedagogical condition within the overall structure of the studied factors. To verify the correctness of the matrix creation, the control sum of all rows was analyzed, and the fulfillment of the condition was checked using Formula 1:

$$\sum_{j=1}^{n} x_{ij} = \frac{(1+n)n}{2}$$

where *n* - is the number of pedagogical conditions; *xij* - is the rank of the j-th factor for the i-th respondent.

Thus, the sum of numbers in all rows (52.5+53+50+16+35.5+14+19+37+59+49) equals the control sum (55 x 7 = 385), which allows for the correct analysis of data from the properly filled matrix.

Table 1

Matrix of Expert Evaluation Results for the Significance of Pedagogical Conditions for the Formation of Energy-Efficient Competence in Future Construction Industry Professionals

Expert №	Pedagogical Conditions *(№)										$\sum_{j=1}^{n}\sum_{i=1}^{m} x_{ij}$
	1	2	3	4	5	6	7	8	9	10	
I	8	10	9	1	6	2	3	4	7	5	55
II	9	7	5	2	4	3	6	1	8	10	55
III	5,5	8	7	3	9	1	2	5,5	10	4	55
IV	5	7	6	2	4	1	3	10	8	9	55
V	10	8	5	1	3	4	2	9	7	6	55
VI	8	7	10	4	5	1	2	3	9	6	55
VII	7	6	8	3	4	2	1	5	10	9	55
$\sum_{j=1}^{n}\sum_{i=1}^{m} x_{ij}$	52,5	53	50	16	35	14	19	37,5	59	49	385
Sum	8	8	7	2	4	1	3	5	10	6	

The first position in the rank matrix, with the lowest score (14), was taken by the pedagogical condition "Availability of teachers who possess energy-efficient competence and improvement of their qualifications in the field of energy-efficient technologies."

The second most significant condition influencing the development of energy-efficient competence, according to experts, is "Use of active learning methods (project-based learning, case methods, etc.) for the formation of energy-efficient competence."

The third position in terms of points (19) was taken by the pedagogical condition "Creation of an appropriate educational creative environment that will influence the formation of energy-efficient competence in students." This means a comfortable and creative pedagogical educational environment in construction educational institutions, where relations between the teacher and the student are primarily built on pedagogical interaction, cooperation, and co-creation, and on students' awareness and understanding of eco-oriented learning material, structured through active learning methods and a transition from subject-based

learning to personally-oriented ecological education for future construction industry professionals.

Unfortunately, despite the importance of forming energy-efficient competence in future construction industry professionals for solving the problem of post-war "green" reconstruction of the country, this problem has not been sufficiently addressed in scientific research, dissertations, or scientific articles.

For example, in her research, M. Tsapenko (2019, p. 128) believes that to form energy-saving competence in general secondary education students during physics lessons, the following conditions should be considered: ensuring the formation of energy-saving competence in accordance with the tasks and goals of the educational field; implementing the cross-cutting content line "Environmental Safety and Sustainable Development"; creating a model in accordance with didactic theory. In her dissertation research, O. Hlushchenko (2017, pp. 80-81) selected pedagogical conditions that influence the formation of energy-efficient competence in future skilled workers in the machine-building industry, specifically: forming stable motivation in students for rational use of energy resources; updating the content of vocational training to include modern energy-efficient technologies in the machine-building industry; using project-based learning methods in the educational process, focused on forming practical skills and abilities in future skilled workers regarding effective energy use.

The researcher N. Kulalaieva (2018) states that the pedagogical conditions for the development of energy-efficient competence in students of vocational (vocational-technical) education institutions in the construction industry are: the availability of teachers who possess energy-efficient competence; specially designed content of educational material; creation of an appropriate educational environment that will influence the formation of energy-saving behavior in students. According to V. Kupriievych (2025, p. 257), the pedagogical conditions for the formation of energy-efficient competence in future construction industry professionals are: integration of energy efficiency into professional disciplines (construction, electrical engineering, mechanical engineering, etc.); use of active learning methods (project-based learning, case methods, STEM approaches); formation of practical skills through laboratory work and training, development of ecological awareness and responsibility in future workers; professional development of teachers in the field of energy-efficient technologies.

Conclusions. As a result of the conducted research, the main pedagogical conditions capable of effectively influencing the development of energy-efficient competence in future construction industry professionals were identified, namely: "Availability of teachers who possess energy-efficient competence and improvement of their qualifications in the field of energy-efficient technologies"; "Use of active learning methods (project-based learning, case methods, etc.) for the formation of energy-efficient competence"; "Creation of an appropriate educational creative environment that will influence the formation of energy-efficient competence in students." Further research will be aimed at designing a model for the development of energy-efficient competence in future construction industry professionals and experimentally verifying the effectiveness of the identified pedagogical conditions.

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ПЕДАГОГІЧНІ УМОВИ РОЗВИТКУ ЕНЕРГОЕФЕКТИВНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ФАХІВЦІВ БУДІВЕЛЬНОЇ ГАЛУЗІ

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Реферат:

Актуальність проблеми формування та розвитку енергоефективної компетентності спеціалістів у будівельній галузі на сучасному етапі обумовлена такими чинниками: економічний – впровадження інвестицій в відбудову інфраструктури потребує значних фінансових ресурсів, проте підвищення енергоефективності призведе до зниження енерговитрат в майбутньому; екологічний – скорочення енергоспоживання сприяє зменшенню викидів вуглекислого газу через перехід на відновлювані джерела енергії та інші низьковуглецеві технології.

Мета: визначити педагогічні умови розвитку енергоефективної компетентності майбутніх фахівців будівельної галузі.

Методи: теоретичний аналіз педагогічної літератури і навчально-методичної документації щодо формування енергоефективної компетентності фахівців будівельної галузі; опитування педагогічних працівників, методистів закладів професійної освіти – для визначення переліку педагогічних умов розвитку досліджуваного феномена; експертне оцінювання – для вибору найбільш значущих педагогічних умов формування енергоефективної компетентності майбутніх фахівців будівельної галузі.

*Результати: з*асобами аналізу теоретичних джерел і навчально-методичної літератури, законодавчих актів, опитування педагогів, майстрів та інструкторів виробничого навчання визначено перелік педагогічних умов розвитку енергоефективної компетентності майбутніх фахівців будівельної галузі; задля оптимізації

визначених факторів, що впливають на розвиток досліджуваного феномена, було проведено їх ранжування й експертне оцінювання.

Висновки: основними педагогічними умовами, що впливають на розвиток енергоефективної компетентності майбутніх фахівців будівельної галузі, на думку експертів визнано: «Наявність викладачів, які володіють енергоефективною компетентністю та підвищення їх кваліфікації у сфері енергоефективних технологій», «Використання активних методів навчання (проєктне навчання, кейс-методи тощо) для формування енергоефективної компетентності», «Створення відповідного освітнього креативного середовища, що впливатиме на формування в учнів енергоефективної компетентності».

Ключові слова: *професійна освіта, енергоефективна компетентність, активні методи навчання, педагогічні умови, енергетична грамотність.*

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UTILIZING INNOVATIVE ENERGY-EFFICIENT TECHNOLOGIES IN THE PROFESSIONAL TRAINING OF FUTURE CONSTRUCTION INDUSTRY SPECIALISTS

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Abstract

The relevance: of developing and implementing energy-efficient technologies in the modern construction industry is driven by Russia's ongoing energy-intensive war against Ukraine, which necessitates the formation of energy-saving behavior among all citizens and specialists and the implementation of energy-efficient technologies in all energy-consuming sectors of the domestic economy, one of which is construction.

Aim: To substantiate the importance of using modern building materials and innovative energy-efficient technologies in the professional training of vocational (vocational-technical) education students in the construction field to enhance energy efficiency, energy saving, and rational use of thermal energy in the modern construction industry of Ukraine.

Methods: Analysis of scientific sources, regulatory legal documents, and empirical data – to prove the importance of using modern building materials and innovative energy-efficient technologies in the professional training of vocational (vocational-technical) education students in the construction field; theoretical analysis, synthesis, and generalization – to form conclusions regarding the peculiarities of applying modern building materials and energy-efficient technologies in the educational process of vocational (vocational-technical) education institutions in the construction field.

Results: The main energy-economic indicators of Ukraine were identified and compared with those of other countries, revealing them to be negative (electricity consumption in Ukraine is 60%, while in France it is 40%, and in Great Britain – 35.8%); it was substantiated that the professional training of construction specialists requires familiarizing students with the problems and principles of sustainable development in construction (minimizing energy and material resource consumption during the construction and operation of building structures, reducing the negative impact of construction on the environment; comprehensive analysis of energy, environmental, economic, and socio-social issues of building construction, etc.).

Conclusions: It has been substantiated that to ensure the rational use of material and energy resources, increase energy saving in Ukraine's housing and communal sector, and strengthen its energy independence, it is necessary to include in the content of professional training for future construction industry specialists familiarization with innovative energy-saving technologies in construction (design of energy-efficient buildings, energy performance certificates for buildings, thermal modernization of the housing stock, use of modern thermal insulation materials, installation of energy-saving windows, application of energy-saving engineering technologies and heating systems), environmental characteristics of energy-saving technologies, principles of energy-saving measures, etc.

Keywords: *vocational education, vocational education institutions in the construction field, energy-saving technologies, energy-efficient competence, construction industry, sustainable development in construction, interactive learning, educational process, qualified worker, energy-efficient competence.*

Introduction. The construction industry in Ukraine is a significant consumer of energy resources. This sector consumes up to 50% of natural resources and over 40% of energy. Substantial energy expenditures are required not only for the construction of buildings but also for their subsequent operation. Old buildings currently demand excessive energy, making their operation a burden on Ukraine's modern fuel and energy complex. The construction of new facilities that do not meet energy-saving requirements further exacerbates the problem. To ensure the rational use of energy resources and enhance the energy efficiency of Ukraine's housing and communal sector, it is necessary to modernize the existing housing stock.

The main principles of sustainable development in construction involve minimizing energy and material resource consumption during the erection and subsequent operation of building structures, and reducing their negative impact on the environment. Familiarizing future construction specialists with these principles is currently a priority research direction in vocational pedagogy.

Therefore, the main criterion for a sustainable development strategy is innovation in the energy sector, increased energy efficiency in the domestic production sector, and enhanced efficiency of renewable energy sources. This underscores the relevance of incorporating energy-saving technologies into the professional training of future construction specialists, which is vital for strengthening Ukraine's energy independence and boosting the energy efficiency of its domestic construction industry.

Research Sources. The theoretical basis of this study comprises scientific and practical works by Ukrainian researchers on fostering an understanding of the importance of energy saving and developing energy-efficient competence in students. Among the ideas utilized in preparing this article, the following are noteworthy: the philosophy of a healthy environment (V. Barhiiuk), ecological and economic aspects of energy saving in construction (M. Sanytskyi, O. Pozniak, O. Mazurak, Yu. Fedun), modern aspects of reconstruction and reinforcement of buildings and structures (Z. Blikharskyi, V. Saviovskyi); and the energy performance certificate of a building (V. Hershkovych). An analysis was also conducted of textbooks actively used in the modern educational process to train future specialists for energy-efficient professional activities, including: energy-saving technologies in construction (M. Sanytskyi, O. Pozniak, U. Marushchak), fundamentals of technical operation of buildings and engineering systems (A. Havryliak), and others. The conducted analysis suggests the need to intensify scientific and pedagogical attention to the formation and development of energy-efficient competence among future specialists to accelerate the pace of Ukraine's reconstruction, strengthen its energy independence, and promote sustainable development.

Aim of the Article. The aim of this article is to substantiate the importance of using modern building materials and innovative energy-efficient technologies in the professional training of vocational (vocational-technical) education students in the construction field to enhance energy efficiency, energy saving, and rational use of thermal energy in the modern construction industry of Ukraine.

Research Methods. The research methods include: analysis of scientific sources, regulatory legal documents, and empirical data – to prove the importance of using modern building materials and innovative energy-efficient technologies in the professional training of vocational (vocational-technical) education students in the construction field; theoretical analysis, synthesis, and generalization – to form conclusions regarding the peculiarities of applying modern building materials and energy-efficient technologies in the educational process of vocational (vocational-technical) education institutions in the construction field.

Results and Discussion. The primary objective of the energy policy of the European Union and Ukraine is to fulfill the obligations under the Kyoto Protocol. The excessive consumption of various types of energy (electricity, heating, water supply, gas supply, etc.) raises the most concern in both Ukraine and the European Union. To address this issue, it is proposed to construct buildings with low energy demands, partially utilizing renewable energy sources. Through effective changes in construction technologies, buildings can be constructed and renovated in accordance with economic, energy-saving, and ecological

requirements. By employing modern techniques and technologies in construction, heat loss can be reduced by 2-5 times, providing enormous energy-saving reserves.

To solve these problems, modern building materials, highly efficient technologies, and high-quality training of engineering and skilled workers are essential. The training of qualified workers for the construction industry with modern high-tech knowledge and skills is critically important, as these young, skilled workers can implement and realize ecological approaches in the construction industry. The integration of energy-saving technologies into the educational process helps in preparing qualified workers and junior professional bachelors who can effectively apply modern energy-efficient technologies amidst growing demands for energy efficiency, energy saving, and environmental safety in the construction sector.

Considering that Ukraine is in a state of prolonged destructive war, the training of qualified workers and junior professional bachelors, taking into account modern energy efficiency requirements, acquires strategic importance. The training of qualified workers and junior professional bachelors in vocational (vocational-technical) education institutions is carried out according to developed and approved standards, educational and educational-professional programs, the content of which is based on competency-based approaches. During the learning process, students develop a complex of key and professional competencies. Professional competencies are the ability of a qualified worker or junior professional bachelor, within their powers, to apply specially acquired knowledge, skills, and abilities, to demonstrate appropriate moral and business qualities for the proper performance of necessary tasks and duties, learning, and professional and personal development.

Every professional standard, educational, and educational-professional program includes ecological and energy-efficient competencies, which comprise the acquisition of knowledge on: the fundamentals of energy efficiency; regulatory and legal acts in the field of energy saving and ecology; the application and energy-efficient use of building materials and energy-saving equipment; methods of energy saving in enterprises; rules for waste sorting; waste utilization, reproduction and preservation of natural resources; methods of environmental preservation and protection in professional activity and in everyday life.

Thus, ecological and energy-efficient competencies are closely interconnected and are important outcomes of modern professional training for youth. The development of educational programs that incorporate energy-saving technologies contributes to the high-quality professional training of skilled workers and junior professional bachelors for the construction industry, fostering a responsible attitude towards natural resources and their rational use without environmental pollution.

It is crucial to convey to future specialists that knowledge of energy-saving technologies and their application in professional activities forms the basis for implementing sustainable development principles in construction. The main directions and technologies, whose knowledge is of primary importance in the professional training of future specialists in the construction sector, include: designing energy-efficient buildings, energy performance certificates for buildings, thermal modernization of the housing stock, the use of modern thermal insulation materials, the installation of energy-saving windows, the application of energy-saving engineering technologies and heating systems, etc. (Haiduk, Herliand, Kulalaieva, Pivtoratska, & Piatnychuk, 2021, pp. 5-7).

Of particular importance for overcoming the economic crisis caused by the war is a more complete utilization of the experience of EU countries regarding sustainable construction. In the EU, energy-saving technologies and energy efficiency are key priorities, enshrined in the EU Energy Strategy until 2030. Its main goals include reducing greenhouse gas emissions, increasing the share of renewable energy, and enhancing energy efficiency. Educational programs for future specialists in Ukraine's construction sector should include familiarization with the strategic directions of energy saving and energy efficiency in the EU, planned for implementation by 2030. These include: a 40% reduction in greenhouse gas emissions (compared to 1990); a 27% increase in the share of renewable energy; a 27% increase in energy efficiency; the creation of a common energy market and a 15% increase in interconnectivity between EU

countries; and the development of infrastructure projects in the energy sector (Sanytskyi, Pozniak, & Marushchak, 2013, p. 9). Furthermore, energy-saving technologies used in the construction sector of EU countries deserve attention, such as: improving building thermal insulation (to reduce heat loss through walls, roofs, windows, and doors); installing energy-efficient equipment (using energy-efficient heating systems, lighting, household appliances); increasing the rational use of energy (economical use of light, water, heating, and other energy resources); utilizing renewable energy sources (installing solar panels, heat pumps, etc.); energy management (implementing energy consumption monitoring systems, developing energy budgets, and planning energy-saving measures); and energy auditing (assessing the energy efficiency of buildings and enterprises, identifying opportunities for energy saving).

To effectively introduce students to modern energy-saving technologies and develop the energy-efficient competence of future construction specialists, it is necessary to apply a number of scientific and pedagogical approaches in their training process.

Considering that energy efficiency is a complex and multifaceted phenomenon (S. Honcharenko, I. Ziaziun, P. Luzan), its study and implementation require the application of a systemic approach, which involves, for example, viewing a building structure as a single system where all elements are interconnected and influence each other. In the process of forming energy-efficient competence in future qualified workers and junior professional bachelors for the construction industry from the perspective of a systemic approach, it is necessary to: analyze the interconnections between different aspects of energy efficiency, its impact on ventilation systems, external and internal thermal insulation, heating systems, and electricity supply; optimize the building's energy system as a whole, i.e., adopt comprehensive solutions that ensure maximum energy efficiency of the entire building; clarify the building's construction year, and account for energy costs at all stages of the building's life cycle, from the production of building materials to waste disposal.

It is also important to apply the subject-activity approach (N. Aristova, O. Dubaseniuk), which focuses on individualizing the process of forming energy-efficient competence in future qualified workers. It contributes to the personal development of students as active participants in learning, creating conditions for the maximum realization of their creative abilities through practical activity. According to the principle of unity, consciousness, and activity, it is active activity that shapes consciousness, which in turn determines the subsequent actions of the individual. Research by Ukrainian scientists (T. Herliand, N. Kulalaieva, T. Piatnychuk) convincingly demonstrates that the application of the subject-activity approach in the educational process of vocational education institutions opens up wide opportunities for the professional growth of students. Such an approach, by placing students at the center of the educational process, stimulates them to active participation, independence, and creativity.

Given the aforementioned problem, it is also necessary to consider the requirements of the technological approach (T. Ilyina, O. Piekhota), which forms the energy-efficient competencies of future qualified workers in the construction field and appears as a structured algorithm of logical actions within the educational process with a clearly defined final result. Pedagogical activity aimed at forming energy-efficient competence is considered as an educational technology – an integrated didactic system that includes principles, methods, pedagogical conditions, and means of controlling expected results. Therefore, the technological approach to learning involves designing and planning the educational process to guarantee the achievement of didactic goals.

We have also taken into account the requirements of the prognostic approach (T. Herliand, M. Koliada), which suggests that the formation of energy-efficient competence in qualified workers and junior professional bachelors in the construction industry should be oriented towards adaptation to future changes in production and technological processes. To this end, it is necessary to promptly use information about scientific and technical innovations, based on which vocational (vocational-technical) education institutions adapt their material and technical base, educational content, curricula, educational and

educational-professional programs to ensure quality training and professional development of pedagogical staff.

It is also important to note that energy efficiency is a field that requires knowledge in various areas, such as construction, energy, ecology, economics, law, and others. The educational process should include such components to ensure that future qualified workers and junior professional bachelors in the construction industry achieve an understanding of: the impact of the construction industry on the environment, assessing environmental consequences, and the rational use of various building materials and technologies; orientation in legislation and regulations in the field of energy saving, knowledge of requirements for energy certification of buildings, energy efficiency standards, and other regulatory documents.

Among the most popular pedagogical technologies that will contribute to ensuring students' deep understanding of modern energy-saving technologies and improving the practical application of energy-saving principles in the construction industry are: information, communication, and personal development technologies, interactive and problem-based learning, the project method, and others. Information technologies play an important role, enabling the use of specialized software for energy modeling of buildings, heating, ventilation, and air conditioning systems. Communication technologies involve organizing interactive seminars and webinars for participants and energy efficiency experts; creating a platform for exchanging experience between students, teachers, and social partners from construction companies; and virtual trainers and simulators for practicing skills in designing and constructing energy-efficient buildings. The use of these technologies allows for the creation of an effective educational environment that fosters high-quality, in-depth knowledge, skills, and motivation in future builders for designing, constructing, and operating energy-efficient buildings.

Conclusion. To ensure the rational use of material and energy resources, enhance energy saving in Ukraine's housing and communal sector, and strengthen its energy independence, it is necessary to include in the content of professional training for future construction industry specialists familiarization with innovative energy-saving technologies in construction (designing energy-efficient buildings, energy performance certificates for buildings, thermal modernization of the housing stock, using modern thermal insulation materials, installing energy-saving windows, applying energy-saving engineering technologies and heating systems), ecological characteristics of energy-saving technologies, principles of energy-saving measures, etc. It is also essential to utilize the experience of EU countries, apply scientifically substantiated domestic pedagogical approaches (systemic, subject-activity, technological), and innovative pedagogical technologies (to familiarize students with modern energy-saving technologies and form energy-efficient competence in future construction specialists). This will enable significant progress in training specialists capable of practically implementing the construction of energy-saving, comfortable buildings with minimal environmental pollution.

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ВИКОРИСТАННЯ У ПРОФЕСІЙНІЙ ПІДГОТОВЦІ МАЙБУТНІХ ФАХІВЦІВ БУДІВЕЛЬНОЇ ГАЛУЗІ ІННОВАЦІЙНИХ ЕНЕРГОЕФЕКТИВНИХ ТЕХНОЛОГІЙ

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Реферат:

Актуальність розроблення і впровадження енергоефективних технологій в сучасній будівельній галузі зумовлюється продовженням енергетично виснажливої війни рф проти України, що потребує формування у всіх громадян і фахівців енергозаощадливої поведінки та впровадження енергоефективних технологій у всі енергозатратні галузі вітчизняної економіки, однією з яких є будівельна.

Мета: обґрунтувати важливість використання сучасних будівельних матеріалів та новітніх енергоефективних технологій у професійній підготовці здобувачів професійної (професійно-технічної) освіти будівельного профілю для посилення енергоефективності, енергозбереження, раціонального використання теплової енергії в сучасній будівельній галузі України.

Методи: аналіз наукових джерел, нормативно-правових документів та емпіричних даних – для доведення важливості використання сучасних будівельних матеріалів і новітніх енергоефективних технологій у професійній підготовці здобувачів професійної (професійно-технічної) освіти будівельного профілю; теоретичний аналіз, синтез та узагальнення – для формування висновків щодо особливостей застосування сучасних будівельних матеріалів та енергоефективних технологій в освітньому процесі закладів професійної (професійно-технічної) освіти будівельного профілю.

Результати: виявлено основні енергоекономічні показники України порівняно з показниками інших країн і з'ясовано, що вони є негативними (витрати електроенергії в Україні становлять 60%, тоді як у Франції – 40%, а Великобританії – 35,8%); обґрунтовано, що професійна підготовка фахівців будівельного профілю потребує ознайомлення здобувачів освіти з проблемами і принципами збалансованого розвитку у будівництві (мінімізація витрат енергії та матеріальних ресурсів у процесі спорудження та експлуатації будівельних конструкцій, зменшення негативного впливу будівництва на навколишнє середовище; комплексний аналіз енергетичної, екологічної, економічної га суспільно-соціальної проблематики зведення будівельних об'єктів тощо).

Висновки: обґрунтовано, що для забезпечення раціонального використання матеріальних і енергетичних ресурсів, підвищення енергозбереження житлово-комунального сектору України та посилення її енергетичної незалежності необхідно включити до змісту професійної підготовки майбутніх фахівців будівельної галузі ознайомлення з інноваційними енергозберігаючими технологіями у будівництві (проєктування енергоефективних будинків, енергетичний паспорт будинку, термомодернізація житлового фонду, використання сучасних теплоізоляційних матеріалів, встановлення енергозберігаючих вікон, застосування

енергозберігаючих інженерних технологій та систем опалення), екологічними характеристиками енергозберігаючих технологій, принципами енергозберігаючих заходів тощо.

Ключові слова: *професійна освіта, заклади професійної освіти будівельного профілю, енергозберігаючі технології, енергоефективна компетентність, будівельна галузь, збалансований розвиток*.

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DEVELOPMENT OF DIGITAL COMPETENCE OF VOCATIONAL THEORETICAL TRAINING LECTURERS THROUGH THE USE OF THE "SMART ECOSYSTEM FOR STUDENTS" DIGITAL PLATFORM

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Abstract

The relevance of the article: is determined by: the rapid pace of digital transformation in education, which necessitates the development of digital competence among vocational theoretical training lecturers, particularly in vocational (vocational-technical) education institutions; the demands of the digital economy for improving the quality of training qualified specialists, which is impossible without the implementation of innovative digital solutions that combine educational content, interaction tools, reflection, and assessment; the capabilities of the Smart EcoSystem for Students digital platform, which can be an effective tool for integrating educational processes into a unified digital environment; the need for understanding and scientific clarification of approaches to defining the essence and structure of the concept of "professional competence," as well as substantiating it as a key condition for the effective activity of lecturers who provide training for skilled workers in the service sector in accordance with current labor market challenges and digital education development.

Purpose of the article: is to highlight the capabilities of the Smart EcoSystem for Students digital platform for the development of digital competence of vocational theoretical training lecturers and to substantiate the methodological principles of its use in the educational process of vocational education institutions.

Methods: systemic analysis, pedagogical observation, generalization of empirical data, questionnaires, and methodological modeling of digital interaction based on the platform's functionality.

Results: it was found that the use of the Smart EcoSystem for Students digital platform provides personalized support for lecturers in forming digital competence, contributes to the improvement of pedagogical interaction, analysis of learning activities, and the implementation of adaptive educational routes; practical cases of using the platform in the context of increasing the effectiveness of the educational process were analyzed.

Conclusions: the main directions of using the Smart EcoSystem for Students platform in the process of digital transformation of vocational education are defined; its potential for the development of digital competence of vocational theoretical training lecturers is substantiated; the role of an integrated digital environment in improving the quality of the educational process, taking into account the individual educational needs of students and the current challenges of the modern labor market, is highlighted.

Keywords: *digital competence, vocational theoretical training, Smart EcoSystem for Students, simulation technologies, professional development.*

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Introduction. In the context of transformational changes encompassing vocational education, the digital competence of lecturers emerges as one of the leading components of professional readiness for effective teaching in a digital environment. According to the updated European Digital Competence Framework for Citizens DigComp 2.1 (European Commission, 2017), digital competence encompasses not only basic technical skills but also the ability to use digital resources for communication, content creation, security, and problem-solving in the digital space. The Ukrainian adapted version of DigComp, available on the "Diia.Osvita" platform, defines digital competence as the ability of a lecturer to work with digital educational technologies with an orientation towards the needs of students (Ministry of Digital Transformation of Ukraine, 2023).

At the same time, analytical reviews show a significant gap between the existing level of digital training of lecturers and the requirements for digital support of vocational theoretical training in the context of Industry 4.0 (Chanysheva & Nanyeva, 2021; Bilyk, 2023). This refers, in particular, to the need not only for the instrumental use of digital platforms, but for the formation of a reflective, methodological approach to organizing blended learning using industry-specific software, simulation technologies, and analytical dashboards.

In this context, the Smart EcoSystem for Students digital platform serves as a comprehensive educational environment that provides personalized learning, management of educational routes, automated monitoring of results, integration of mentoring tools, feedback, certification, and more. Its development is based on the principles of methodological integrity, interdisciplinarity, and analytical adaptability, which corresponds to the provisions of The Digital Competence Wheel (The Digital Competence Wheel, 2024).

Thus, a scientific and practical problem arises: how to organize the use of Smart EcoSystem for Students (Hrechanyk, 2025) in the educational process of vocational (vocational-technical) education institutions with the aim of developing the digital competence of vocational theoretical training lecturers. This issue is closely related to the modernization of vocational education, digital self-management of educators, and the construction of an internal institutional strategy for digital transformation.

Sources. The issue of forming digital competence among pedagogical workers is actively being developed in the European educational space within the framework of the Digital Competence Framework for Citizens (DigComp 2.1), which defines five key areas of competence: information literacy, communication, digital content creation, safety, and technical problem-solving (Van den Brande, 2016). This framework serves as a conceptual basis for the Ukrainian adaptation of the digital framework – Diia.Digital Literacy, introduced by the Ministry of Digital Transformation of Ukraine (Diia.Osvita, 2024). We share the systematic nature of this classification, however, we note that it does not cover the specifics of pedagogical activity in the field of vocational (vocational-technical) education, which creates a demand for a more adapted platform for the development of digital competence specifically for vocational theoretical training lecturers.

A study by the European Training Foundation (2023) determined that the effectiveness of digital platforms in vocational education depends not only on technological design but also on the level of readiness of educators for digital transformation. The authors insist on the need for platforms that provide personalized learning, adaptability, and built-in assessment mechanisms. These very features are embedded in the Smart EcoSystem for Students platform, which is the object of our research. We agree with the thesis about the need for comprehensive training of pedagogical workers and propose our own model for implementing these approaches based on the platform.

A number of studies emphasize the importance of using simulation technologies in vocational education (Lisovyi et al., 2016; Shaforost, Lut, & Shpak, 2024). However, in our opinion, most of them are primarily focused on the technical aspect of using digital tools, without proper methodological justification of the impact of such tools on the development of the lecturer's digital competence. In our study, these simulation components are integrated into the digital platform

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as tools for pedagogical diagnostics and project-based learning, not just as an imitation environment.

Publications dedicated to the implementation of digital educational environments (Lemay, Bazelais, & Doleck, 2021; Cui, Zhao, & Zhang, 2022) emphasize the need to consider cultural, industry, and institutional contexts. This approach is methodologically justified in our development as well – Smart EcoSystem for Students is adapted to the needs of the vocational and technical industry, taking into account specific educational and industrial conditions and the role of pedagogical workers as facilitators of the digital environment.

Despite the existence of relevant research in the field of digital transformation of education, we have identified the following gaps: insufficient development of platforms that would integrate both pedagogical and simulation functions for vocational and technical education; lack of consistency between digital tools and educational competence frameworks for lecturers. These very aspects became the object of our theoretical analysis and practical experiment.

Aim. The purpose of the article is to explore the capabilities of the Smart EcoSystem for Students digital platform for the development of digital competence of vocational theoretical training lecturers and to substantiate the methodological principles of its use in the educational process of vocational (vocational-technical) education institutions. Within the stated purpose, the following tasks have been defined:

– to analyze the current state of scientific approaches to the development of digital competence in vocational education;

– to reveal the structural and functional features of the Smart EcoSystem for Students platform as a digital educational environment;

– to characterize the mechanisms that ensure personalization of learning, professional reflection, and the formation of intellectual capital of pedagogical workers;

– to determine the effectiveness of the proposed digital ecosystem in the context of the digital transformation of vocational and technical education.

Methods. In the research process, a complex of interconnected methods of theoretical and empirical analysis was applied, which ensured the reliability and scientific validity of the obtained results:

– theoretical analysis and generalization of scientific literature – for studying modern approaches to the digitalization of education, digital competence frameworks (including DigComp 2.1), and for identifying scientific gaps;

– systemic and structural analysis – with the aim of singling out the functional components of the digital ecosystem and determining its pedagogical value;

– pedagogical modeling – for constructing the architecture of the Smart EcoSystem for Students digital platform and determining its educational potential in the context of professional training;

– surveying vocational theoretical training lecturers – as a tool for collecting empirical data on the level of digital competence formation and evaluating the effectiveness of using the developed platform;

– expert evaluation – for verifying the methodological relevance of the proposed model, its consistency with the demands of vocational education institutions.

Results and Discussion. The conducted research was aimed at a systematic study of the functional components of the Smart EcoSystem for Students digital platform, as well as at determining its significance in the formation and development of digital competence of vocational and technical education lecturers. Given the need for the transformation of vocational education in accordance with the requirements of digitalization, the key task was to identify those tools of the educational environment that contribute to the formation of the lecturer's ability to effectively use digital resources in professional activities.

The Smart EcoSystem for Students digital platform is implemented as a complex of interconnected environments that functionally interact within a single educational and methodological infrastructure. As a result of systemic and structural analysis, five leading functional components of this ecosystem were identified:

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Smart Learning Environment – a module that provides an adaptive, personalized learning environment for students and lecturers. It contains a database of digital courses, interactive simulators, video instructions, and simulation scenarios aimed at forming professional skills. This environment meets the DigCompEdu requirements for creating learning situations based on ICT competence.

Smart Collaboration Zone – a functional block that enables lecturers and students to interact in real-time. This includes joint development of educational projects, exchange of digital resources, online consultations, and feedback. Its integration contributes to the development of the lecturer's digital communication competence.

Smart Monitoring Dashboard – an analytical tool that allows for assessing the digital progress of students, including their activity, the quality of task completion, and the level of formation of digital and professional skills. For the lecturer, this is a tool for formative assessment and making pedagogical decisions.

Smart Parent Dashboard – a platform for interaction with the social environment, particularly parents of students, which allows them to be involved in the educational process. From a pedagogical value perspective, this function enhances the transparency and openness of the digital educational environment.

AI Assistant and Scenario Builder – an artificial intelligence-based module for creating pedagogical scenarios adapted to the level of student training, as well as for supporting the learning process. This particular tool allows lecturers to create their own digital educational products based on a competence-based approach.

The Smart EcoSystem for Students digital ecosystem was piloted among vocational and technical education (VTE) lecturers in Kryvyi Rih, Kharkiv, Khmelnytskyi, and Kropyvnytskyi. The study participants noted that the platform's functional components allowed them to transition from fragmented application of digital technologies to comprehensive digital support of the educational process. Furthermore, the platform became a catalyst for the professional growth of educators in the field of digital competence, providing them with tools not only for teaching but also for self-education and interaction in the digital environment.

The pedagogical value of Smart EcoSystem for Students is manifested in the platform's ability to provide not only functional support for the learning process but also to transform the lecturer's educational culture, oriented towards self-reflection, the development of digital autonomy, and the implementation of pedagogical innovations.

In the process of systemic analysis and approbation of the functional capabilities of the Smart EcoSystem for Students digital platform in vocational (vocational-technical) education institutions, we identified a complex of interdependent components that ensure the formation of digital competence of vocational theoretical training lecturers. This specifically refers to the integration of tools for personalized learning, digital collaboration, monitoring of educational outcomes, and progress analytics. All of these not only create a unified digital environment but also transform the methods of professional interaction between subjects of the educational process. The results of the systemic analysis and experimental application of the platform confirm the expediency of its implementation in the educational process of vocational education institutions as a tool for increasing the level of digital competence of vocational theoretical training lecturers.

Let's characterize the mechanisms of the Smart EcoSystem for Students digital platform that ensure personalized learning, support the lecturer's professional reflection, and contribute to the formation of their intellectual capital in the vocational education system:

Personalization of learning. One of the central mechanisms of the platform is the individual educational route, which is automatically formed based on diagnostic input testing and analysis of the lecturer's educational needs. This route includes:

− adaptive modules for professional development in digital tools, simulation-based learning, and cybersecurity;

− dynamic changes in the trajectory according to success in interactive cases and completion of reflective tasks;

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– recommendations based on AI algorithms that consider the pace, depth, and style of material assimilation of a specific educator.

Example: a lecturer from Kropyvnytskyi, who had a basic level of digital competence, gained access to a series of training blocks on Google Workspace and Canva for Education simulation trainers adapted to the needs of a vocational and technical institution after completing the platform. After a month of training, the platform automatically changed the complexity of the cases and offered work in the Smart Collaboration Zone environment.

Professional Reflection. The platform includes a digital reflective diary that allows the lecturer to record difficulties, educational ideas, and impressions from using digital tools. Its mechanisms:

– automated analysis of entries through semantic interpretation tools, which allows the platform to provide advice for further professional growth;

– weekly reflective prompts that focus on assessing one's own progress, interacting with students, and implementing new technologies. These are special stimulating questions or tasks that the digital platform (in our case, Smart EcoSystem for Students) automatically generates weekly for the lecturer to: help them rethink their own work experience; encourage self-analysis of professional activity; contribute to the formation of skills for conscious improvement of pedagogical practice ("What digital tools were most effective for your group this week and why?" "What difficulties did you encounter during the implementation of the simulation module and how did you overcome them?" "What would you change in your educational approach next week based on the experience gained?"). Such prompts appear in a special reflective diary on the platform and motivate the lecturer to regularly record their thoughts, which becomes part of their digital portfolio.

Example: In Khmelnytskyi, one of the vocational theoretical training lecturers noted a low level of digital engagement in the group through the diary. After analyzing the entries, the platform provided recommendations for implementing a collaborative Padlet environment with thematic surveys, which increased student motivation.

Formation of Intellectual Capital. Intellectual capital is formed through the creation, accumulation, and exchange of pedagogical developments within the Smart Knowledge Hub – an integrated environment of a digital library, a community of practices, and a platform for micropublications.

Mechanisms include:

– automatic saving of the lecturer's educational solutions (lesson examples, digital scenarios, recommendations), which can be published in open access at the educator's discretion;

– gamified assessment of intellectual contributions within the community – other participants can evaluate the value of published cases;

– a system for tracking content impact – number of views, downloads, comments.

Example: In Kharkiv, a lecturer created a simulation module on workplace safety, which the platform, after expert moderation, added to the open collection. The module was used by 19 educators from other cities, which was recorded in the author's profile as an indicator of their intellectual contribution.

Thus, Smart EcoSystem for Students not only provides a space for preserving and disseminating educators' intellectual products but also forms new mechanisms for recognizing the individual contribution of the lecturer to the educational digital community. All this is supplemented by a deep individualization of the educational process, which is manifested in a holistic system of personalization, professional reflection, and monitoring of pedagogical progress. Table 1 summarizes the mechanisms that ensure the implementation of these functions on the Smart EcoSystem for Students platform.

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Table 1

Mechanisms of Personalization and Reflection in Smart EcoSystem for Students

Mechanism	Functional Purpose	Application Examples
Individual Learning Paths	Adjusting the pace, forms, and content of learning to meet the teacher's needs	Creation of a personalized module with simulation exercises for engineering discipline teachers.
Reflective Prompts	Stimulating regular professional reflection	Weekly open questions in the format: "What have you managed to change in your teaching approaches?"
Teacher Digital Portfolio	Recording results, achievements, and development dynamics	Uploading certificates, video lessons, and developed materials to a unified platform.
Micro-publications within the Internal Environment	Enhancing professional confidence through experience sharing	Publishing teaching cases that are commented on by other platform participants.
Educational Interaction Analytics	Automated data collection on activity, ensuring informed management decisions	Monitoring activity in educational rooms with visualization of results.

After a systematic analysis of the functional mechanisms of the Smart EcoSystem for Students digital ecosystem, presented in Table 1, the empirical generalization of the platform's impact on the formation of digital competence among vocational theoretical training teachers became a logical next step. An illustrative visualization of the obtained results is presented in Figure 1.

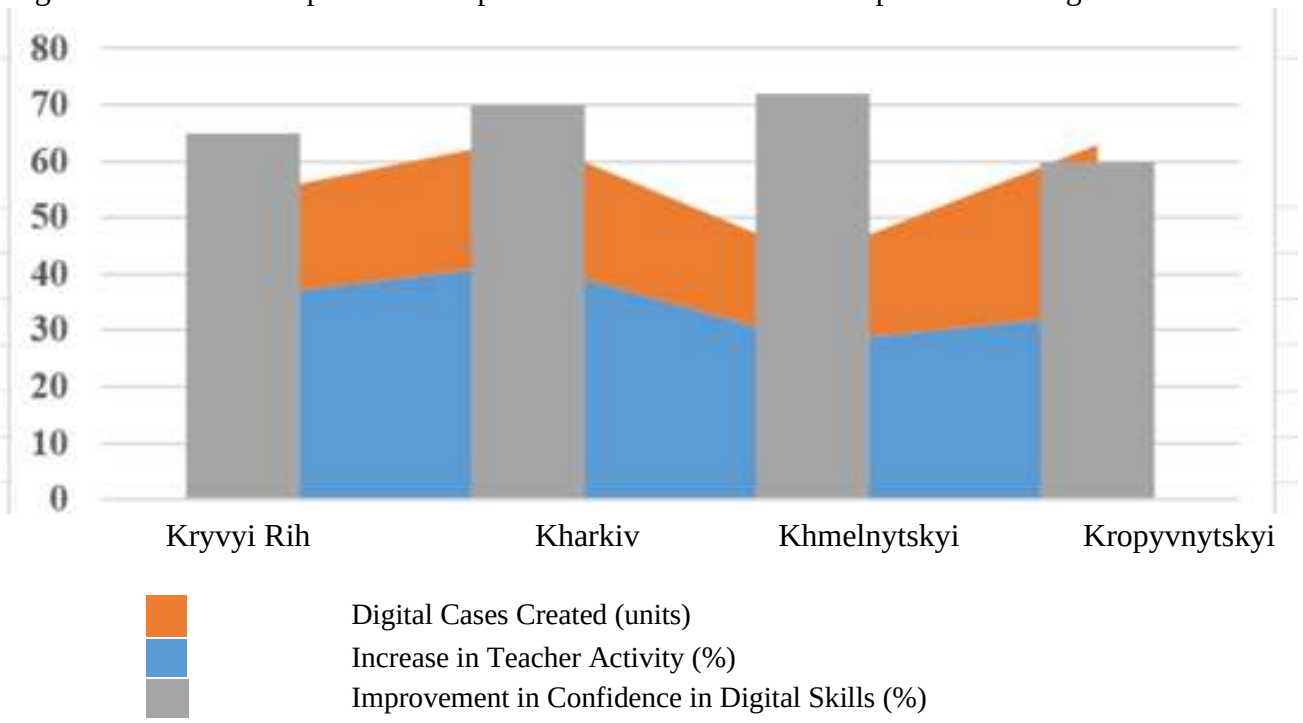

Fig. 1. Comparative indicators of the effectiveness of using the Smart EcoSystem for Students digital platform for developing the digital competence of vocational theoretical training teachers.

The diagram above clearly shows a direct correlation between the active use of the Smart EcoSystem for Students digital platform and an increase in the level of digital competence among educators. Specifically, the highest indicators of confidence in digital skills were recorded in Khmelnytskyi (72%), which was accompanied by a stable dynamic in the creation of digital cases. In contrast, in Kropyvnytskyi, despite the highest number of digital cases created (30 units), the growth rate of confidence remained lower (60%), indicating a need for accompanying support measures (mentoring, coaching, etc.).

In Kharkiv and Kryvyi Rih, a synchronous increase in digital activity (42% and 36%) and confidence in digital skills (70% and 65%) is observed, demonstrating the effective integration of the platform into internal educational processes. At the same time, the results indicate the high potential of Smart EcoSystem for Students as a means of not only formal but also informal development of digital competence among teachers, which opens up new prospects for its implementation across the entire vocational education system.

Conclusions. The conducted analysis of scientific approaches to defining the concept of "digital competence" of vocational theoretical training teachers showed that there is still a lack of coherent approaches to its structural, content, and developmental methods in the field of vocational (vocational-technical) education. It has been proven that the actualization of the problem of developing digital competence among vocational theoretical training teachers in the context of the digital transformation of vocational education necessitates the use of integrated digital solutions. The expediency of implementing the Smart EcoSystem for Students platform has been determined as an innovative tool that combines pedagogical, simulation, and communication functions within a single digital educational environment. This approach ensures the implementation of a competency-based, person-centered, and adaptive model of specialist training. It has been substantiated that the use of the Smart EcoSystem for Students digital platform aligns with the methodological principles of vocational education (subjectivity, flexibility, integration, development of self-learning, and reflection). It has been shown that the platform can contribute to the development of teachers' digital competence through the organization of digital content, a personalized environment for interaction with students, and assessment and feedback systems, which correspond to the principles of DigCompEdu and the adapted Ukrainian digital competence framework. The use of the platform can be effective not only as a learning tool but also as an innovative environment for the professional development of teachers. Prospects for further scientific research lie in developing indicators for assessing the digital competence of teachers, as well as in analyzing the dynamics of improving the quality of professional training of students as a result of implementing this educational ecosystem.

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РОЗВИТОК ЦИФРОВОЇ КОМПЕТЕНТНОСТІ ВИКЛАДАЧІВ ПРОФЕСІЙНО-ТЕОРЕТИЧНОЇ ПІДГОТОВКИ В ПРОЦЕСІ ВИКОРИСТАННЯ ЦИФРОВОЇ ПЛАТФОРМИ «SMART ECOSYSTEM FOR STUDENTS»

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Реферат:

Актуальність статті зумовлена: швидкими темпами цифрової трансформації освіти, що зумовлює необхідність розвитку цифрової компетентності викладачів професійно-теоретичної підготовки, зокрема у закладах професійної (професійно-технічної) освіти; запитами цифрової економіки на підвищення якості підготовки кваліфікованих фахівців, що неможливо без впровадження інноваційних цифрових рішень, які поєднують навчальний контент, засоби взаємодії, рефлексії та оцінювання; можливостями цифрової платформи *Smart EcoSystem for Students*, що може бути ефективним інструментом інтеграції освітніх процесів у єдиному цифровому середовищі; потребою осмислення і наукового уточнення підходів до визначення сутності й структури поняття «професійна компетентність», а також обґрунтування її як ключової умови ефективної діяльності викладачів, які забезпечують підготовку кваліфікованих робітників у сфері послуг відповідно до актуальних викликів ринку праці та цифрового розвитку освіти.

Метою статті є висвітлення можливостей цифрової платформи Smart EcoSystem for Students для розвитку цифрової компетентності викладачів професійно-теоретичної підготовки та обґрунтувати методологічні засади її використання в освітньому процесі закладів професійної освіти.

Методи: системного аналізу, педагогічного спостереження, узагальнення емпіричних даних, анкетування, а також методичне моделювання цифрової взаємодії на основі функціоналу платформи.

Результати: виявлено, що використання цифрової платформи Smart EcoSystem for Students забезпечує персоналізовану підтримку викладачів у формуванні цифрової компетентності, сприяє удосконаленню педагогічної взаємодії, аналітики навчальної діяльності та впровадженню адаптивних освітніх маршрутів;

проаналізовано практичні кейси використання платформи у контексті підвищення ефективності освітнього процесу.

Висновки: визначено основні напрями використання платформи *Smart EcoSystem for Students* у процесі цифрової трансформації професійної освіти; обґрунтовано її потенціал для розвитку цифрової компетентності викладачів професійно-теоретичної підготовки; висвітлено роль інтегрованого цифрового середовища у підвищенні якості освітнього процесу з урахуванням індивідуальних освітніх потреб здобувачів освіти та актуальних викликів сучасного ринку праці.

Ключові слова: *цифрова компетентність, професійно-теоретична підготовка, Smart EcoSystem for Students, симуляційні технології, підвищення кваліфікації.*

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RECOMMENDATIONS FOR IMPROVING THE CONTENT OF PSYCHOLOGICAL AND PEDAGOGICAL TRAINING OF FUTURE EDUCATORS IN UKRAINE

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Abstract

Relevance: The problem of updating the content of psychological and pedagogical training for future teachers is determined by the need to actualize Ukrainian historical and pedagogical heritage to strengthen the nation-building context of psychological and pedagogical disciplines; to enrich topics related to educational personology, mental health, inclusion, overcoming educational losses, psychodidactics, and media didactics based on interdisciplinary integration; and to harmonize the content of psychological and pedagogical disciplines with the professional standard for teachers, lecturers, etc.

Aim of the article: To generalize the results of a survey of lecturers from institutions of professional pre-higher and higher pedagogical education in various regions of Ukraine, to study educational documentation regarding the structuring of the content of psychological and pedagogical training for future teachers; and to substantiate recommendations for improving the content of psychological and pedagogical training for future teachers at different levels.

Research methods: Online survey of lecturers from institutions of professional pre-higher and higher pedagogical education to identify problematic issues in teaching psychological and pedagogical disciplines to future teachers at various educational levels; analysis of educational documentation for psychological and pedagogical disciplines (educational programs, syllabi, work programs, educational and methodological support/provision) in the training of future teachers of various specializations at the professional pre-higher education level, and at bachelor's, master's, and doctoral educational levels in 18 institutions of professional pre-higher and higher pedagogical education in various regions of Ukraine; prognostic analysis to substantiate recommendations for updating the content of psychological and pedagogical training for future teachers.

Results: Generalizing the survey results, it was found that lecturers are motivated to update the content of psychological and pedagogical disciplines, taking into account innovations (introduction of the New Ukrainian School, specialized senior high school, etc.), aiming for an appropriate structuring of the content of disciplines to form competencies defined in the professional standard and in higher education standards for a specific specialty, while also noting the stability and outdatedness of educational components, the lack of quality educational and methodological support, and the leveling of interdisciplinary connections, etc. The analysis of educational documentation for psychological and pedagogical disciplines allowed concluding the need to improve the content of psychological and pedagogical training for future teachers, which should occur through the introduction of content modules and topics

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from the theory and practice of psychopedagogy, educational personology, the actualization of historical and pedagogical ideas, and the implementation of cross-cutting content modules and topics in compulsory and elective disciplines concerning children's psychological traumas resulting from military actions, mental health issues in partnership with teachers, students, parents, and the community; and the creation of digital educational and methodological support for updating the content of compulsory psychological and pedagogical disciplines, etc.

Conclusions: Based on the results of empirical research (lecturer surveys, study of educational documentation for teaching psychological and pedagogical disciplines), recommendations were proposed at various levels – institutional (improving quality criteria for educational programs by the National Agency for Higher Education Quality Assurance regarding human resources, specifically the need to develop teachers' professional competencies; determining the necessity of correlating the content of psychological and pedagogical disciplines with competencies defined in the professional standard; regulating educational partnership between institutions of higher pedagogical and general secondary education to respond to the challenges of war and post-war recovery of the country); management (improving psychological and pedagogical training for future teachers based on the theory and practice of psychopedagogy, educational personology, and the actualization of historical and pedagogical ideas; updating the content of the compulsory discipline "Pedagogy"; implementing cross-cutting content modules and topics on children's psychological traumas resulting from military actions, mental health issues in partnership with teachers, students, parents, and the community; creating digital educational and methodological support); professional (updating syllabi and programs of psychological and pedagogical educational components, taking into account the actualization of Ukrainian historical and pedagogical heritage to strengthen the nation-building context of the content of relevant disciplines; updating the content of psychological and pedagogical disciplines based on interdisciplinary integration with topics related to educational personology, mental health, inclusion, overcoming educational losses, psychodidactics, and media didactics) etc.

Keywords: *psychological and pedagogical training, future teachers, content of psychological and pedagogical training, competencies, recommendations.*

Introduction. In the conditions of the military aggression of the Russian Federation against Ukraine, a special sociocultural role is performed by the teacher, who is a transmitter of national cultural traditions, professional knowledge, and the values of language, literature, folklore, and history in educational practice, and who, by their own life and professional example, shapes the student as a personality. This mission is highlighted in the context of the cultural and informational war associated with the military aggression of the Russian Federation on the territory of Ukraine. Indeed, the role of the educator today lies in the formation of students' personalities, their worldview, and values, as well as in taking into account the realities of war. This requires the possession of professional and personal qualities that enable pedagogical influence on students based on empathy, partnership communication, a personal approach, mental health support, and the ability to respond to innovations defined by the competency-based principles of the New Ukrainian School, specialized high school, and so on.

Modern trends in the development of education in Ukraine and European countries reflect society's demand for the formation in students of not only academic knowledge but also "soft skills," namely communication, creativity, emotional intelligence, critical thinking, and others. These current issues prove that a modern educator must be a master in their profession, a mentor, a guide, capable of self-regulation, empathy, stress resistance, personal and professional development, and internal readiness for the challenges of the profession. Accordingly, the problem of updating the content of the psychological and pedagogical training of future teachers is becoming relevant. This is due to the need to actualize the Ukrainian historical-pedagogical heritage to strengthen the nation-building context of the content of psychological and pedagogical disciplines; to enrich it with topics on the problems of the personology of education, mental health, inclusion, overcoming educational losses, psychodidactics, and mediadidactics on the basis of interdisciplinary integration, etc.

Research Sources. The problem of psychological and pedagogical training of future teachers has become the subject of research by Ukrainian scientists and practicing educators in the

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context of studying the specifics of teaching psychological and pedagogical disciplines (T. Belan (2019), R. Horbatiuk (2017), L. Diachenko (2016), V. Kravchenko (2023), O. Kryvylova (2018), N. Pavlyk, O. Ivanova (2022), N. Titova (2019), et al.). The foreign experience of professional, psychological, and pedagogical training of future teachers has been studied by O. Bihun (2020), A. Dzhurylo (2019), V. Ivanova (2020), Yu. Kobiuk (2021), O. Martyniuk (2017), O. Samoilenko, Yu. Novhorodska (2025). The problem of forming the professional competencies of future teachers in the process of psychological and pedagogical training has been the subject of research by O. Kucheriavyi (2021), N. Lazarenko (2020), L. Rakitianska (2019), O. Dzhuniak (2020), and others. Empirical data on the problem of developing the content of psychological and pedagogical training for future teachers on a competency basis are highlighted in the publications of the article's authors (Vovk, Hryshchenko, & Solomakha, 2024) and in research data presented on open platforms (Vovk, & Hryshchenko, 2024).

The purpose of the article is to summarize the results of a survey of lecturers from institutions of professional pre-higher and higher pedagogical education in different regions of Ukraine and to study educational documentation regarding the structuring of the content of psychological and pedagogical training for future teachers; to substantiate recommendations for improving the content of psychological and pedagogical training for future teachers at different levels.

Research methods: an online survey of lecturers from institutions of professional pre-higher and higher pedagogical education to identify problematic issues in the process of teaching psychological and pedagogical disciplines to future teachers at different educational levels; analysis of educational documentation of psychological and pedagogical disciplines (educational programs, syllabi, work programs, educational and methodological support/provision) in the training of future teachers of various specializations at the level of professional pre-higher education, and at the bachelor's, master's, and doctoral educational levels in 18 institutions of professional pre-higher and higher pedagogical education in different regions of Ukraine; prognostic analysis to substantiate recommendations for updating the content of psychological and pedagogical training for future teachers.

Results and discussion. During 2023-2024, scientists from the Department of Content and Technologies of Pedagogical Education of the Ivan Zyazyun Institute of Pedagogical Education and Adult Education of the National Academy of Educational Sciences of Ukraine, as part of the research study "Development of the Content of Psychological and Pedagogical Training for Future Teachers on a Competency-Based Approach" (RK 0123U100447, 2023–2025), conducted an online survey of lecturers regarding the problem of the content of psychological and pedagogical training of future teachers in institutions of professional pre-higher and higher education. The survey involved 204 lecturers from 13 institutions of professional pre-higher and higher education. Among the respondents, 20 were lecturers from institutions of professional pre-higher education, 138 teach at the bachelor's level, 29 teach at the master's level, and 17 lecturers at the doctoral level. The survey results are partially presented in open access (Vovk, & Hryshchenko, 2024).

To determine the involvement of lecturers in teaching psychological and pedagogical disciplines, it was proposed to answer the following question: "Which psychological and pedagogical disciplines do you teach?" (Figure 1). Among the respondents, the largest number of lecturers teach the methodology of teaching a specific discipline in school (38.3%), general pedagogy (19.4%), and pedagogy (18.1%).

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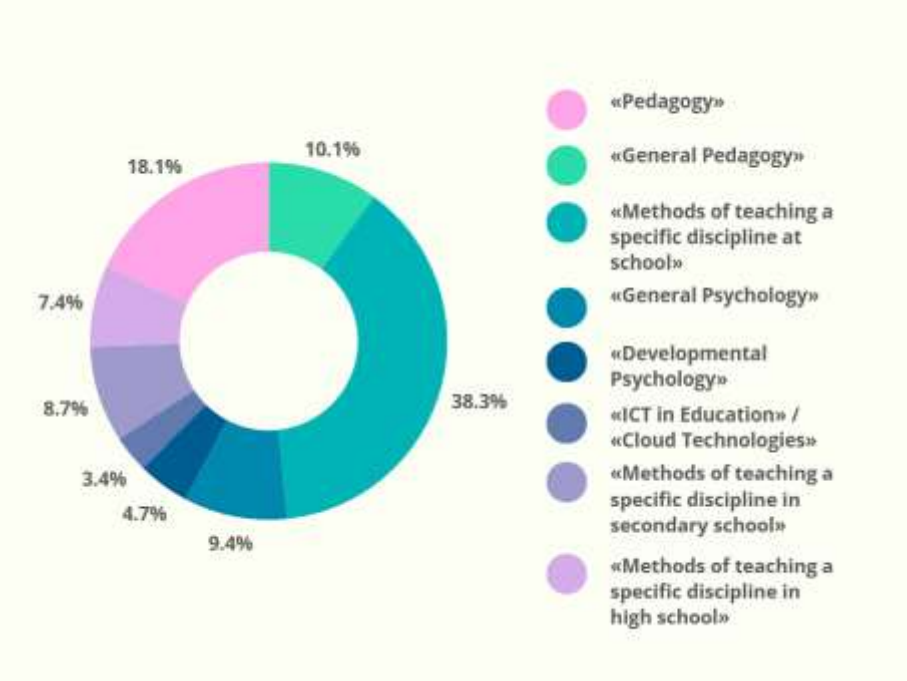

Figure 1. Lecturers' involvement in teaching psychological and pedagogical disciplines to future teachers (%)

The respondents indicated that most psychological and pedagogical disciplines in the educational programs are compulsory (67.7%) (Figure 2).

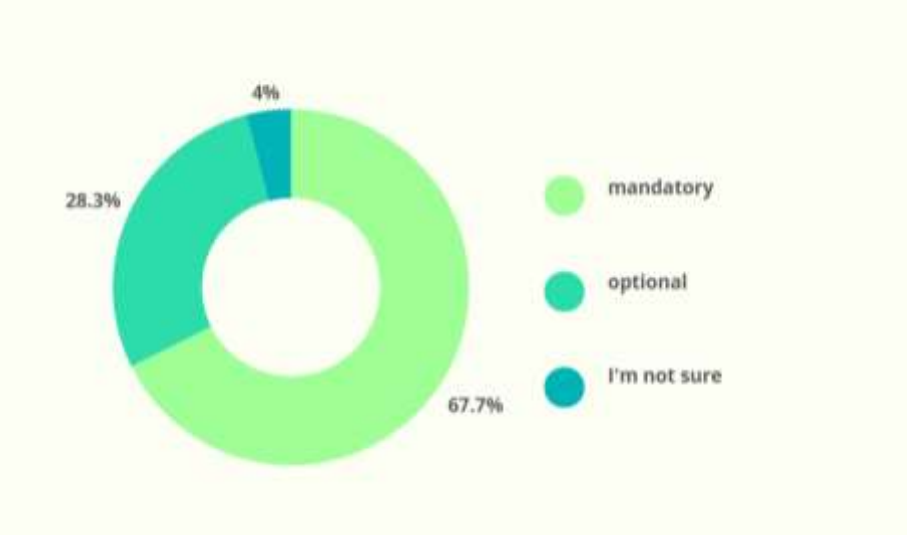

Figure 2. Inclusion of psychological and pedagogical disciplines in the compulsory or elective components (%)

The responses to the question, "Do you consider it necessary to change the content of the curricula for psychological and pedagogical disciplines annually?" revealed that 72% of respondents see the need to update and supplement the content of the curricula for psychological and pedagogical disciplines each year (Figure 3).

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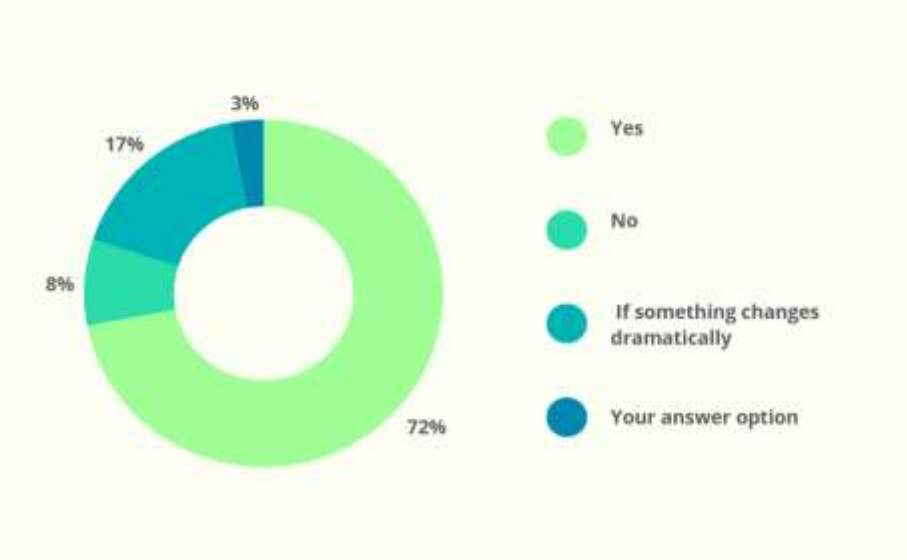

Figure 3. Lecturers' motivation to annually change the content of curricula for psychological and pedagogical disciplines (%)

The need to update the content of psychological and pedagogical disciplines, taking into account the trends in pedagogical science in Ukraine, is confirmed by 74% of respondents (Figure 4).

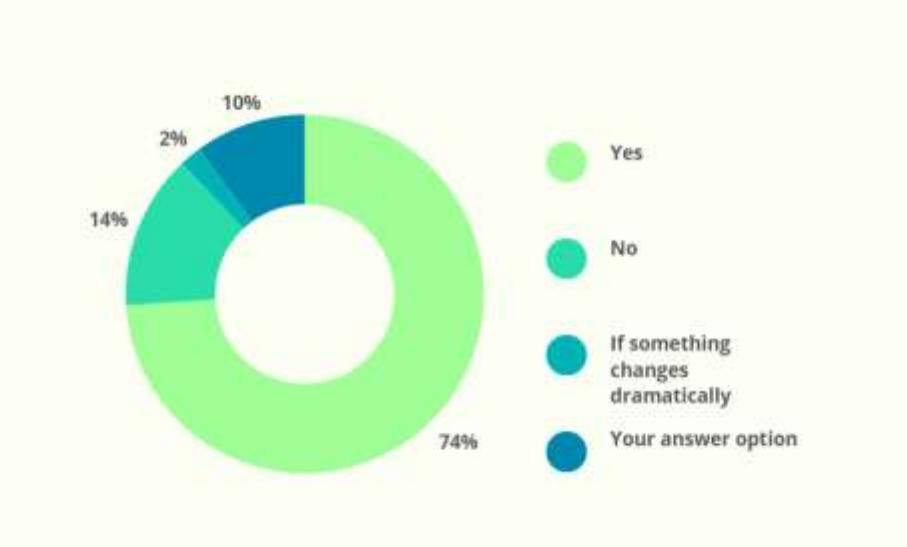

Figure 4. The need to update the content of psychological and pedagogical disciplines, taking into account the trends in pedagogical science in Ukraine (%)

54.4% of lecturers believe there is a need to study and implement foreign experience in teacher training and to make changes to the content of psychological and pedagogical disciplines based on this experience (Figure 5).

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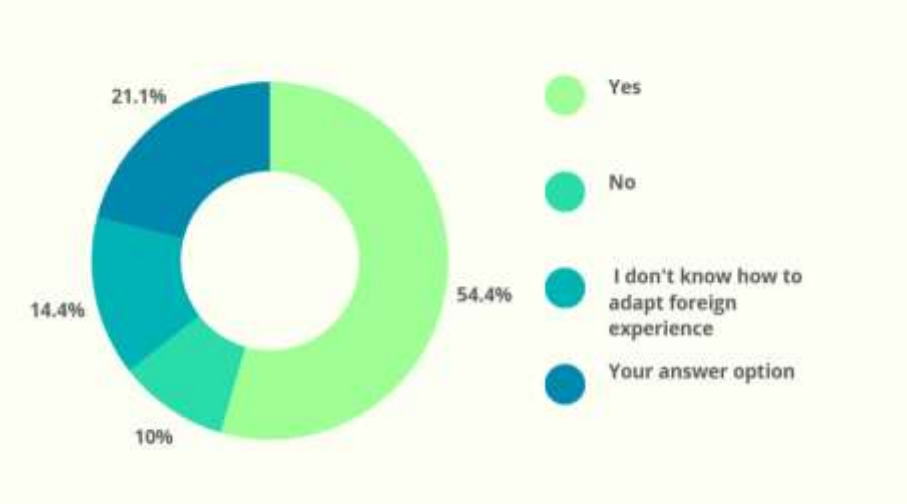

Figure 5. The need to study and implement foreign experience in the training of future teachers (%)

To the question "Which psychological and pedagogical disciplines do you consider outdated?" respondents indicated that the following disciplines require content renewal: pedagogy (32%), methodology of educational work (25%), methodology of teaching disciplines (13%), and others (30%) (Figure 6).

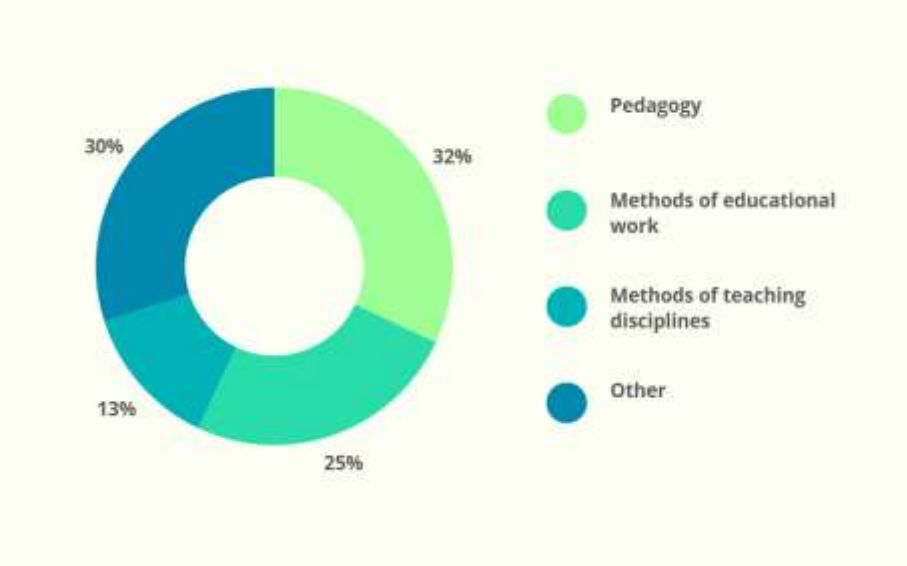

Figure 6. Outdatedness of the content of psychological and pedagogical disciplines in the training of future teachers (%)

The lecturers also determined the priority of the main professional competencies that are formed in future teachers during the study of psychological and pedagogical disciplines (Figure 7).

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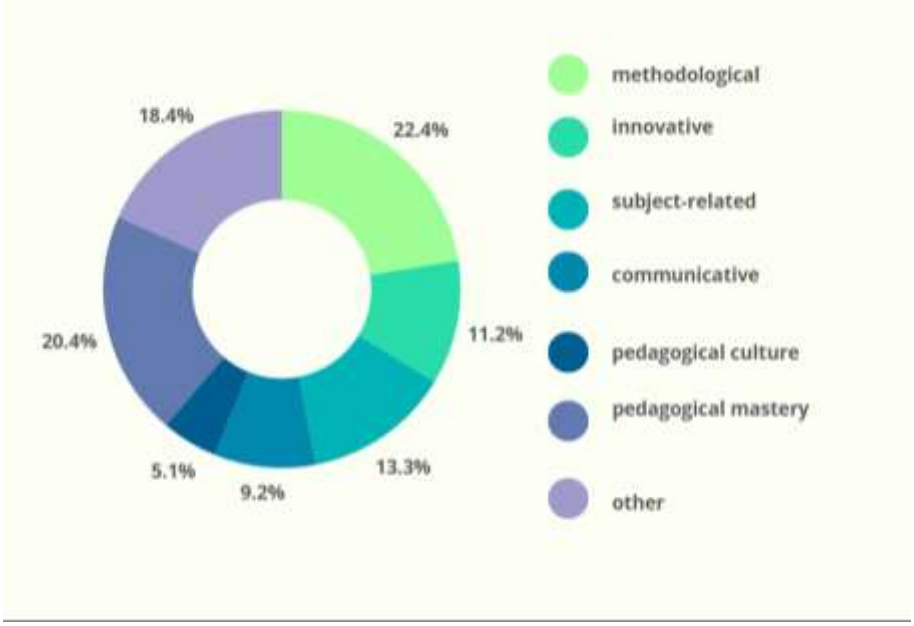

Figure 7. Formation of core professional competencies in future teachers during the study of psychological and pedagogical disciplines (%)

Respondents noted that the study of psychological and pedagogical disciplines contributes to the formation of other competencies important for the professional activity of a teacher (Figure 8), including organizational (8.3%), reflective (8.3%), subject-methodological (8.8%), and others, which corresponds to the current professional standard for teachers.

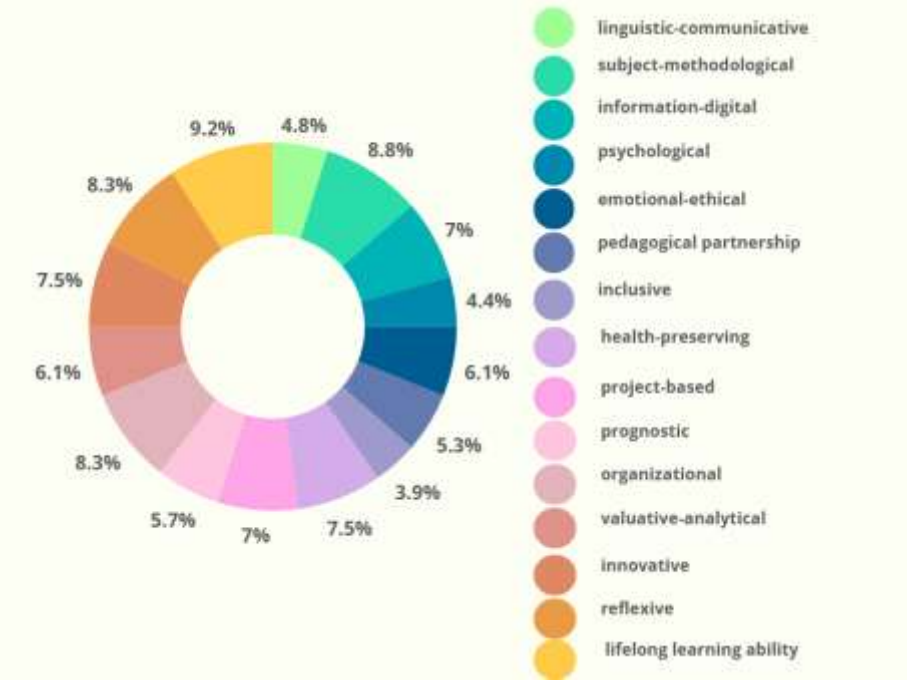

Figure 8. Formation of professional competencies in future teachers during the study of psychological and pedagogical disciplines (%)

In their answers to the question "What innovative psychological and pedagogical disciplines, in terms of content, should be taught to future teachers?" respondents gave preference to such disciplines as: "Pedagogical Innovatics" (28%), "Distance Learning Technologies" (20%), "Cloud Technologies" (15%), "Innovations in Pedagogy" (12%), and other disciplines (25%) (Figure 9).

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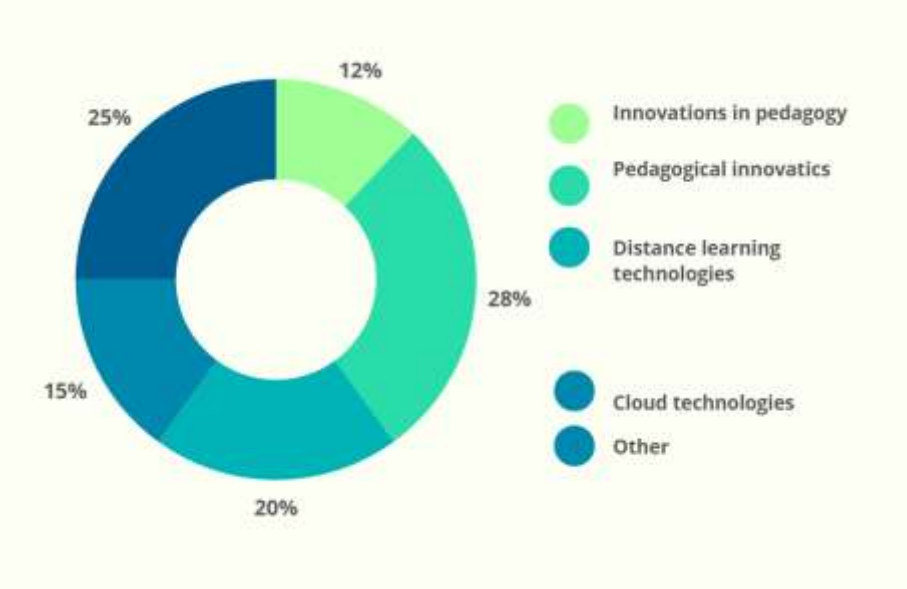

Figure 9. Disciplines innovative in content within the psychological and pedagogical field (%)

The answers to the question "What forms and methods do you prefer in the process of teaching psychological and pedagogical disciplines to future teachers?" were distributed as follows: practical workshops 8.2%, lectures 17.1%, trainings 9.6%, pedagogical situations 6.2%, individual consultations 13.7%, group consultations 18.5%, online classes 12.3%, independent work 9.6%, others 4.8%. (Figure 10).



Figure 10. Preference for forms and methods in the process of teaching psychological and pedagogical disciplines to future teachers (%)

To the question "In your professional activity, what are the main resources for improving the content, forms, and methods of teaching psychological and pedagogical disciplines to future teachers?" respondents identified the most effective as internships/professional development in Ukraine (30.1%), webinars (23%), trainings, masterclasses (11.5%), collaboration with colleagues (9.7%), and collaboration with scientists (5.3%) (Figure 11).

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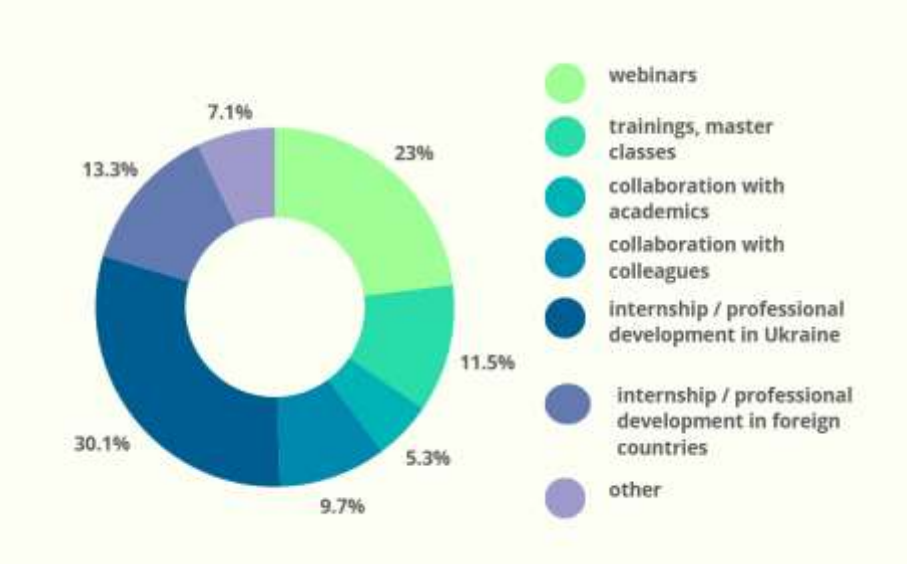

Figure 11. Sources for improving the content, forms, and methods of teaching psychological and pedagogical disciplines to future teachers (%)

Summarizing the survey results, we state that there is a motivation among lecturers to update the content of psychological and pedagogical disciplines, taking into account innovations (the implementation of the New Ukrainian School, specialized high school, etc.), and a focus on the appropriate structuring of the disciplines' content to form the competencies defined in the professional standard and in the standards of higher education for a particular specialty. At the same time, stagnation, outdatedness of the content of educational components, underdevelopment of quality educational and methodological support, and the neglect of interdisciplinary connections were noted.

In the course of the study, an analysis of the educational documentation of psychological and pedagogical disciplines (educational programs, syllabi, work programs, educational and methodological support/provision) was carried out in the training of future teachers of various specializations at the level of professional pre-higher education, and at the bachelor's, master's, and doctoral educational levels in 18 institutions of professional pre-higher and higher pedagogical education in different regions of Ukraine.

The study of the documentation allowed us to identify the following features of the content structuring of psychological and pedagogical training for future teachers at different educational levels, which is partially presented in the publications of researchers such as M. Vovk, Yu. Hryshchenko, S. Solomakha (2024):

– *at the educational level* of professional pre-higher education: the diversification of psychological and pedagogical disciplines depends on the specialty, the focus of the educational and professional programs, and the regional specifics of the institution's functioning; psychological and pedagogical disciplines precede pedagogical, educational, and professional practicums; significant attention is paid to the methodologies of teaching specialized subjects, and methodological techniques for teaching/learning in primary school, taking into account the conceptual principles of the New Ukrainian School; the content is structured considering the theory and practice of pedagogical mastery in primary school, in preschool education, etc.; and the organization of educational work;

– *at the bachelor's educational level* (focus on the formation of professional competencies, development of elective educational components taking into account the future profession, the individual educational trajectory of students, structuring of content based on the study of problems of inclusive education, psychological help, support, countering bullying, etc.);

– *at the master's educational level* (the content of educational and professional training programs for specialists is formed taking into account competencies (general and special (professional, subject-specific)) and learning outcomes; focus on the formation of teaching skills in synthesis with the

development of research, innovative, and leadership competencies);

– *at the doctoral educational level* (the list and content of elective psychological and pedagogical disciplines are regulated by the demand from future lecturer-researchers for an in-depth study of a relevant sub-discipline of pedagogy, psychology, or an interdisciplinary course, considering their research interests and the topic of their dissertation research; the content of psychological and pedagogical disciplines is structured to develop teaching and pedagogical mastery, the ability to create innovations in the field of educational and pedagogical sciences and to transmit them into educational practice).

Based on the results of the empirical research (survey of lecturers, study of educational documentation for teaching psychological and pedagogical disciplines), recommendations were proposed at different levels:

– *at the institutional level*: improvement of the quality criteria for educational programs by the National Agency for Higher Education Quality Assurance under the human resources criterion, focusing on the need to develop the professional competencies of lecturers, who must have the ability and readiness to teach future educators who have experienced psychological trauma, physical violence, etc., in the conditions of the Russian war against Ukraine; defining in the local documents of educational institutions the need to correlate the content of psychological and pedagogical disciplines with the competencies specified in the professional standard; harmonization of curricula under educational programs at different educational levels; regulation of educational partnerships between institutions of higher pedagogical and general secondary education to respond to the challenges of the war and the post-war recovery of the country;

– *at the managerial level:* improvement of the psychological and pedagogical training of future teachers based on the theory and practice of psychopedagogy, personology of education, and the actualization of historical-pedagogical ideas; updating the content of the compulsory discipline "Pedagogy" considering the competency-based principles of the New Ukrainian School; implementing cross-cutting content modules and topics on the problems of psychological trauma in children resulting from military actions, and problems of mental health in partnership with teachers, students, parents, and the community; creating digital educational and methodological support for updating the content of compulsory psychological and pedagogical disciplines; developing educational and methodological support for improving the content of psychological and pedagogical training for future lecturers of pedagogical specialties, taking into account key competencies;

– *at the professional level*: updating syllabi and programs of educational components in the psychological and pedagogical field, considering the actualization of the Ukrainian historical-pedagogical heritage to strengthen the nation-building context of the content of the respective disciplines; updating the content of psychological and pedagogical disciplines on the principles of interdisciplinary integration with topics on the problems of personology of education, mental health, inclusion, overcoming educational losses, psychodidactics, and mediadidactics; introducing into educational components innovative content on the problems of methodology of pedagogical and psychological research based on the works of Ukrainian and foreign scientists; modeling professional situations to develop partnership interaction among participants in the educational process, taking into account the challenges of war, as well as with a projection onto the realities of organizing the educational process in the period of post-war recovery; creating an innovative educational environment (mentoring, author's pedagogical workshops, summer/winter schools for graduate students), etc.

Conclusions. Improving the content of psychological and pedagogical training for future teachers on a competency basis is a multifaceted process that requires a systematic approach at different educational levels. It is recommended to improve the content of the basic discipline of the pedagogical field ("Pedagogy"); to update the content of the "Pedagogy" discipline based on the introduction of content modules and topics on the problems of psychopedagogy, history of pedagogy, personology of national education, and pedagogical mastery; to improve syllabi, work programs, and the educational-methodological support for the psychological and pedagogical training of future teachers at different educational levels in the field of knowledge 01 Education in institutions of professional pre-higher education (pedagogical

colleges) and institutions of higher pedagogical education based on the competencies defined in the professional standards for teachers and lecturers; to significantly update the content of the psychological-pedagogical component in the context of its derussification; to implement modern innovative scientific and methodological support for the study of psychological and pedagogical disciplines in a digital format, etc.

It is advisable to make qualitative changes to the educational programs for the training of future teachers in the field of knowledge 01 Education at the bachelor's and master's educational levels in institutions of higher pedagogical education; to improve the content of psychological and pedagogical training for specialists of pedagogical professions, taking into account the challenges of the post-war recovery of Ukraine.

The improvement of the content of psychological and pedagogical training for future teachers should occur through the introduction of content modules and topics from the theory and practice of psychopedagogy, personology of education, and the actualization of historical-pedagogical ideas by implementing cross-cutting content modules and topics in compulsory and elective disciplines on the problems of psychological trauma in children resulting from military actions, and problems of mental health in partnership with teachers, students, parents, and the community. The updating of syllabi and programs of educational components in the psychological and pedagogical field should be carried out taking into account the Ukrainian historical-pedagogical heritage to strengthen the nation-building context of the content of the respective disciplines, and on the principles of interdisciplinary integration with topics on the problems of personology of education, mental health, inclusion, overcoming educational losses, psychodidactics, mediadidactics, etc. It is advisable to foresee the creation of digital educational and methodological support for updating the content of compulsory psychological and pedagogical disciplines; the modeling of professional situations to develop partnership interaction among participants in the educational process, taking into account the challenges of war, as well as with a projection onto the realities of organizing the educational process in the period of post-war recovery (teaching psychologically traumatized pupils and students, the need for partnership communication with internally displaced persons, persons who have suffered losses, stressful situations, etc.); and the adaptation of the latest European and global educational-pedagogical practices to the needs of the education system in Ukraine.

A perspective for further research is the development and approbation of educational and methodological support for improving the content of psychological and pedagogical disciplines in the training of future teachers.

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РЕКОМЕНДАЦІЇ З УДОСКОНАЛЕННЯ ЗМІСТУ ПСИХОЛОГО-ПЕДАГОГІЧНОЇ ПІДГОТОВКИ МАЙБУТНІХ ПЕДАГОГІВ В УКРАЇНІ

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Реферат:

Актуальність: проблема оновлення змісту психолого-педагогічної підготовки майбутніх педагогів зумовлена необхідністю актуалізації української історико-педагогічної спадщини з метою посилення націєтворчого контексту змісту психологічних і педагогічних дисциплін; збагачення темами з проблем персонології освіти, ментального здоров'я, інклюзії, подолання освітніх втрат, психодидактики, медіадидактики на засадах міжпредметної інтеграції; гармонізації змісту психолого-педагогічних дисциплін з професійним стандартом вчителя, викладача тощо.

Мета статті: узагальнення результатів опитування викладачів закладів фахової передвищої і вищої педагогічної освіти різних регіонів України вивчення освітньої документації щодо структурування змісту

психолого-педагогічної підготовки майбутніх педагогів; обґрунтування рекомендацій з удосконалення змісту психолого-педагогічної підготовки майбутніх педагогів на різних рівнях.

Методи дослідження: онлайн опитування викладачів закладів фахової передвищої і вищої педагогічної освіти з метою визначення проблемних питань у процесі викладання психолого-педагогічних дисциплін майбутнім педагогам на різних освітніх рівнях аналіз освітньої документації психолого-педагогічних дисциплін (освітніх програм, силабусів, робочих програм, навчально-методичного супроводу/забезпечення) в підготовці майбутніх педагогів різного фаху на рівні фахової передвищої освіти, на бакалаврському, магістерському, докторському освітніх рівнях у 18 закладах фахової передвищої і вищої педагогічної освіти в різних регіонах України; прогностичний аналіз задля обґрунтування рекомендацій з оновлення змісту психолого-педагогічної підготовки майбутніх педагогів.

Результати: Узагальнюючи результати опитування, констатовано, що спостерігається вмотивованість викладачів на оновлення змісту психолого-педагогічних дисциплін з урахування інновацій (упровадження Нової української школи, профільної старшої школи тощо), спрямованість до доцільне структурування змістового контенту дисциплін задля формування визначених у професійному стандарті, у стандартах вищої освіти з певної спеціальності компетентностей усталеність, застарілість змісту освітніх компонентів, нерозробленість якісного навчально-методичного супроводу, нівелювання міжпредметних зв'язків тощо. Аналіз освітньої документації до психолого-педагогічних дисциплін уможливив висновок про необхідність удосконалення змісту психолого-педагогічної підготовки майбутніх педагогів, що має відбуватися шляхом упровадження змістових модулів, тем з теорії і практики психопедагогіки, персонології освіти, актуалізації історико-педагогічних ідей, упровадження наскрізності змістових модулів, тем в обов'язкові і варіативні дисципліни з проблем психологічних травм дітей, отриманих у результаті військових дій, проблем ментального здоров'я у партнерстві вчителів, учнів, батьків, громади; створення цифрового навчально-методичного супроводу оновлення змістового контенту обов'язкових психолого-педагогічних дисциплін тощо.

Висновки: за результатами емпіричного дослідження (опитування викладачів, вивчення освітньої документації до викладання психолого-педагогічних дисциплін) було запропоновано рекомендації на різних рівнях – на інституційному (удосконалення критеріїв якості освітніх програм Національним агентством із забезпечення якості вищої освіти за критерієм людських ресурсів у напрямі необхідності розвитку професійних компетентностей викладачів; визначення необхідності співвіднесення змісту психолого-педагогічних дисциплін визначеним у професійному стандарті компетентностям; урегулювання освітнього партнерства між закладами вищої педагогічної та загальної середньої освіти з метою реагування на виклики війни і повоєнного відновлення країни); на управлінському (удосконалення психолого-педагогічної підготовки майбутніх вчителів на основі теорії і практики психопедагогіки, персонології освіти, актуалізації історико-педагогічних ідей; оновлення змісту обов'язкової дисципліни «Педагогіка»; впровадження наскрізності змістових модулів, тем з проблем психологічних травм дітей, отриманих у результаті військових дій, проблем ментального здоров'я у партнерстві вчителів, учнів, батьків, громади; створення цифрового навчально-методичного супроводу); на професійному (оновлення силабусів, програм освітніх компонентів психолого-педагогічного спрямування з урахуванням актуалізації української історико-педагогічної спадщини з метою посилення націєтворчого контексту змісту відповідних дисциплін; оновлення змісту психолого-педагогічних дисциплін на засадах міжпредметної інтеграції темами з проблем персонології освіти, ментального здоров'я, інклюзії, подолання освітніх втрат, психодидактики, медіадидактики) тощо.

Ключові слова: *психолого-педагогічна підготовка, майбутні педагоги, зміст психолого-педагогічної підготовки, компетентності, рекомендації.*

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LEARNER-CENTERED TEACHING OF PSYCHOLOGICAL AND PEDAGOGICAL DISCIPLINES IN HIGHER EDUCATION INSTITUTIONS: CURRENT STATE OF RESEARCH

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Abstract

The relevance of the article is driven by the necessity to implement learner-centered teaching of psychological and pedagogical disciplines in higher education institutions. This need becomes particularly significant within the context of Ukraine's integration into the European Higher Education Area, the dynamic transformations of the pedagogical paradigm, the expansion of adult education, and the increasing demands for the professional training of modern specialists.

*Aim***:** To conduct a comprehensive analysis of the state of scholarly research on learner-centered teaching of psychological and pedagogical disciplines in higher education institutions, with the purpose of identifying key trends, contradictions, and outlining prospects for further development and practical implementation.

*Methods***:** Information retrieval methods for analyzing scientific electronic databases and selecting relevant sources; scientometric and bibliographic methods aimed at quantitative analysis of publications and citation metrics; semantic-network analysis of the structure and interrelations of key concepts; comparative analysis and synthesis of scientific literature; statistical and graphical analysis of research dynamics.

*Results***:** The analysis of domestic scientific sources revealed a predominance of theoretical studies focused on organizational models and the training of future teachers, while empirical research–especially in non-pedagogical higher education institutions—remains insufficiently explored. Bibliometric and semantic-network analyses of international databases (Web of Science, Google Scholar) facilitated tracing and graphically illustrating the evolution of key concepts within the research domain, the emergence and development of new research clusters in the scientific information space. These findings indicate dynamic development of the field, particularly in response to the widespread transition to distance and blended learning formats. The paper substantiates the urgency of further enhancing the system of teaching psychological and pedagogical disciplines by introducing innovative learner-centered models, technologies, and pedagogical methods, alongside systematic preparation of educators to operate within student-centered education frameworks.

*Conclusions***:** The comprehensive analysis enables clear tracking of the development of learner-centered teaching of psychological and pedagogical disciplines within the national and international scientific communities, revealing major trends, clusters, and research gaps. This analysis supports the identification of promising research directions and improvements in educational program quality through content transformation. It is confirmed that learner-centered teaching is gaining a leading role in the theory and practice of professional education, linked to the adoption of cognitive strategies and productive learning in training specialists across various economic sectors via distance and

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blended learning modalities aimed at enhancing education quality. The observed evolution of key concepts and the formation and growth of new clusters in the information space signify the dynamic advancement of this research area.

Keywords: *person-centered learning, person-centered approach, person-centered teaching, person-centered learning, higher education institution, bibliometric analysis.*

Introduction. Integration into the multidimensional and dynamic European Higher Education Area (EHEA) requires a systematic and flexible response to modern challenges, based on coordinated state responsibility for implementing structural changes. Among the key directions of these changes are the development of academic freedom, institutional autonomy, and adherence to the principles of academic integrity. At the present stage, the improvement of Ukrainian higher education is occurring through standardization in accordance with the National Qualifications Framework, harmonized with the European Qualifications Framework, the application of a common degree structure, and the implementation of quality assurance principles and procedures and the recognition of qualifications (European Ministers responsible for Higher Education [EMHE], 2010). The introduction of the "Teaching and Learning Excellence" (TLE) paradigm in the EHEA was an initiative of ministers from 47 countries and was officially enshrined in the Yerevan Communiqué on May 14-15, 2015. The last decade has been characterized not only by observation but also by the active participation of the Ukrainian pedagogical community in the profound transformations of the national education system (Order of the Cabinet of Ministers of Ukraine, 2022), which particularly concerns the reform and modernization of higher education, improving the quality of educational services, and expanding opportunities for human potential development (Ministry of Economy of Ukraine, 2024; Ministry of Economy of Ukraine, n.d.). In this context, the training of specialists capable of acting in complex, dynamic, and unpredictable educational environments at both institutional and regional levels, making responsible decisions, carrying out innovative activities, and ensuring lifelong learning becomes particularly relevant (Order of the Cabinet of Ministers of Ukraine, 2024; National Council for the Recovery of Ukraine from the Consequences of the War, 2022). Thus, there is a growing need for specialists who possess not only deep professional knowledge but also developed psychological and pedagogical competencies that allow them to perform various roles – lecturer, tutor, facilitator, coach, mentor, business trainer, etc. (Ministry of Education and Science of Ukraine, 2024). This becomes especially important in the context of the expanding sphere of adult education, the development of corporate training, and the implementation of state strategies aimed at the country's recovery and the formation of a civil society (Decree of the President of Ukraine, 2021). At the same time, the effectiveness of training such specialists largely depends on the quality of teaching psychological and pedagogical disciplines, which should be person-centered, that is, take into account the individual characteristics, needs, and potential of education seekers.

Sources. To search for monographs, collections of scientific works, professional journals, and other publications that cover the theoretical and applied aspects of person-centered learning and teaching, national information resources were used: the depository of electronic copies of scientific journals and collections of works of the V. I. Vernadsky National Library of Ukraine, as well as the Ukrainian Abstract Database "Ukrainika Naukova," which provides access to bibliographic descriptions and abstracts of domestic scientific publications in the field of knowledge A Education and related fields. To search and analyze dissertation research by key phrases ("person-centered learning," "person-centered approach," etc.) with visualization of results by year, the National Repository of Academic Texts (NRAT) was used. Among international information resources, the open-access system Google Scholar was used to search for full-text, modern Ukrainian and foreign scientific articles, and the Web of Science (Clarivate) platform was used for analyzing publications and citations of scientific works by English-language keywords ("learner centered learning," "learner oriented learning," etc.). Bibliometric and semantic network analyses were performed using VOSviewer software. Promising directions for implementing foreign experience in the context of legislative and organizational changes in pedagogical education in Ukraine are considered in the works of N. Avsheniuk, Yu. Hryshchuk, L. Diachenko, M. Zembytska, N. Paziura, L.

Pukhovska, K. Shevchenko, O. Chuhai, and others. The problems of pedagogical training for specialists in various fields were studied by M. Artiushyna, V. Bondar, S. Vitvytska, M. Vovk, V. Kuleshova, O. Kucheriavyi, O. Lavrentieva, O. Lavrinenko, E. Luzyk, N. Machynska, S. Semerikov, V. Semichenko, and others. The application of person-centered learning technologies in the higher education system is highlighted by L. Baranovska, P. Dziuba, N. Kulalaieva, Yu. Prykhodko, H. Romanova, V. Tkachenko. The concepts of personalized learning and the personal educational environment were developed by Yu. Nosenko, M. Shyshkina, T. Anderson, D. Buckley, A. Chatti, S. Epstein, S. Fiedler, S. Wheeler, and others. The transformation of the professional development of pedagogical and scientific-pedagogical workers in the context of open education is studied by L. Kartashova, L. Lukianova, O. Ovcharuk, L. Petrenko, L. Pukhovska, A. Kennedy, B. Philipsen, D. Sparks, Wendi K. Zimmer. The problems of continuous professional education and training in the context of lifelong learning were researched by V. Loznytsia, N. Nychkalo, S. Sysoieva, and others. Aspects of adult education were considered by O. Anishchenko, V. Maslova, T. Aleksander, P. Jarvis, M. Knowles, P. Smith, L. Turos, and colleagues. In addition to the mentioned sources, the authors used normative and conceptual documents, including: the Yerevan Communiqué (May 14-15, 2015) as a guideline for the development of teaching and learning in the EHEA; the National Qualifications Framework of Ukraine, harmonized with the European Qualifications Framework (EQF); analytical and statistical data – quantitative analysis of dissertations and scientific publications by keywords in domestic and international databases; visualization of bibliometric indicators (number of publications, citations, thematic clusters) using VOSviewer and other scientometric platforms. This complex of information resources, analytical tools, and theoretical sources became the basis for a deep content analysis of the problem of person-centered teaching of psychological and pedagogical disciplines, which guarantees the scientific validity and relevance of the obtained conclusions.

Purpose of the article. To conduct a comprehensive analysis of the state of scientific development of the problem of person-centered teaching of psychological and pedagogical disciplines in higher education institutions to identify major trends, contradictions, and determine prospects for further research and practical implementation.

Methods. For a comprehensive analysis of the state of scientific development of the problem of person-centered teaching of psychological and pedagogical disciplines in higher education, a range of methods was applied: information retrieval – for analyzing scientific electronic databases and selecting relevant sources; scientometric and bibliographic – for conducting quantitative analysis and evaluating the citation of publications; semantic network analysis of text structures – for identifying interconnections between key concepts; comparative analysis and generalization of scientific literature – for forming main ideas and conclusions; statistical and graphical analysis of research dynamics – for visualizing the obtained results. The synthesis of these methods ensured a multifaceted characterization of the state, trends, and prospects for the development of person-centered teaching in higher education institutions.

Results and Discussion. Pedagogical practice has proven that teaching effectiveness plays a crucial role in the learning process, yet little is known about its conceptualization and assessment, especially in higher education (Mastrokoukou et al., 2022). For the information-retrieval analysis of the research source base, we used key term combinations belonging to the same semantic group: "person-centered orientation," "person-centered learning," "person-centered approach," "person-oriented learning," "person-centered teaching." In the context of our research topic, it is pertinent to note that in pedagogy, the concept of "learning" (навчання) is understood as the purposeful interaction between a teacher and students during which knowledge is acquired, and skills and abilities are formed (Volkova, 2001, p. 14). This feature of the concept was taken into account by us during the search for scientific literature. Therefore, we did not exclude the joint use of these concepts in the same scientific works. Pedagogical practice confirms that teaching effectiveness is a key factor in the success of the educational process, but its conceptualization and quantitative assessment remain insufficiently researched (Mastrokoukou et al., 2022). Within our

study, a broad semantic group of terms (e.g., "person-centered learning," "person-centered approach") was used, corresponding to the central problem of personality formation in the process of education. For the quantitative analysis, national and international electronic resources were involved, including the depository of the V. I. Vernadsky National Library of Ukraine, the Ukrainian Abstract Database "Ukrainika Naukova," the National Repository of Academic Texts (NRAT), Google Scholar, as well as the Clarivate and Web of Science platforms using the VOSviewer visualization tool. This approach allowed for a multidimensional analysis of scientific publications, dissertation research, citations, thematic clusters, and development trends. According to the results of the quantitative search in the Scientific Periodicals of Ukraine (NBUV), over 300 documents related to person-centered learning were identified, 173 documents for the term "person-centered approach," and 14 for the concept "person-centered teaching." The analysis of the topics shows an emphasis on the theoretical foundations of learning, models of educational process organization, and methods of teaching various academic disciplines in higher education institutions (HEIs), particularly for the professional training of future teachers. However, insufficient authorial attention is given to the application of the person-centered approach in non-pedagogical HEIs, which indicates a certain narrowness of the existing scientific field in Ukraine on the stated research topic. An analysis of the titles, abstracts, and conclusions of the authors makes it possible to distinguish the main trends in research on this issue. Since the 2000s, it has covered the theory and practice of learning and teaching in various educational institutions. The largest number of studies is devoted to the professional training of future teachers. At the same time, it was found that the use of a person-centered approach by teachers of non-pedagogical higher education institutions in the professional training of specialists for various sectors of the economy is insufficiently covered. In the process of studying the scientific literature, it was established that Ukrainian scientists mostly focus on the theoretical foundations of the development of the person-centered approach and its implementation in the educational process, while there are significantly fewer empirical studies of its practical implementation in HEIs. The results of the quantitative analysis of dissertations by the specified terms in NRAT, visualized graphically in Fig. 1, demonstrate the peak scientific activity of researchers in 2009, with 8 defended works. However, in subsequent years, a fluctuation is noted, which likely reflects the completion of the initial stage of studying the topic or a shift in research priorities. The absence of dissertations in Ukraine since 2019 contrasts with the increased interest in this problem (Kerimbayev, 2023) in the European Higher Education Area after 2015 (Yerevan Communiqué, 2015).

Based on the scientific results of studying person-centered learning and teaching, highlighted in the scientific works of I. Bekh (Bekh, 2003), V. Kulchytskyi (Kulchytskyi, 2014), N. Panchuk (Panchuk, 2018), and others, a further search for dissertations in NRAT was carried out using the concept of "person-centered approach" – a pedagogical and psychological strategy that focuses on the individual characteristics, needs, interests, and potential of the personality in the process of learning, upbringing, and correction, which involves creating conditions for self-realization, development of autonomy, self-determination, and active participation of the subject in their own development (Bekh, 2003; Kulchytskyi, 2014; Panchuk, 2018).

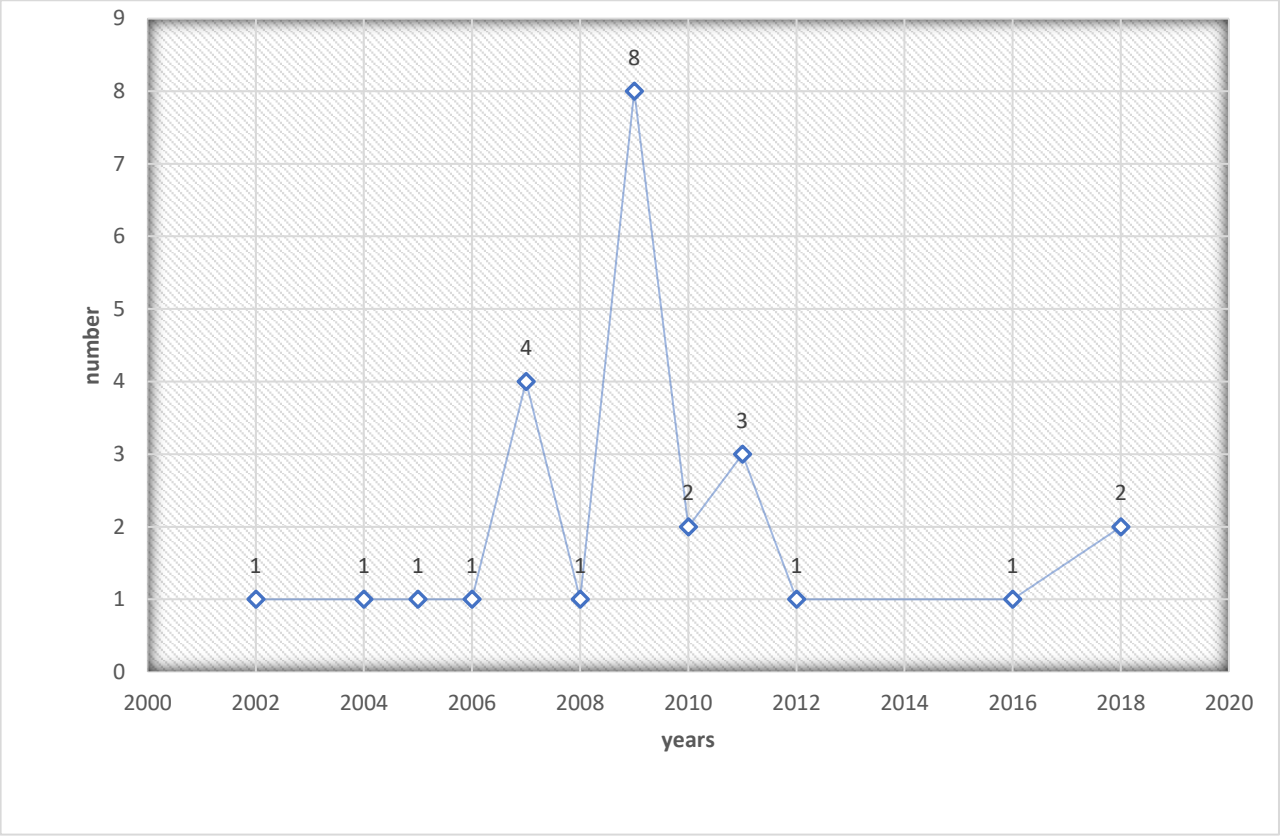

Fig. 1. Results of the quantitative analysis of dissertations in NRAT by the key concept "person-centered learning" (source: developed by the authors)

The obtained results of the information-analytical search for scientific works are visualized graphically in Fig. 2 and illustrate a low interest from the scientific community in this issue during 2007–2018. These data show the annual defense of one dissertation during the specified period, which examines the problem of using a person-centered approach to solve current tasks in the education system. From our point of view, these indicators, on the one hand, reflect the stability of the topic in domestic scientific research, but on the other hand, they indicate a limited expansion of the circle of researchers or the highly specialized nature of the topic in the context of the theory and practice of pedagogical science. At the same time, the absence of sharp changes in quantitative indicators points to the preservation of interest in the stated problem at a constant level, without pronounced spikes over the last 20 years.

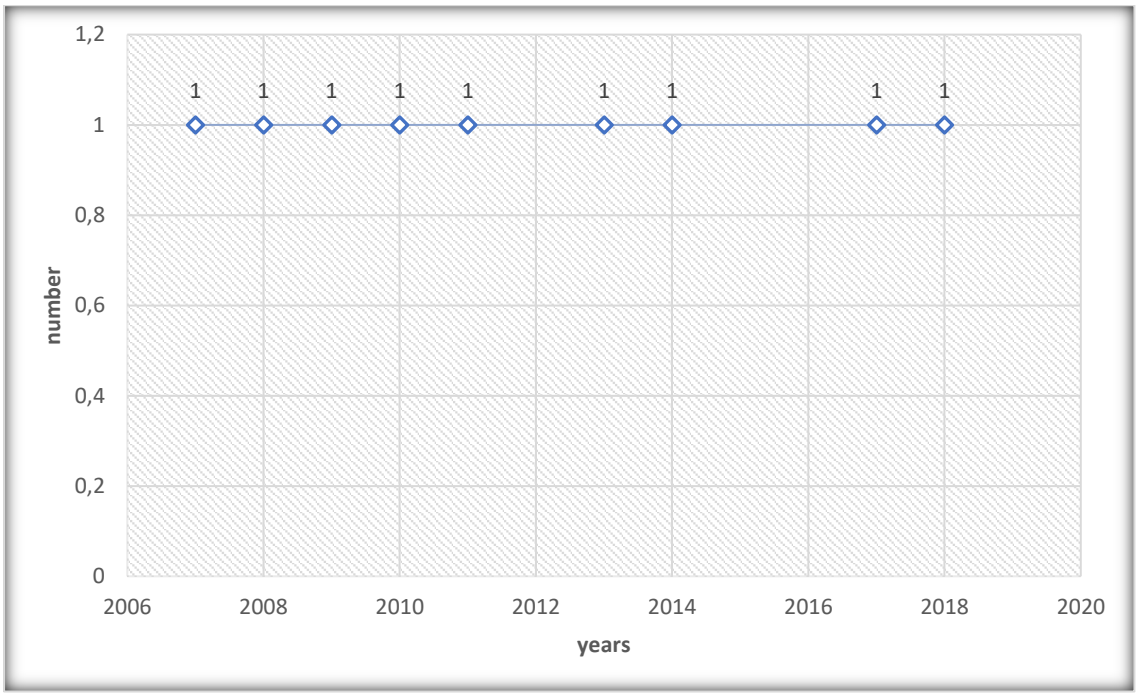

Fig. 2. Results of the information-analytical search of dissertations in NRAT by the key phrase "person-centered approach" (source: developed by the author)

In the open-access search engine Google Scholar, over the last five years, more than 58 thousand mentions of the researched definitions have been found in the titles and texts of articles by Ukrainian and foreign authors, which indicates a significant global interest in the specified topic. For the information-retrieval analysis of scientific articles and publications on the Web of Science platform using equivalent term combinations in English: "personality oriented/centered approach," "learner centered/oriented approach," "learner centered/oriented pedagogy," "learner oriented teaching," "learner centered/oriented learning," we applied the VOSviewer software tool (Saini, Lievens & Srivastava, 2022) and Clarivate analytics. However, the result obtained exceeded the capabilities of the specified platform, and therefore we conducted a search query using the term "learner centered learning," which is sufficiently informative to achieve the research goal, for the period from 2000 to 2025, which made it possible to identify 11,634 articles. The graphical representation of these results (Fig. 3) indicates a noticeable increase in scientific interest in the raised issue since 2009 (51 publications, 252 citations). Subsequently, a stable growth in the number of publications is observed until 2020 (729 publications, 8693 citations) and reaches a peak in 2021 (837 publications, 11180 citations). Subsequently, a certain decline can be observed in 2022-2023. In 2024, the number of published scientific works decreased to 810, but the number of citations increased significantly to 16,824. Following the logic of this study, the subsequent search was aimed at finding articles that use the English term "learner centered learning." For the period 2000–2025, 11,634 articles were identified on the Web of Science platform (Fig. 3).

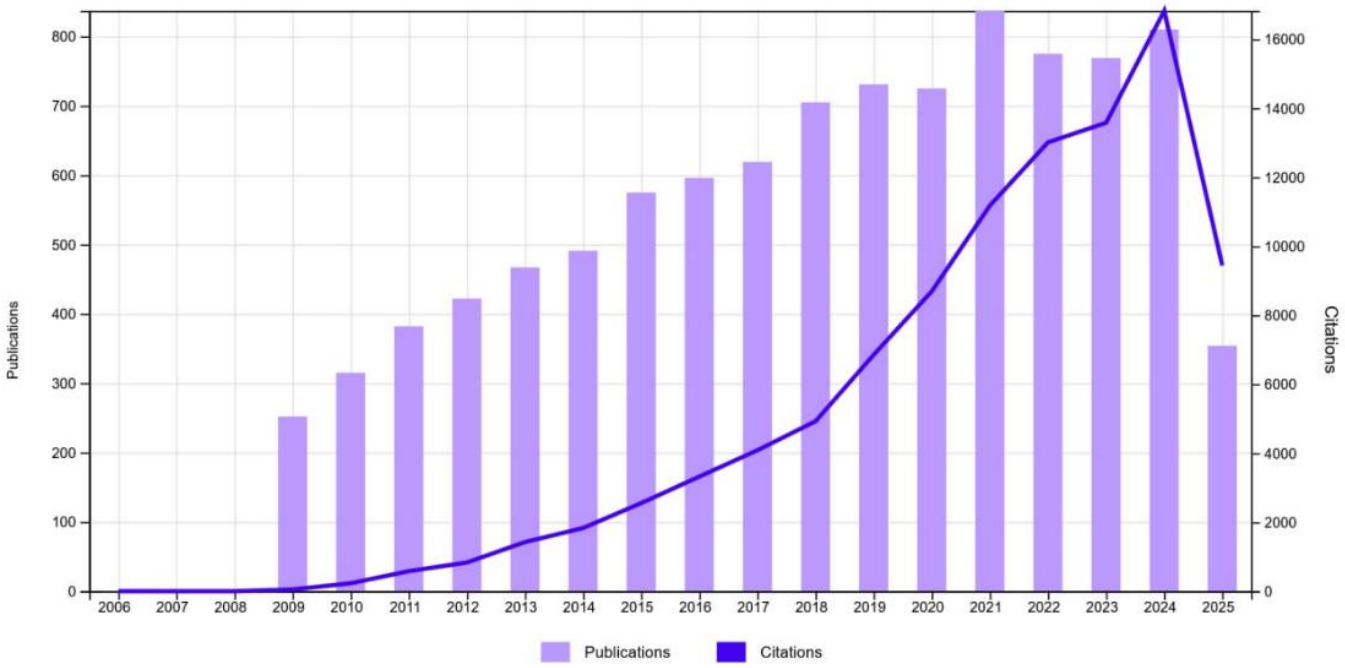

Fig. 3. Dynamics of scientific publications and citations from a Web of Science search query: "learner centered learning" in 2009–2025 (source: Clarivate search platform)

The diagram shows a significant increase in publications and citations starting from 2009, with a peak in 2021. Despite a slight decline in 2022-2023, the number of citations continues to grow in 2024, indicating the influence of the research. At the same time, despite the growing number of citations of scientific works on person-centered learning, the actual teaching practices remain under-researched (Aldino et al., 2025). Thus, the dynamics of publications and citations on the researched topic show a general upward trend until 2024. It can be hypothesized that the sharp increase in publications with results of research on person-centered learning and teaching is related to the mass transition to distance and blended learning and the development of student agency. In general, the growth in the number of publications was accompanied by an even greater growth in citations, which testifies to their influence on the organization of the educational process in educational institutions and the professional training of specialists for various sectors of the economy. The visualization of the bibliometric analysis (Saini et al., 2022) using VOSviewer allows for the identification of the largest centers (clusters) in thematic research based on the search query "learner centered learning." Figs. 4-5 display the key thematic clusters of scientific research in 2023–2024 (Fig. 4), which are dominated by the concepts of "pedagogy," "higher education," "person-centered teaching," as well as terms related to modern challenges – "online," "active learning," "feedback," and "COVID-19 pandemic." For example, in 2023, 810 articles marked with these terms were identified (Chan, Cheah & Choong, 2024; Mastrokoukou et al., 2022; Lam, 2021).

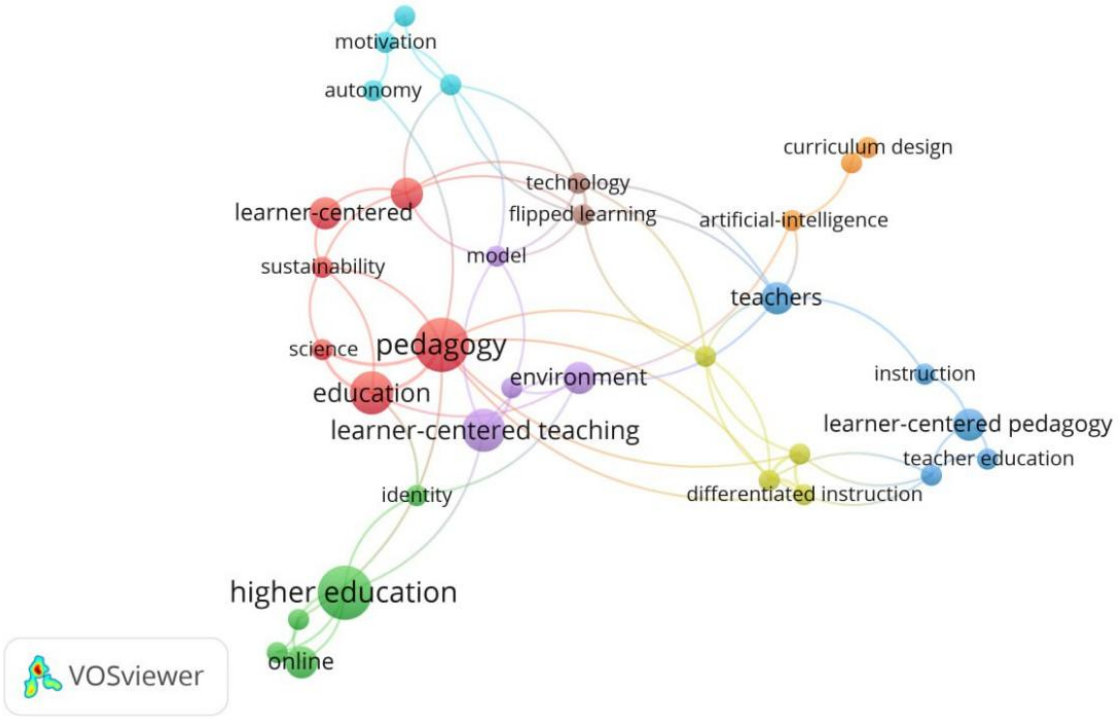

Fig. 4. Visualization of the results of the bibliometric analysis of the researched term combinations for 2023 from a Web of Science query: "learner centered learning" (source: developed by the authors)

The clusters marked with green and yellow markers, created by the concepts "higher education," "online," and "differentiated instruction," indicate the emergence of new research directions. The connections between them within the clusters are also shown. The lines between individual clusters indicate the frequency of co-occurrence of these terms in scientific publications. Fig. 5 shows the emergence of clusters in 2024 (886 articles) with keywords linked to each other in the context of scientific publications in the fields of education, learning, and cognitive sciences. Attention should be paid to the main centers – key terms and topics or concepts. For example, the concepts "performance" and "quality" are associated with the concept "teachers."

One cluster combines the terms "feedback," "education," and "self-efficacy," for example, in the publication by (Chan, Cheah & Choong, 2024). In scientific publications, the categories "students," "higher education," and "COVID-19" are often interconnected (Mastrokoukou et al., 2022). The links between the concepts "learner-centered," "student-centered," and "active learning" are clearly displayed as a separate center. The cluster formed by the terms "performance," "quality," and "teachers," which are related to the concepts "knowledge" and "skills," indicates new trends in research on the problems of person-centered teaching. The emergence of large centers on the scientometric map indicates the importance of topics in pedagogical theory and practice or the frequency of mentions of this topic in research. The scientometric maps shown in Figs. 4 and 5 indicate that modern research is concentrated on such important aspects in education as: assessment and performance (Pereira et al., 2022; Farias et al., 2022); feedback (Lam, 2021); learner-orientation ("learner-centered," "student-centered," "active learning") (Oyelana, Olson, & Caine, 2022; Doolittle, Wojdak & Walters, 2023); use of technology (Kerimbayev, 2023); the impact of the COVID-19 pandemic on students (Chen, Hughes & Ranade, 2023) and higher education (Robertson et al., 2021); and the level of knowledge and skills as goals of the educational process (Doyle, 2023). In summary, we consider it necessary to draw attention to the growing importance of an integrated approach in educational research, which combines cognitive theories (e.g., "cognitive load theory") with active pedagogical models and methods for assessing effectiveness (Doolittle, Wojdak & Walters, 2023; Moos & Pitton, 2014). It is also worth emphasizing

the significant impetus in the introduction of innovative technologies as a significant factor influencing the student environment and the development of pedagogical technologies aimed at implementing a student-oriented approach, which is now gaining increasing popularity as a means of improving the quality of online, distance, and blended learning (Kerimbayev, et al., 2023).

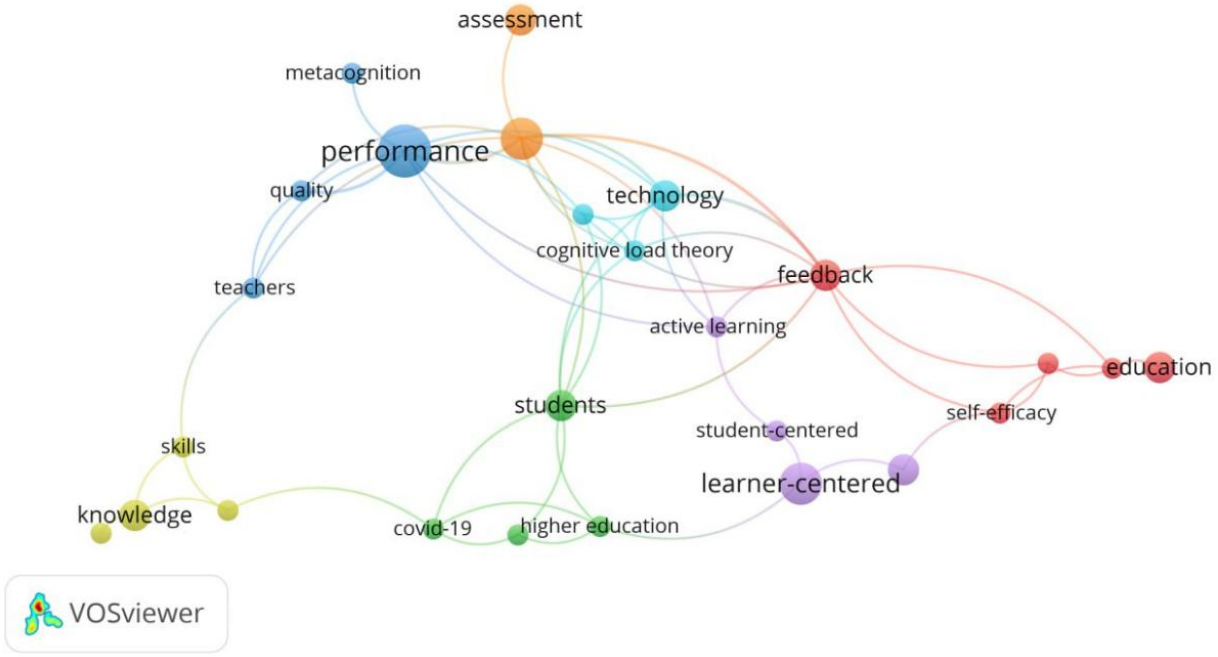

Fig. 5. Visualization of the results of the bibliometric analysis of the researched term combinations for 2024 from a Web of Science query: "learner centered learning" (source: developed by the authors)

Conclusion. Thus, the conducted comprehensive bibliometric analysis and visualization of scientometric data have made it possible to: illustrate the development of the topic of person-centered teaching of psychological and pedagogical disciplines in the domestic and international scientific space; identify the main trends, clusters, and scientific gaps; outline promising research directions and ways to improve the quality of educational programs through the transformation of their content; confirm the strengthening of scientific attention to the problem of person-centered teaching in the theory and practice of professional education; show the existence of a link between the quality of education and the implementation of cognitive strategies and productive learning in the format of distance and blended learning in the training of specialists for various sectors of the economy; reveal the evolution of key concepts, the trend of emergence and further development of new clusters in the information space, and prove the dynamic development of this direction.

Prospects for further research. We see prospects for further development in conducting interdisciplinary research, developing international cooperation for the exchange of experience, developing educational analytics, monitoring innovations in the field of person-centered teaching of psychological and pedagogical disciplines in higher education institutions, and conducting exploratory studies on the impact of artificial intelligence on the transformation of student-centered learning.

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ОСОБИСТІСНО ОРІЄНТОВАНЕ ВИКЛАДАННЯ ПСИХОЛОГО-ПЕДАГОГІЧНИХ ДИСЦИПЛІН У ЗАКЛАДАХ ВИЩОЇ ОСВІТИ: СТАН НАУКОВОЇ РОЗРОБЛЕНОСТІ

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Реферат:

Актуальність статті зумовлена необхідністю впровадження особистісно орієнтованого викладання психолого-педагогічних дисциплін у закладах вищої освіти, яка набуває особливого значення в умовах інтеграції України до Європейського простору вищої освіти, динамічних змін педагогічної парадигми, розширення сфери освіти дорослих та посилення вимог до професійної підготовки сучасних фахівців.

Мета: здійснити комплексний аналіз стану наукової розробленості проблеми особистісно орієнтованого викладання психолого-педагогічних дисциплін у закладах вищої освіти для виявлення основних тенденцій, суперечностей і окреслення перспектив подальшого розвитку й практичного впровадження.

Методи: інформаційно-пошуковий – для аналізу наукових електронних баз даних та відбору релевантних джерел; наукометричні та бібліографічні – для здійснення кількісного аналізу й оцінювання цитованості публікацій; семантико-мережевий аналіз структури текстів – для виявлення взаємозв'язків між ключовими концептами; порівняльний аналіз і узагальнення наукової літератури – для формування основних ідей і висновків; статистичний та графічний аналіз динаміки досліджень – для унаочнення отриманих результатів.

Результати: аналіз вітчизняних наукових джерел засвідчив домінування теоретичних досліджень, зосереджених на організаційних моделях та підготовці майбутніх учителів, тоді як емпіричним розробкам, зокрема у закладах вищої освіти непедагогічного профілю, приділяється недостатньо уваги; проведений бібліометричний та семантико-мережевий аналіз міжнародних ресурсів (Web of Science, Google Scholar) дозволив відстежити та графічно ілюструвати еволюцію ключових понять досліджуваної проблематики, появу й розвиток нових дослідницьких кластерів у науковому інформаційному просторі; виявлено динамічний розвиток напряму, особливо в умовах масового переходу до дистанційної та змішаної форм навчання; оґрунтовано актуальність подальшого вдосконалення системи викладання психолого-педагогічних дисциплін шляхом впровадження інноваційних моделей, технологій і методик особистісно орієнтованого навчання, а також системної підготовки викладачів до роботи на засадах студентоцентрованої освіти.

Висновки: проведений комплексний аналіз ілюструє розвиток теми особистісно орієнтованого викладання психолого-педагогічних дисциплін у вітчизняному й міжнародному науковому просторі; виявляє основні тренди, кластери та наукові прогалини; окреслює перспективні напрями досліджень і сприяє покращенню якості освітніх програм через трансформацію їх змісту; підтверджує посилення наукової уваги до проблеми особистісно орієнтованого викладання в теорії і практиці професійної освіти; показує наявність зв'язку між якістю освіти та впровадженням у підготовку фахівців для різних галузей економіки когнітивних стратегій і продуктивного навчання у форматі дистанційного та змішаного навчання; виявляє еволюцію ключових понять, тенденцію виникнення й подальшого розвитку нових кластерів у інформаційному просторі, що свідчать про динамічний розвиток цього напряму.

Ключові слова: *особистісно орієнтоване навчання, особистісно орієнтований підхід, особистісно орієнтоване викладання, особистісно орієнтоване навчання, заклад вищої освіти, бібліометричний аналіз.*

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CONCEPTUAL MODEL FOR INTEGRATING SOCIAL AND HUMANITARIAN APPROACHES IN YOUTH CAREER GUIDANCE TOWARD VOCATIONAL PROFESSIONS

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Abstract

The relevance of developing a conceptual model for integrating social and humanitarian approaches into the professional orientation of young people towards blue-collar professions is determined by the need to: form value-motivated professional choices, overcome social stereotypes, increase the prestige of blue-collar professions, reduce youth unemployment, and increase young people's satisfaction with their professional choices.

Objective: to substantiate a conceptual model for integrating social and humanitarian approaches into the professional orientation of young people toward blue-collar professions, taking into account the value, cultural, and communicative factors that contribute to the formation of value-motivated professional choices.

Methods: general scientific (theoretical analysis, synthesis, comparison, modeling – for analyzing sources and achieving research objectives); empirical (content analysis – for studying narratives in the media and educational discourse; case studies – for analyzing successful local practices; advocacy strategies – for developing recommendations for implementing the model).

Results: the source base was analyzed; the peculiarities of social and humanitarian approaches to youth career guidance were identified and compared; successful practices of socially and humanitarily oriented career guidance were summarized; a conceptual model for integrating social and humanitarian approaches was substantiated; recommendations for implementing the model were developed.

Conclusions: career guidance for young people needs to be rethought as a tool for social cohesion and cultural renewal; the integration of social and humanitarian approaches contributes to the formation of a responsible professional identity; the updated model of career guidance is a strategic resource both for stabilizing the labor market in wartime and for the sustainable development of Ukraine in the context of post-war recovery.

Keywords: *vocational education, socio-humanitarian education, career guidance, social approach, humanitarian approach.*

Introduction. The professional orientation of youth towards skilled trades in Ukraine is largely implemented through tools that ignore social and humanitarian approaches. The lack of a systematic interaction between family, school, business, and community, as well as the underestimation of value orientations, cultural images of professions, and moral support, leads to a formal choice, loss of motivation, and a mismatch between the expectations of young people and the realities of the labor market. According to a 2022 survey (Bazyl et al., 2022, pp. 88, 129, 137), most vocational education institutions hold career guidance weeks, training sessions, and master classes, but these events are often one-off and not integrated into the educational process. Young people from rural areas, internally displaced persons, and people with disabilities have limited access to career guidance

programs. As part of the "Youth Pact-2025" initiative, over 45,000 jobs were created, and more than 100 forums and trainings were held; however, even such large-scale projects do not compensate for the general fragmentation of career guidance policy (Ministry of Economy, n.d.b.). This indicates the need for a new conceptual framework that will combine labor market analytics with humanitarian reflection, ensuring meaningful depth and social accessibility of professional choice.

Sources. The model proposed in the article was built using analytical studies of the domestic labor market (National Foresight Study "Ukraine-2035: Human Capital and Labor Market", 2021; Lesnikova, 2022; The Youth Segment of the Ukrainian Labor Market during the Full-Scale War, 2023; Kolesnikova, 2025). The development of the model's concept took into account foreign career choice concepts—ecological (Young, 1983; Özbilgin, Küskü, & Erdoğmuş, 2005) and social-cognitive (Lent, Brown, & Hackett, 1994; Hui, & Lent, 2018)—and theoretical approaches to career guidance developed by domestic scholars that emphasized the need to consider humanitarian and social aspects (Ye. Yehorova, O. Ihnatovych, V. Kobchenko, N. Lytvynova, H. Tataurova-Osyka, A. Shevenko, A. Shydelko). The instrumental component of the model was justified based on pedagogical innovations developed by scholars of the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine: D. Zakhatnov (identifying socio-psychological barriers, developing technologies for professional self-determination and methods of vocational education); V. Lozovetska (analyzing the influence of market conditions on career guidance, researching problems of social adaptation); O. Melnyk, L. Zlochevska, N. Honchar (using psychodiagnostic tools in the career guidance process with consideration of humanitarian factors); V. Kaloshyn (proving the role of positive thinking as a resource for professional self-determination in vocational education institutions). At the same time, the socio-humanitarian aspect of career guidance for youth in production professions in the context of war and post-war reconstruction requires additional study.

The purpose of the study is to substantiate a model for the integration of social and humanitarian approaches to career guidance for youth in skilled trades, taking into account value, cultural, and communicative factors that contribute to the formation of a conscious professional choice, increasing the prestige of skilled professions, and strengthening social cohesion.

Methods: general scientific (theoretical analysis – for critical reflection on official and scientific sources and forming the conceptual basis of the model; synthesis – for combining social, psychological, pedagogical, and cultural components into a single integrative framework for career guidance; modeling – for constructing a conceptual model that reflects the interaction of social and humanitarian approaches, as well as the mechanisms of influence on youth motivation for skilled trades); empirical (content analysis of sources – for studying narratives about skilled trades in scientific publications, media, educational programs, and public discourse; case studies – for analyzing successful local career guidance practices with a humanitarian component; focus group interviews – for studying the opinions of youth, educators, employers, and community representatives regarding motivation, barriers, and expectations; advocacy strategies – for preparing recommendations on the implementation of the developed model at various management levels).

Results and Discussion. The professional orientation of youth towards skilled trades is a multidimensional social process that includes family, school, vocational education institutions, business, the state, civil society, and scientific institutions. The family provides emotional support, promotes independent career choice, helps overcome stereotypes, and orients towards labor market realities. The state coordinates inter-agency programs, implements digital platforms, and supports career centers and national projects. The general education school forms initial orientations but faces staffing, resource, and methodological problems. Vocational education institutions compensate for the shortcomings of school career guidance through career centers, dual education, collaboration with business, and infrastructure modernization. Business plays a key role in forming human capital through internships, mentorship, financial support, and participation in advisory bodies, although it faces limited resources, low

motivation, and weak coordination. Scientific institutions, including the IVE NAES of Ukraine, provide methodological support, labor market analysis, development of career guidance models, and popularization of innovations. Civil society implements local initiatives, partnership projects, and educational routes but needs systematic integration. During the pandemic and the war, the digitalization of career guidance intensified, which contributed to the creation of integrated platforms (CareerHub, SmartJob, "Passport of Abilities") that combine testing, mentorship, and educational routes. The "Youth Pact - 2025" Initiative became an example of effective public-private partnership.

Thus, the social approach to the professional orientation of youth towards skilled trades involves the formation of a system of actors with clearly defined career guidance functions, namely: the family (a fundamental resource for career support for youth), the school (forms initial career orientations); vocational education institutions (ensure the formation of primary professional skills and the practical start of a young specialist); business (implements the integration of the labor market and education by organizing internships, developing dual education, and strengthening the material and technical base of educational institutions); the state (creates support institutions, voucherization, and systematic career guidance design); scientific institutions (provide analytical and methodological support, develop educational programs and courses, model and popularize examples of successful practices).

From the perspective of the social approach, career guidance is a local social process that forms competent citizenship and stable labor practices, and involves a systematic combination of individual support, institutional coordination, technological innovation, and the development of professional identity, which together contribute to achieving the expected socio-economic result—a reduction in youth unemployment and an increase in effective employment.

The humanitarian approach to career guidance involves a reorientation from the utilitarian choice of "profession as a means of earning a living" to a value-personal vision of "profession as a form of self-realization, service, and dignity." This approach is based on the principles of human-centeredness, dialogue, reflection, and cultural integration. It allows not only to inform young people about professional development opportunities but also to form a deep understanding of the social significance of skilled trades and their role in creating a common good. The relevance of this approach is due to a number of challenges: stereotyping (skilled trades are often perceived as less prestigious, which demotivates young people and lowers the social status of vocational and technical education); a deficit of reflection (young people often choose a profession without realizing their own values, interests, and life goals); a lack of dialogue (the educational environment does not always provide a space for open discussion of career paths, life scenarios, and cultural models of success); and socio-cultural fragmentation (many communities lack resources for the humanitarian support of professional choice—libraries, cultural centers, mentorship).

The essence of the humanitarian approach lies in creating conditions for: understanding the profession as a cultural phenomenon (through success stories, literary figures, and artistic practices that form a positive image of work); narrative counseling (where young people talk about their dreams, fears, and experiences, and the counselor helps structure these narratives into professional scenarios); creative self-expression (using essays, collages, and projects that allow young people to see themselves in various professional roles); and forming and understanding value orientation (assisting in shaping ideas about dignified work, responsibility, and service to the community).

The humanitarian approach does not deny the importance of economic, technical, or psychological factors but complements them with a deeper dimension—the formation of a professional identity based on cultural codes, ethical guidelines, and social meaning. In this context, a skilled trade is seen not as an "alternative" to academic success but as an equivalent path to self-realization that requires intellectual, emotional, and moral resources.

Thus, the humanitarian approach to youth career guidance is not only a method but also a strategy for forming a new culture of work, where every profession has dignity, and every student has the right to a meaningful choice. Its implementation in the system of vocational and technical education

will contribute not only to increasing youth motivation but also to strengthening the social capital of Ukraine.

The social and humanitarian approaches in career guidance differ in focus, methods, and value orientations. The former is aimed at aligning youth choice with the needs of the labor market, useful for forecasting employment and educational policy, but risks depersonalizing the choice. The latter focuses on the inner world of the individual, their aspirations, and meanings, helping them find not just a job, but themselves in a profession. In combination, these approaches transform career guidance into a process of forming a mature, responsible personality.

The social demand for the integration of these approaches into youth career guidance arises as a response to the complex challenges of modern Ukrainian society—economic, cultural, demographic, and educational. Such integration is not only a methodological solution but also reflects a deep societal demand for the formation of a mature, responsible, and dignified professional choice for young people, especially in the context of skilled trades.

The demand for integration is justified by a number of factors: the need for social cohesion (in the post-war context, Ukraine needs to restore trust between generations, regions, and sectors; skilled trades are not only an economic necessity but also a social cement that unites communities through shared work, responsibility, and local identity; the integration of approaches allows combining social effectiveness with personal dignity, which strengthens social unity); the necessity of overcoming the gap between education and the labor market (young people often do not understand how their values, interests, and abilities relate to real professional opportunities; the social approach provides analytics, the humanitarian one provides meaning, and their combination allows transforming statistics into a life scenario, and a profession into a personal mission); the focus on forming professional identity (society expects that young people will not just be employed but consciously integrated into the professional environment; this requires not only knowledge of the labor market but also a deep understanding of oneself, one's values, motivations, and cultural codes); the awareness of the need to form a new culture of career guidance (educational institutions should not only be a conduit for knowledge but also a space for meaning, dialogue, and reflection; the integration of approaches allows creating an educational environment where professional choice is not pressure but a process of self-discovery and social inclusion); the expectation of strengthening inter-sectoral cooperation (communities, business, the state, and education must work together, but often "speak different languages"; the integrative model creates a common framework where social indicators are combined with humanitarian meanings, which allows for effective communication between sectors).

Given this, a conceptual model that integrates social and humanitarian approaches to youth career guidance for skilled trades is particularly relevant for Ukraine's professional education system, with its relevance determined by the tasks of post-war reconstruction. The purpose of this model is to ensure a holistic process of youth career guidance that simultaneously takes into account socio-economic realities and the inner world of the individual, contributing to a conscious, dignified, and viable career choice.

The structure of the model provides for the presence of analytical, value-personal, and integration blocks (Fig. 1).

The analytical block (social approach) includes: labor market monitoring (determining relevant professions, regional needs, employment dynamics, etc.); sociological research (identifying youth expectations, the peculiarities of the influence of family, community, media, etc.); outlining educational and professional routes (ensuring the accessibility of educational programs, expanding employment opportunities).

The value-personal block (humanitarian approach) includes: narrative counseling (discussing life stories, reflection, defining meanings); career counseling (determining professional goals, planning professional development); cultural practices (selecting literary images of work, preparing artistic projects, creating essays, etc.); dialogue formats (group discussions, mentorship, analysis of ethical dilemmas).

The integration block (synthesis of approaches) contains: forming professional identity (combining social demand with personal beliefs);

modeling life scenarios (building an image of "myself in the profession" considering economic realities and values); creating educational modules (integrated lessons that combine labor market analysis with a humanitarian understanding of various aspects of professional activity).

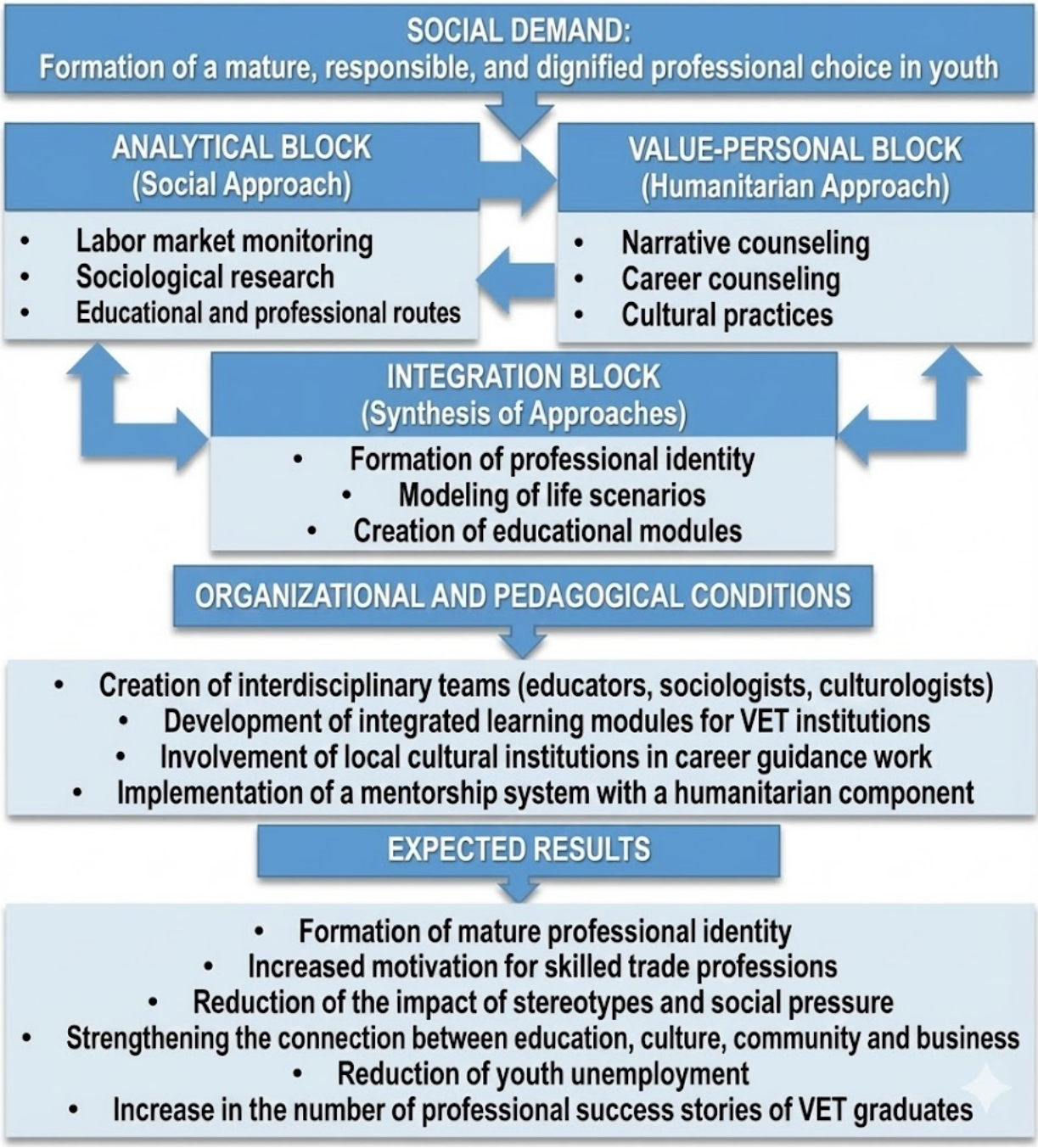

Fig. 1. Conceptual model of integrating social and humanitarian approaches to youth career guidance for skilled trades

The integrative model also allows for a harmonious combination of practical tools from both approaches to career guidance for vocational students. Four key career guidance tools can be distinguished: a professional map of the region, an individual career guidance plan, group training sessions, and mentorship. Each of these tools is revealed through social and humanitarian components. This approach allows combining the structural logic of the labor market with a personal understanding of career choice, which is especially important in a unstable social environment and the transformation of educational demands.

In the construction of a professional map of the region, the social component includes employment statistics, a list of current vacancies,

and information about educational institutions that train specialists in the relevant field. This creates a realistic picture of the labor market and allows young people to navigate local career opportunities. The humanitarian component complements the dry data with living success stories and cultural images of professions, which form emotional perception and motivation. This helps overcome stereotypes and build a positive image of skilled trades.

In the process of creating an individual career guidance plan, the social component involves testing, competency analysis, and identifying strengths and areas for development. This makes it possible to create a personalized professional development trajectory. The humanitarian component includes writing essays, reflective practices, and building a value matrix, which helps young people realize not only "what I can do" but also "what is important to me." This approach forms internal motivation and resilience to professional challenges.

When preparing and conducting group training sessions, the social component is realized through role-playing games, case studies, and situation modeling, which allows participants to feel themselves in real professional conditions and develop communication and adaptation skills. The humanitarian one includes discussions, creative tasks, and ethical dilemmas that stimulate critical thinking, moral evaluation of professional situations, and the development of emotional intelligence.

In the implementation of a mentorship program, the social component covers professional consultations, familiarization with market requirements, assistance in resume writing, and interview preparation. The humanitarian one involves narrative counseling, moral support, and discussion of life scenarios, which allows young people not only to receive information but also to feel support, trust, and understanding.

Thus, effective career guidance cannot be reduced to just tests and statistics. It must include a value, emotional, and cultural component that forms not just an employee but a conscious citizen capable of self-realization, adaptation, and social contribution. This approach is especially relevant for Ukraine, where youth career guidance is not only an educational but also a strategic tool for economic recovery and strengthening social cohesion.

To implement this model, a number of conditions must be met: create interdisciplinary teams (educators, sociologists, cultural specialists); develop integrated training modules for vocational education institutions; involve local cultural institutions in career guidance work, and implement a mentorship system with a humanitarian component.

The expected results of the implementation of this model are: the formation of a mature professional identity, increased motivation for skilled trades, reduced influence of stereotypes and social pressure, strengthened connection between education, culture, and community, reduced youth unemployment, and an increase in professional success stories.

In the context of the transformation of the education system and challenges in the labor market, youth career guidance requires significant updating—not only in its tools but also in its value approaches. The social and humanitarian components of career guidance play a key role in forming a conscious, responsible career choice based not only on economic expediency but also on personal meaning, civic motivation, and cultural identity. In this regard, the preparation of recommendations for improving these components is necessary for: ensuring equal access to career guidance resources; forming the dignity of work as a social value; integrating humanitarian practices into the professional self-determination of youth; strengthening inter-sectoral cooperation between education, culture, social policy, and the market.

The target audience for the recommendations can be: government structures (Ministry of Education and Science, Ministry of Social Policy, Ministry of Economy, Ministry of Youth and Sports) – to help in shaping policies and regulatory frameworks; regional and local authorities – to adapt the tasks of professional guidance for vocational students to the community context; vocational education institutions – to implement humanitarian approaches in career guidance work; career consultants, educators, social workers – to apply the recommendations as a practical tool for daily work with youth; cultural and youth institutions – to create joint career guidance formats; public organizations

and analytical centers – to develop, monitor, and evaluate the effectiveness of the social and humanitarian components of career guidance.

Given this, we propose recommendations for the implementation of the conceptual model of integrating social and humanitarian approaches to youth career guidance for skilled trades, with their distribution by management levels.

At the national level, it may be expedient to: normatively consolidate the model (include provisions on the socio-humanitarian component of career guidance in strategic documents that affect the implementation of youth career guidance; develop standards for career guidance activities with consideration of humanitarian approaches); form inter-agency coordination (create an inter-ministerial working group to coordinate the policies of the Ministry of Education and Science, Ministry of Social Policy, Ministry of Economy, Ministry of Digital Transformation, Ministry of Culture regarding the organization of youth career guidance; introduce a unified digital platform for career guidance with the integration of analytics, cases, and cultural resources); invest in the training of personnel for career guidance and career counseling (include humanitarian modules in advanced training programs for career consultants; create grant programs for innovative career guidance projects).

At the regional level, one can ensure: the adaptation of the model to the regional context (conduct regional studies of the needs of youth, the labor market, and cultural resources; create regional road maps for youth career guidance); networking of institutions (unite vocational education institutions, employment centers, cultural institutions, and youth spaces into regional career guidance clusters; organize inter-institutional training and experience exchanges); public communication (organize regional campaigns to popularize skilled trades through systematic cultural narratives; involve local opinion leaders, artists, and successful graduates of vocational education institutions as regional ambassadors for career guidance for skilled trades).

At the local level, it is proposed to: integrate career guidance tools and practices into community youth policy (include career guidance in youth, education, and culture development programs; create local career guidance hubs based on libraries, leisure centers, and career centers of vocational education institutions); involve youth in joint activities (conduct workshops, surveys, and focus groups with youth regarding their expectations and needs; create youth councils at career guidance hubs); support innovative formats (introduce career guidance theatrical performances, exhibitions, and podcasts; organize competitions for the best professional choice story).

At the institutional level, it is important to: in vocational education institutions—ensure the renewal of the educational environment (implement interdisciplinary modules with humanitarian content on the history of work, professional ethics, etc.; create spaces for reflection—clubs, workshops, creative laboratories), strengthen partnerships with employers and cultural institutions (organize joint events—"Day of the Profession," "Master Class with a Master," "Profession in Culture," etc.; create case studies based on real success stories of graduates); in higher pedagogical education institutions and postgraduate pedagogical education institutes—organize the training of educators and consultants (conduct training sessions on humanitarian methods of career guidance, introduce the principles of narrative counseling and cultural cases; implement mentorship between experienced and young educators on the problems of career guidance for students); in scientific institutes—ensure scientific and methodological support for the career guidance activities of career centers in vocational education institutions (develop pedagogical innovations to improve the social and humanitarian components of youth career guidance for current skilled trades, ensure their advocacy and popularization in the scientific and educational environment).

Conclusions. In the current conditions of the development of professional education in Ukraine, especially in the context of post-war reconstruction, youth career guidance for skilled trades requires rethinking in both its content and methodological dimensions. The analysis of social aspects shows that effective career guidance must be based on the realities of the labor market, regional needs, inter-sectoral interaction, and the accessibility of resources for all categories of youth. At the same time, the humanitarian foundations of guidance open up space for the formation of professional identity,

value-based choice, reflection, and a cultural understanding of work.

The proposed conceptual model for integrating social and humanitarian approaches to youth career guidance for skilled trades allows for the creation of a holistic system of professional orientation in which labor market analytics are complemented by a meaningful, ethical, and cultural dimension. This approach contributes not only to employment but also to the formation of a mature, responsible personality capable of consciously choosing a professional path and participating in the reconstruction of society.

The recommendations for implementing the model at the national, regional, local, and institutional levels outline specific steps for integrating social and humanitarian components into career guidance practice. Their implementation requires political will, inter-agency coordination, pedagogical readiness, and the participation of youth as the subject of their own professional choice. Thus, updating career guidance based on an integrative approach is not only an educational task but a strategic investment in human capital, social cohesion, and the cultural resilience of Ukraine.

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КОНЦЕПТУАЛЬНА МОДЕЛЬ ІНТЕГРАЦІЇ СОЦІАЛЬНОГО Й ГУМАНІТАРНОГО ПІДХОДІВ ДО ПРОФЕСІЙНОЇ ОРІЄНТАЦІЇ МОЛОДІ НА РОБІТНИЧІ ПРОФЕСІЇ

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Реферат:

Актуальність розроблення концептуальної моделі інтеграції соціального й гуманітарного підходів до професійної орієнтації молоді на робітничі професії зумовлена потребою: формування ціннісно вмотивованого професійного вибору, подолання соціальних стереотипів, підвищення престижу робітничих спеціальностей, зниження рівня молодіжного безробіття, підвищення вдоволеності молоді професійним вибором.

Мета: обґрунтування концептуальної моделі інтеграції соціального й гуманітарного підходів до професійної орієнтації молоді на робітничі професії з урахуванням ціннісних, культурних та комунікативних чинників, що сприяють формуванню ціннісно вмотивованого професійного вибору.

Методи: загальнонаукові (теоретичний аналіз, синтез, порівняння, моделювання – для аналізу джерел і досягнення мети дослідження); емпіричні (контент-аналіз – для вивчення наративів у медіа та освітньому дискурсі; кейс-стаді – для аналізу успішних локальних практик; адвокаційні стратегії – для розроблення рекомендацій щодо впровадження моделі).

Результати: проаналізовано джерельну базу; виявлено особливості соціального і гуманітарного підходів до професійної орієнтації молоді, здійснено їх порівняльний аналіз; узагальнено успішні практики соціально і гуманітарно орієнтованої професійної орієнтації; обґрунтовано концептуальну модель інтеграції соціального й гуманітарного підходів; розроблено рекомендації щодо її впровадження.

Висновки: професійна орієнтація молоді потребує переосмислення як інструменту соціального згуртування та культурного оновлення; інтеграція соціального й гуманітарного підходів сприяє формуванню відповідальної професійної ідентичності; оновлена модель профорієнтації є стратегічним ресурсом як для стабілізації ринку праці в умовах війни, так і для сталого розвитку України в умовах повоєнного відновлення.

Ключові слова: *професійна освіта, соціогуманітарна освіта, професійна орієнтація, соціальний підхід, гуманітарний підхід, інтегрований підхід.*

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MODELING THE PROCESS OF PREPARING FUTURE COMPUTER SCIENCE TEACHERS FOR THE GAMIFICATION OF THE EDUCATIONAL PROCESS IN MIDDLE SCHOOL

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Abstract

Relevance : Modern realities demand that teachers possess innovative thinking and the ability to implement new approaches, as well as create and apply new educational technologies, among which gamification holds a prominent place.

Objective: To theoretically substantiate a model for preparing future computer science teachers for the gamification of the educational process in middle school.

Methods: Modeling – to develop the model for preparing future computer science teachers for the gamification of the educational process in middle school; mathematical statistics – to process the experimentally obtained data.

Results: A model for preparing future computer science teachers for the gamification of the educational process in middle school has been developed. The effectiveness of the developed model was verified through a formative stage of an experiment, which involved a step-by-step mechanism for the model's implementation and consisted of three stages (motivational-introductory, implementation, and evaluation-and-adjustment). The author's educational and methodological materials, aimed at organizing and operating a gamified educational environment, were tested.

Conclusions: The training of future computer science teachers under study is presented as a holistic process of purposeful interaction between instructors and learners within a gamified educational environment, aimed at improving learners' mastery of the educational material through the application of a game context with the involvement of modern digital technologies. The proposed model delineates several blocks: an objective-oriented block (goal, tasks, scientific approaches, principles), a motivational-needs block (motives, interests, needs), a content-procedural block (content of training, its organizational forms, methods, tools, the gamified educational environment, stages of forming the future computer science teacher's readiness for gamification of the educational process), and a resultative block (criteria, indicators, levels of readiness of the future computer science teacher for gamification of the educational process). The effectiveness of the model's implementation is confirmed by the positive dynamics in the development of the future computer science teacher's readiness for the gamification of the educational process.

Keywords: *professional training of a future computer science teacher, gamification, educational process, modeling.*

Introduction. The development of society today is inextricably linked with technology. Digital tools have become an integral part of our lives and professional activities, requiring specialists to continuously improve their knowledge and skills in this area. Therefore, there is an urgent need for high-quality training of future specialists, starting from school age.

A key role in this process is played by the training of future computer science teachers. They are the conduits of digital technologies in general secondary education institutions. To meet modern

challenges, teacher training must be updated, in particular, through the introduction of innovative educational approaches. One such tool is gamification – the use of game elements in the learning process, which helps students and teachers stay abreast of the latest educational trends and digital technologies.

Gamification has significant potential as it allows students to perceive information not as separate facts, but as part of a holistic system. Instead of rote memorization, games help to see the interconnections between different subjects and phenomena, and each task acquires meaning as it becomes part of a large, interconnected system.

Research Sources. The elements of gamification have been studied as an effective method for optimizing and enhancing the effectiveness of learning by many domestic scientists, including D. Verbovetskyi, Yu. Moiseiuk, O. Pasichnyk, S. Petrenko, S. Tolochko, and S. Churko. Researchers have studied the possibilities of using gamification at various educational levels: in primary education (L. Zhydilova, O. Karabin, and K. Liashenko); for studying individual subjects in secondary school (I. Borysiuk, M. Marienko, O. Pinchuk, N. Yaskova); as a tool for teaching specific disciplines and forming professional skills (in teaching English – K. Halatsyn; in the training of future teachers – H. Kobernyk; in the formation of professional competence of foreign language teachers – S. Denhaieva; in the use of computer didactic games for the training of mathematics and computer science teachers – N. Kyrylenko). However, despite sufficient interest in the problem of gamifying the educational process in general secondary schools, we believe that teachers currently lack proficiency in the tools of gamification of the educational process, which requires certain improvements in their professional training.

The purpose of the article: to theoretically substantiate the model for training future computer science teachers for the gamification of the educational process in basic school.

Research Methods. To achieve this goal, we applied the modeling method, which has become widespread in pedagogical research (Lodatko, 2010) as an important cognitive tool used extensively in various fields of science, technology, and production, including mathematical, physical, or computer modeling (Kalapusha, 1982, p. 68).

Results and Discussion. Gamification of learning is currently viewed by researchers as a modern educational trend, which actualizes the issue of preparing future computer science teachers during their studies at a higher education institution for implementing a gamified approach. In a general sense, gamification can be defined as the use of game elements and techniques in non-game situations to engage people in solving problems in various fields by motivating their behavior. Unlike a regular game, gamification orients participants toward achieving a specific result rather than the game process itself. In education, gamification is seen as a special way of organizing learning where the game is a key element. Students acquire knowledge and skills by participating in games that have clear rules set by the teacher. Special incentive systems are used for motivation. Summarizing the approaches of various researchers, gamification of the educational process can be defined as the application of game mechanics and elements in learning to motivate students to learn using a game context, often involving modern digital technologies (Antonov, 2024, p. 3).

In accordance with the logic of the research, we analyzed the state of readiness of practicing and future computer science teachers for the gamification of the educational process in basic school. The presence of problems and shortcomings was identified, related to the insufficient provision of general secondary education institutions with trained teachers capable of implementing a gamified approach to learning, the limitation of educational and methodological tools, and the insufficient mastery of relevant technologies by teachers. At the same time, future and practicing computer science teachers recognize the relevance and need for gamification of the educational process in basic school, which actualizes the need for additional training of students for this type of activity and the development of appropriate scientifically-grounded methodological support.

By applying the modeling method, a model for training future computer science teachers for the gamification of the educational process in basic school was developed. In a scientific context, modeling is a cognitive method based on the use of scientific models that reproduce the key characteristics of a certain object and are created specifically for its study. A researcher can model both existing objects and phenomena, as well as those that are only being constructed. This means that modeling involves the creation of artificial or natural systems that imitate the essential properties of the original (Palamarchuk, 1999).

In pedagogy, modeling has become popular due to its cognitive functions. It allows for the analysis of educational phenomena and processes by creating an intermediate link – a model – between the researcher and the object of their research. With the help of a model, it is possible to isolate individual characteristics that are subject to study, evaluation, and managerial influence (Lodatko, 2010). Most researchers believe that the best definition of a model is offered by philosophers as a mentally imagined or realized system that reflects the object of research and can replace it, providing new information about it (Lodatko, 2010). However, a model is not just a substitute, but a working tool that helps the researcher see the internal structure of an object, determine influencing factors, and select resources. The model summarizes the essential connections between the elements of the object, creating a holistic structure. This is a special form of abstraction where key relationships are visualized in connections that are easily perceived and imagined. A model can be a diagram, a physical construction, a symbolic form, or a formula that reproduces the structure and properties of the object under study in a simplified way (Polishchuk, 2013).

In pedagogy, both the content of education and learning activities are subject to modeling. Particular attention is paid to the creation of models for teaching specific disciplines. The object of pedagogical modeling is the content of education and methods of teaching subjects, which include methodological solutions at different stages of learning. The most common in pedagogy is considered to be the structural-functional model, which takes into account the needs of society in training specialists and their demand in the labor market. Such a model includes four main components: value-motivational; content-based; practical; and reflective-evaluative. In accordance with the presented logic, the modeling of the training of future computer science teachers for the gamification of the educational process included: defining the purpose, content, methods, and means. This process encompassed the formation of needs, interests, motives, as well as the acquisition of knowledge, skills, and the creation of an appropriate educational environment.

The result of this work was a model (Fig. 1) consisting of several components: target (defines the goal, objectives, scientific approaches, and principles), motivational-needs (focuses on the motives, interests, and needs of students), content-procedural (includes the content of training, organizational forms, methods, means, and stages), and resultative (involves criteria, indicators, and levels of formation of the future teacher's readiness for the gamification of the educational process).

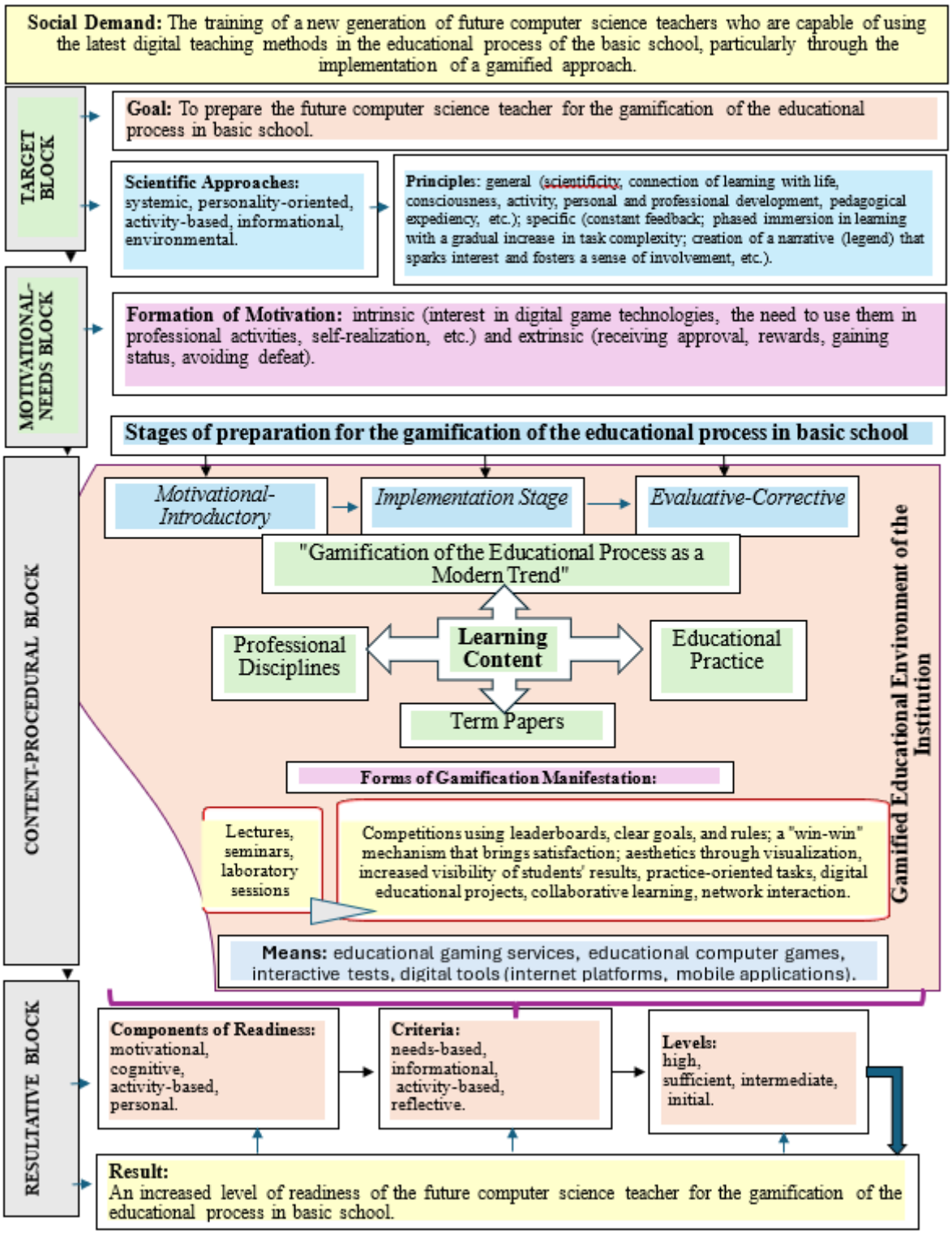

Fig. 1. Model for training future computer science teachers for the gamification of the educational process in basic school.

The traditional training of computer science teachers in higher education institutions is focused on mastering theoretical foundations and teaching methodology. However, modern society requires a future teacher not only to have subject knowledge but also the ability to generate and implement innovative technologies, such as gamification. Improving the quality of training for such specialists requires the enhancement of the educational process, bringing it closer to the real conditions of the school environment, as well as strengthening attention to the formation of students' readiness for professional activity.

Thus, there is a clear social demand in society for the training of a computer science teacher capable of applying the latest teaching methods.

Therefore, the goal of the proposed model is defined as the need to form the readiness of the future teacher for the gamification of the educational process in basic school.

The proposed model is based on several key methodological approaches, namely: systemic (considers training as a holistic system), personality-oriented (focused on the development of the student's personality), activity-based (emphasizes the formation of skills through activity), informational (takes into account the role of information technologies), and environmental (highlights the importance of the educational environment).

The construction of the educational process on the principles of gamification is based on the following interconnected principles: engagement through play (students learn information better through game elements); a sense of success (the use of points, statuses, levels, and ratings creates a sense of progress and achievement); social interaction (gamification promotes a sense of community and partnership, which is possible only with the active participation of the teacher); balance and expediency (game elements should be integrated appropriately to guide students toward the learning goal, not just to entertain). It is important that the effectiveness of gamification is achieved only with the comprehensive application of these principles. Using them separately will not bring the expected result (Kazarian; Kovalenko, Palamarchuk, 2023).

The motivational-needs block of the model for training future computer science teachers for the gamification of the educational process focuses on external and internal motivation according to the approaches of researchers who identify three main groups of motivation formed through the gamification of learning (Kovalenko, Palamarchuk, 2023):

1. Motivation for activity in a game environment. This type of motivation is supported by tracking the student's activity, which leads to a change in their status, helps them adapt to various electronic resources, and changes their social status within the group.
2. Motivation to study the academic discipline. Students receive points for quick results, which contributes to the acquisition of knowledge and skills on specific topics and the discipline as a whole.
3. Motivation to master collective skills. Students derive satisfaction from teamwork and competition, which contributes to the formation of collaboration skills, deepens their understanding of their future profession, and various professional roles.

Ultimately, this approach facilitates the assimilation of educational material and forms practical skills and abilities in working with software, which is necessary both for successful exam performance and for future professional activity.

The content-procedural block involved the introduction of gamification elements into the study process of both socio-humanitarian disciplines (Pedagogy) and professional ("Computer Architecture and Configuration of Computer Systems," "Computer Graphics") and practical ("Educational Practice in the Production of Multimedia Software as Elements of Methodological Support") training. This block is implemented in three consecutive stages: motivational-introductory (at this stage, students get acquainted with the concept of gamification and its possibilities in the educational process, which creates the necessary motivation for further learning), implementation stage (students apply the acquired knowledge and skills in practice, creating gamified educational products and scenarios), and evaluative-corrective (at the final stage, an analysis of the results, an assessment of the effectiveness of the developed solutions, and the necessary adjustments for their improvement take place).

The motivational-introductory stage aims to organize and motivate students to master gamification as a tool for their future pedagogical activity. Its goal is to provide organizational and methodological preparation at the university and to create a special gamified educational environment. This will allow for the formation of students' readiness to implement gamification in school and to arouse their interest in this activity. The goal is realized through the following tasks: to create the necessary educational environment; to promote students' motivation to use gamification in their future work; to form a stable interest in this type of activity. The content of this stage involves conducting introductory conversations with students, where they become acquainted with the essence, content, organization, and ways of implementing gamification in the educational process. As a result, an initial level of readiness of future teachers is formed, motivation to use gamification arises, interest in studying professional disciplines develops, and the first elements of a gamified educational environment are created.

The implementation stage aims at the practical application of the gamified approach in the training process of future computer science teachers by involving students in the use of gamification during the study of professional disciplines and practical training. The main tasks of this stage include the formation of students' knowledge, abilities, and skills in gamification. This involves using well-known educational game resources, enriching one's own experience in implementing gamification, and developing one's own game content for organizing learning. Gamification elements are integrated into the learning process by developing a plot for each lesson, creating a game atmosphere – presenting material in parts, gradually increasing complexity, moving to a new level when studying a new topic, interaction between students and the teacher, as well as prompt feedback, and developing an assessment system (using points, badges as awards for achievements, and rating tables (leaderboards)). As a result of this work, a sufficient level of readiness of future teachers for gamification is formed, motivation to use gamification is maintained, and the need to apply a gamified approach in future professional activity is actualized.

The final stage in the preparation process was the evaluative-corrective stage, the purpose of which was to analyze the learning outcomes, assess their quality, and identify the advantages and difficulties of the gamified approach.

The tasks of this stage included completing the formation of the future teacher's readiness for gamification and determining the level of its formation; creating an educational environment in the higher education institution that would promote further game-based activity and prepare students for using this approach in their future profession; stimulating students to independently develop game content, in particular, creating game characters.

The implementation of these tasks was carried out by diagnosing students' readiness to organize gamified learning, their performance of creative and innovative game tasks, the application of modern gamification technologies in learning, the use of educational gaming platforms, and the actualization of interest in developing their own game content, including the creation of game characters.

As a result, students demonstrated a sufficient or high level of readiness for the gamification of the educational process, showed a stable interest in this activity, and identified prospects for further self-improvement.

The developed model was implemented by improving the content of professional training and using gamified methods, such as quests, webquests, and game projects.

For the successful implementation of the model, we consider it necessary to take into account the relevant organizational-pedagogical conditions for optimizing learning (Sahan, 2022), namely: to use a clear assessment scale for all types of activity, avoiding frequent rule changes; to apply tools for counting points, creating a "hall of fame" and leaderboards (it is important that the gap between the best and average students is not too large, so as not to demotivate them); to create an opportunity for players to track their progress and move to a new level by using open educational resources and free applications; to provide for the possibility of students receiving bonuses for activity, including for independent study of topics.

All the above-mentioned components in their unity create the model for training future computer science teachers for the gamification of the educational process in basic school.

Conclusions. Thus, as a result of applying the modeling method, a model for training future computer science teachers for the gamification of the educational process in basic school was developed, which has the following components: a target block (goal, tasks, scientific approaches, principles); a motivational-needs block (motives, interests, needs); a content-procedural block (content of training, its organizational forms, methods, means, gamified educational environment, stages of forming the readiness of the future computer science teacher for the gamification of the educational process); a resultative block (criteria, indicators, levels of readiness of the future computer science teacher for the gamification of the educational process).

In the proposed model, the studied training of future computer science teachers is presented as a holistic process of purposeful interaction between teachers and students within a gamified educational environment aimed at improving students' mastery of educational material by applying a game context with the involvement of modern digital technologies.

We consider the following to be promising areas of work: the development of pedagogical tools for forming teachers' readiness for the gamification of the educational process; the creation of a holistic

gamified educational environment in the higher education institution aimed at further improving the future teacher's readiness to implement a gamified approach in the educational process.

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МОДЕЛЮВАННЯ ПРОЦЕСУ ПІДГОТОВКИ МАЙБУТНЬОГО ВЧИТЕЛЯ ІНФОРМАТИКИ ДО ГЕЙМІФІКАЦІЇ ОСВІТНЬОГО ПРОЦЕСУ ОСНОВНОЇ ШКОЛИ

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Реферат:

Актуальність: реалії сьогодення вимагають від вчителя інноваційного мислення та вміння впроваджувати нові підходи, створювати та застосовувати нові освітні технології, серед яких гейміфікація посідає чільне місце.

Мета: теоретично обґрунтувати модель підготовки майбутнього вчителя інформатики до гейміфікації освітнього процесу основної школи.

Методи: моделювання – для розробки моделі підготовки майбутнього вчителя інформатики до гейміфікації освітнього процесу основної школи; математичної статистики – для опрацювання експериментально отриманих даних.

Результати: розроблено модель підготовки майбутнього вчителя інформатики до гейміфікації освітнього процесу основної школи; здійснено перевірку ефективності розробленої моделі шляхом проведення формувального етапу експерименту, який передбачав поетапний механізм упровадження моделі і складався з трьох етапів (мотиваційно-ознайомлювального, реалізації, оцінно-корегувального); апробовано авторські навчально-методичні матеріали, спрямовані на організацію і функціонування гейміфікованого освітнього середовища.

Висновки: досліджувана підготовка майбутніх учителів інформатики представлена як цілісний процес цілеспрямованої взаємодії викладачів і здобувачів у межах гейміфікованого освітнього середовища з метою покращення опанування здобувачами освіти навчального матеріалу шляхом застосування ігрового контексту із

залученням сучасних цифрових технологій; у запропонованій моделі виокремлено блоки – цільовий (мета, завдання, наукові підходи, принципи), мотиваційно-потребовий (мотиви, інтереси, потреби), змістово-процесуальний (зміст підготовки, її організаційні форми, методи, засоби, гейміфіковане освітнє середовище, етапи формування готовності майбутнього вчителя інформатики до гейміфікації освітнього процесу), результативний (критерії, показники, рівні готовності майбутнього вчителя інформатики до гейміфікації освітнього процесу); результативність реалізації моделі підтверджується наявністю позитивної динаміки розвитку готовності майбутнього вчителя інформатики до гейміфікації освітнього процесу.

Ключові слова: *професійна підготовка майбутнього вчителя інформатики, гейміфікація, освітній процес, моделювання.*

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METHODOLOGICAL ASPECTS OF TRAINING BACHELORS OF VOCATIONAL EDUCATION IN THE FIELD OF CONSTRUCTION AND WELDING FOR THE ORGANIZATION OF DUAL EDUCATION

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Abstract

Relevance: In the modern conditions of the transformation of Ukraine's vocational education system, there is a growing need to implement the dual form of education, which enhances the competitiveness of future specialists and strengthens the connection between educational institutions and the labor market; at the same time, difficulties are observed related to the insufficient preparedness of vocational training teachers.

Purpose: To highlight the theoretical and methodological foundations for training bachelors of vocational education in the field of construction and welding for the organization of dual education, and to reveal the specifics of the stages and methodological tools of this training.

Method: Analysis, synthesis, comparison, systematization and generalization, project design and modeling – to identify the essence and specifics of dual education, and to develop the content and stages of training bachelors for the organization of dual education.

Results: It was established that the effective training of bachelors of vocational education in construction and welding for organizing dual education requires a comprehensive update of the content and methodology of vocational training; its key guidelines have been defined (the formation of the teacher's legal, organizational, methodological, psychological-pedagogical, and information-digital readiness to work in a dual environment); a corresponding model has been developed, which includes four interconnected stages (foundational-orientational, theoretical-methodological, practice-oriented, and final-diagnostic); the directions for updating the content of academic disciplines for the professional and specialized training of vocational training teachers in the context of organizing dual education have been revealed; the content and methodological toolkit for the course "Dual Education: Challenges, Opportunities, and Career Prospects" have been presented.

Conclusions: The proposed model can serve as a basis for the further improvement of educational and professional programs for training vocational training teachers to organize dual education, and its implementation will contribute to enhancing the quality of educational services in institutions of vocational and professional pre-higher education.

Keywords: *dual education, vocational training, vocational training teacher, methodology, methodological toolkit, training model.*

Introduction. The development of vocational education in Ukraine is taking place in the context of profound socio-economic changes that require new approaches to personnel training. An important challenge is the need for specialists capable of combining sound theoretical knowledge with practical skills oriented towards modern production technologies. One of the effective ways to solve this problem is the implementation of the dual form of education, which is based on a partnership between educational institutions and employers and ensures the integration of the

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educational process with the real production environment.

Before the full-scale war, dual education in institutions of vocational (vocational-technical) education (hereinafter referred to as IV(VT)E) demonstrated dynamic development. For instance, in the 2020–2021 academic year, this process involved 217 IV(VT)E and 12,395 of their students, of whom 6,660 were studying directly under the dual system in 192 institutions (Institute of Educational Analytics, 2022). These indicators pointed to the real possibilities for the systemic expansion of a model that ensures a closer link between education and the labor market.

The war has significantly slowed down the pace of development of dual education. According to the Ministry of Education and Science of Ukraine, as of October 2023, it was being implemented by 168 IV(VT)E, with over a thousand enterprises involved in cooperation, and the total number of students pursuing education in the dual form was 10,364 (about 5% of the contingent) ("Despite the war, over 1,000 business enterprises...", 2023). In parallel, the dual form is also gradually developing in higher education (Buchynska et al., 2022). For example, in 2024, over 400 students from technical colleges and universities participated in dual education programs in cooperation with the DTEK Grids DSO, and 52% of them continued to work for the company after graduation (DTEK, 2025). These facts confirm the preserved potential of dual education despite the wartime conditions and, at the same time, emphasize the need to create systemic methodological support for the training of vocational education teachers, particularly in the construction and welding fields, who must be able to organize this process in complex and unpredictable circumstances.

Sources. The review of primary sources we have conducted reflects the systemic nature of scientific inquiry and the desire of researchers to comprehensively analyze the formation and development of the dual form of education in Ukraine and around the world. Considerable attention is paid to studies that reveal the theoretical and methodological foundations of implementing dual education in the professional training of future specialists (Kovalchuk, & Soroka, 2022; Kucher, 2023; Lavrentieva, 2019; Marynchenko, 2019; Savchuk, 2024). These works allow for the outlining of methodological guidelines and approaches to forming a competitive specialist in the context of combining theoretical learning with practical training in the workplace.

An important role in forming the evidence base for the real educational practice of dual education is played by analytical materials from the Ministry of Education and Science of Ukraine and the Institute of Educational Analytics (2022; 2023), as well as reports on the results of implementing pilot projects for the introduction of dual education elements in institutions of vocational, professional pre-higher, and higher education (Buchynska et al., 2022; Chaikovska, Morhun, & Saienko, 2022). Their analysis makes it possible to trace the dynamics of this model's development at the state level.

A significant body of sources consists of scientific and methodological works dedicated to the issues of organizing the educational and production environment, developing social partnership and project activities in the field of vocational education, as well as the prospects, challenges, and trends in improving the training of pedagogical staff for the organization of dual education (Alieksieieva, & Horbatiuk, 2025; Haiduk et al., 2023; Kulalaieva, & Haiduk, 2023; Kravets, & Slobodianyk, 2024; Shykina, & Kuznietsova, 2025). They specify the mechanisms for implementing the dual model, demonstrating the variability of approaches depending on the field of training. Materials concerning the application of digital technologies in vocational education, particularly innovative tools and simulators using virtual and augmented reality (Kovalchuk, Marynchenko, & Hrytsenko, 2019; Lavrentieva et al., 2019), deserve special attention, as this emphasizes the connection between dual education and the digital transformation of the educational environment.

No less significant for the research are monographic and collective works that represent the current state of vocational education in the context of sustainable societal development (Radkevych, & Pryhodii, 2024), as well as educational and methodological works (Lebedyk, Strelnikov, & Strelnikov, 2020) that summarize the experience of implementing innovative approaches in the training system of pedagogical personnel for institutions of vocational, professional pre-higher, and higher education. The practical dimension of the researched issue is illustrated by publications dedicated to corporate practices of dual education (DTEK Grids, 2025), which reflect the results of cooperation

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between business and educational institutions in training young specialists.

Thus, the sources engaged cover a wide range of scientific, normative, and practice-oriented materials, which allows for a comprehensive clarification of the issues of dual education development in the vocational education system, identification of its methodological foundations, outlining of current trends, and determination of prospects for further improvement. At the same time, the results of practical implementation indicate the existence of a number of problems related to the uneven dissemination of the dual form of education, the limited level of digitalization of the educational process, as well as the insufficient readiness of pedagogical staff and workplace training mentors for new requirements. In совокупності, these aspects outline the scientific problem and necessitate the search for effective pedagogical conditions for training bachelors of vocational education (construction and welding) to organize dual education in educational institutions.

Purpose. To highlight the theoretical and methodological foundations for training bachelors of vocational education in the field of construction and welding for the organization of dual education, and to reveal the specifics of the stages and methodological tools of this training.

Methods. The methodological basis of the research consisted of general scientific and special methods that allowed for a comprehensive exploration of the stated problem. In particular, the methods of analysis and synthesis were used to clarify the essence of dual education and determine its specifics compared to traditional educational models. The comparative method made it possible to compare approaches to the training of pedagogical personnel in different forms of organizing the educational process. Systematization and generalization ensured the ordering of scientific propositions and the identification of the main methodological tools that are appropriate for use in preparing bachelors of vocational education for the organization of dual education. The use of the project method allowed for the modeling of the content of individual educational components, particularly a special course aimed at forming the readiness of bachelors of vocational education to organize dual education. Theoretical modeling was the basis for developing the stages of student training, which reflect a gradual transition from familiarization with the legal and regulatory framework to practical implementation and diagnosis of the educational process results.

Results and Discussion. We proceed from the assumption that the organization of dual education in institutions of vocational and professional pre-higher education significantly changes the role of the teacher. Whereas in the traditional model, they are primarily a bearer of knowledge and a controller of its assimilation, in the conditions of the dual form, their functions are supplemented by coordinating, facilitating, and mentoring roles (Shykina, & Kuznietsova, 2025). A vocational training teacher must combine educational and production components in their work, creating conditions for the student that are as close as possible to the real professional environment.

Consequently, new requirements are placed on the modern vocational training teacher. Firstly, they must be knowledgeable in the legal and regulatory foundations of organizing dual education and be able to implement the provisions of the relevant agreements between the educational institution and the employer (Marynchenko, 2019). Secondly, the ability to interact with enterprises, including coordinating curricula, organizing student support in the workplace, and ensuring control over learning outcomes, becomes key. Thirdly, the teacher must be methodologically prepared to integrate forms and methods that organically combine classroom and workplace training into their own practice. No less important is the psychological and pedagogical readiness to support the student's entry into the professional environment, and to form their motivation and responsibility (Savchuk, 2024). Finally, a significant requirement is proficiency in digital tools necessary for planning, monitoring, and communication within the framework of dual education (Alieksieieva, & Horbatiuk, 2025) (Table 1).

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Table 1

AREAS OF ACTIVITY FOR A VOCATIONAL TRAINING TEACHER IN THE CONTEXT OF DUAL EDUCATION

Area	Teacher's Tasks	Practical Actions	Expected Result
Legal	To be knowledgeable in the legal and regulatory acts governing dual education	– familiarization with and adherence to the legal and regulatory framework for the dual form of education; – participation in the development of tripartite agreements "institution – student – employer"; – compliance with labor legislation for students;	Proper organization of dual education on a legal basis, avoidance of conflicts and violations
Organizational	To ensure the alignment of educational and production programs	– coordinating curricula with the enterprise; – creating schedules for workplace training; – monitoring attendance and completion of production tasks;	Continuity of the educational and production process, clear division of responsibilities between the institution and the enterprise
Methodological	To integrate educational and production methodologies	– development and implementation of process charts; – application of case studies and project-based tasks; – selection of methods that reflect real production situations;	Formation of comprehensive skills in students: from theory to practice
Psychological-Pedagogical	To support the student in their professional development	– mentoring and counseling; – motivational talks; – support in resolving adaptation problems in the workplace;	Increased student confidence, development of responsibility and professional culture
Information-Digital	To use modern digital tools for process management	– maintaining electronic internship logs; – using learning management platforms to coordinate tasks; – online communication with employers	Effective monitoring of results, transparency and convenience of interaction among all participants

Thus, a teacher in the dual education system is no longer just an instructor, but an organizer of the educational and production process, a mediator between the student and the employer, a mentor, and a consultant. In this context, the methodological training of future vocational education teachers becomes particularly important, as it is this training that ensures their ability to organize dual education in accordance with the modern demands of the labor market and the conditions of wartime and post-war recovery.

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The methodological training of future vocational education teachers should be based on modern approaches to organizing the educational process: a competence-based approach (focusing on practical outcomes and graduate professional mobility), an integrative approach (combining classroom and workplace components in the educational process), a contextual approach (acquiring knowledge in situations as close as possible to real conditions), and a student-centered approach (taking into account students' individual educational trajectories in the context of dual education) (Kulalaieva, & Haiduk, 2023). It is the combination of these approaches that makes it possible to form in future vocational education teachers of construction and welding profiles the readiness to organize dual education in various types of educational institutions.

To ensure the systematic preparation of future vocational education teachers for the organization of dual education, it is advisable to integrate special educational blocks into the content of the educational and professional program within core disciplines, which form students' knowledge, skills, and methodological readiness for implementing the dual form of education (Kovalchuk, Marynchenko, & Hrytsenko, 2019).

Considering current trends and the spread of the dual form of education, a separate content block "Psychological and Pedagogical Foundations of Organizing Dual Education" (18 hours) can be included in the "Professional Pedagogy" academic discipline, covering topics such as: theoretical foundations of dual education; a student-centered approach in the training of future specialists in the dual form of education; pedagogical interaction and communication in the "student – teacher – employer" triangle; formation of professional motivation and responsibility in students; mentoring and pedagogical support in dual education (Kucher, 2023).

To the content of the "Theory and Methodology of Vocational Training" academic discipline, a block "Methodological Foundations for the Implementation of the Dual Form of Education" (16 hours) can be added, which includes: legal, regulatory, and organizational principles for introducing the dual form of education; planning the educational-production process and coordinating programs; methods and technologies for integrating classroom and workplace learning; digital support and monitoring tools for dual education; assessment of learning outcomes in a dual format (Lavrentieva, 2019).

In turn, for the academic discipline "Methodology of Teaching Specialized Disciplines in Vocational Education Institutions," it is worthwhile to introduce a block "Didactic Support for Specialized Disciplines in the Context of the Dual Form of Education" (17 hours), which has the following content: specifics of selecting and structuring the content of specialized disciplines for dual training; development of educational and methodological materials taking into account production conditions; combining traditional and innovative methods in dual education; using workplace case studies and professionally oriented tasks as a didactic resource; assessing the practical training of students in the process of teaching specialized disciplines (Haiduk et al., 2023).

The proposed content blocks, integrated into the academic disciplines of professional training, form a cohesive system of methodological support for developing the readiness of bachelors of vocational education to organize dual education. They allow for the combination of fundamental knowledge with practice-oriented skills necessary for effective interaction with employers, organizing training in production conditions, and ensuring the development of students' professional independence. Such an approach contributes not only to improving the quality of training for vocational education teachers but also to forming a flexible model of the educational process, capable of adapting to the needs of the modern labor market.

The implementation of tasks for preparing teachers to organize dual education requires utilizing the potential of the elective component of the educational and professional program. In this context, it is advisable to introduce a special course aimed at forming the readiness of future vocational education teachers to organize dual education in IV(VT)E (Barkar, 2023; Chaikovska, Morhun, & Saienko, 2022). Such a course is intended to supplement the basic disciplines of the pedagogical cycle and to provide students with practice-oriented knowledge and skills necessary for effective interaction with employers and for organizing the educational process in a dual format.

Based on these ideas, we have developed and tested an elective course titled "Dual Education: Challenges, Opportunities, and Career Prospects" (90 hours, 3 ECTS credits).

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The purpose of the academic discipline is: to form in students a holistic understanding of the essence, principles, and development trends of dual education in Ukraine and worldwide, to ensure the assimilation of methods for its organization in institutions of vocational (vocational-technical) and higher education, and also to reveal its significance for the career prospects of future specialists.

The course objectives are:

– to familiarize with the legal, regulatory, and conceptual framework of dual education;

– to reveal the methodological, organizational, and psychological-pedagogical aspects of implementing the dual form of education;

– to develop the ability to work with employers when organizing the educational-production process;

– to master methods for combining the theoretical and practical components of professional training;

– to teach the use of digital technologies for communication, monitoring, and assessment in the context of dual education;

– to reveal the opportunities of dual education as a tool for students' career growth.

Upon completion of the course, the student should know: the essence and specifics of dual education as a form of specialist training; the legal and regulatory documents of Ukraine that regulate the organization of dual education; the main challenges and development trends of dual education in the context of wartime and post-war transformations; the opportunities for partnership between educational institutions and employers to build individual learning trajectories; methodological and organizational approaches to combining classroom training with workplace practice; modern digital tools for monitoring, communication, and assessment in the dual process; the role of dual education in shaping the career prospects of graduates.

The student must demonstrate the ability to: analyze and apply the legislative framework for organizing dual education; align educational programs with the needs of employers and enterprises; organize an effective educational-production process within IV(VT)E; provide psychological and pedagogical support to a student in a production environment; apply digital tools for learning management and feedback; assess students' learning outcomes in the dual system format; predict and form individual career trajectories for students based on the experience of dual education.

The volume of the elective academic discipline is 90 hours, of which 12 hours are lectures and 24 hours are practical and seminar classes, with 54 hours of independent study (preparation for classes, completion of practical tasks, literature review, development of a methodological project).

The following forms and methods of work are planned: lectures with elements of discussion; seminars with analysis of regulatory documents and practical case studies; role-playing games ("negotiations with an employer," "drafting a tripartite agreement," "motivational talk," "reflective report"); project-based activity (development of a mini-program for dual education, tasks for individual learning modules); interactive methods (case method, SWOT analysis, masterclasses from practitioners); independent study of sources and preparation of individual research projects.

The structure of the special course involves dividing the content into separate modules that cover both theoretical and practical aspects of organizing dual education. Each module has a defined volume of classroom and independent study hours and concludes with the completion of tasks that promote the integration of knowledge and the formation of practical skills for the future vocational training teacher (see Table 2).

Table 2

CONTENT OF THE ELECTIVE COURSE "DUAL EDUCATION: CHALLENGES, OPPORTUNITIES, AND CAREER PROSPECTS"

Module	Content
1. Theoretical and Methodological Foundations of Dual Education (18 hours)	Origin and formation of the dual education concept in Europe. Theoretical approaches: andragogical, competence-based, contextual. Legal and regulatory framework for dual education in Ukraine. Comparison of dual education models (German, Austrian, Polish) and their adaptation to Ukrainian conditions.

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2. Organizational and Managerial Dimension of Dual Education (20 hours)	Mechanism for concluding tripartite agreements (educational institution – student – employer). Creation of curricula and schedules for the educational process, considering production cycles. Defining the functions of mentors from the enterprise and teachers from the educational institution. Quality monitoring systems: dual education logbook, student's electronic portfolio, employer assessment.
3. Methodology for Preparing Teachers to Work in the Dual System (20 hours)	Specifics of combining theoretical classes with workplace practices. Methodological techniques of dual education: case method, problem-based learning, project-based learning, microteaching, micro-qualifications. Psychological-pedagogical support for the student in the dual education system: supporting learning motivation, working with barriers and challenges (fear of the workplace, adaptation, specialization). Features of the dialogue in the 'student – workplace mentor – educational institution teacher' system.
4. Digital Tools and Innovative Practices in Dual Education (14 hours)	LMS Moodle / Google Classroom in support of dual programs. Using Trello, Asana, MS Teams for planning and communication with employers. Online logbooks and digital competency maps. VR/AR simulators for modeling production processes. The potential of non-formal and informal education in dual training.
5. Career Prospects and Professional Mobility of the Teacher (18 hours)	Employment trends for graduates of dual programs (examples of cooperation with DTEK, Metinvest, BASF, etc.). Developing the professional mobility of the teacher in changing market conditions. Lifelong learning as a continuation of the dual model. Prospects for micro-qualifications and certifications in vocational education.

The proposed elective academic discipline not only provides knowledge about dual education and its career potential but also involves practical training for students in organizing this form of education in vocational institutions. Effectiveness is achieved through the use of purposefully selected methodological tools and the construction of a phased model for such training (Lebedyk, Strelnikov & Strelnikov, 2020) (see Fig. 1).

Process charts for educational and production tasks remain an important foundational element, helping to clearly structure welding or construction work processes, thereby forming students' ability to plan and control quality. This is complemented by the case method, focused on analyzing real workplace situations that require the selection of technologies or the resolution of organizational problems, including those that arise with the dual form of education.

The video method has significant potential, allowing for the demonstration of algorithms for performing technological operations, safety instructions, or examples of modern production practices. Based on this, students can analyze the correctness of actions and critically evaluate different approaches. An effective addition is educational excursions to construction sites or welding areas, where students get acquainted with the real production environment, as well as to training workshops equipped in IV(VT)E. In cases where a direct visit is impossible, it is advisable to use virtual tours created based on 3D modeling or video tours, which allow for safe immersion in production processes.

Project-based tasks hold a special place in the formation of pedagogical skills, prompting students to plan the educational-production process and create layouts and models for work organization (Kravets & Slobodianyk, 2024). WebQuests serve as an important tool, organizing students' research activities on the Internet aimed at solving complex professional problems (for example, selecting optimal materials or technologies considering modern innovations). This form combines the development of information literacy with the formation of investigative research skills in bachelors of vocational education.

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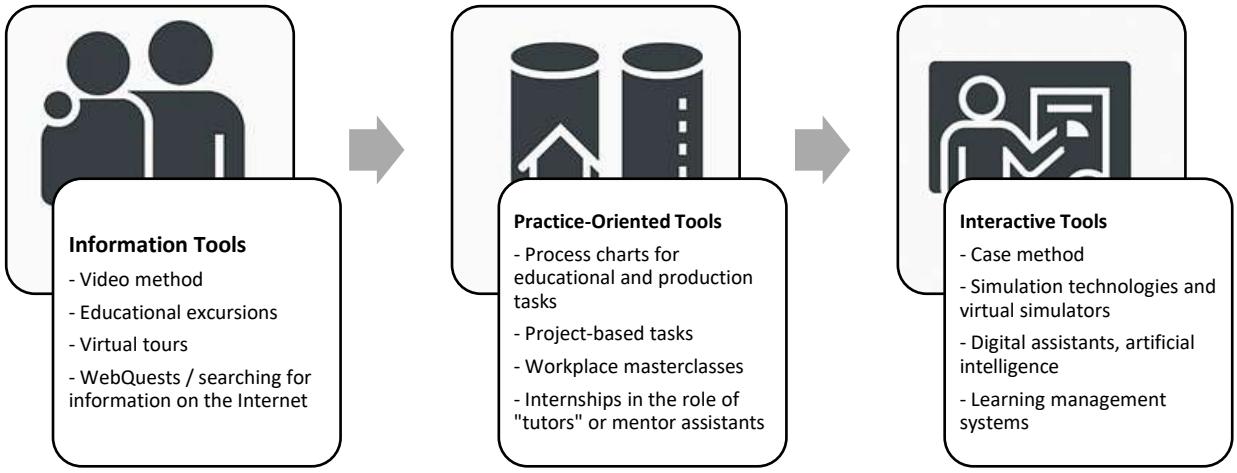

Fig. 1. Methodological tools for preparing vocational training teachers for the organization of dual education

The practical component is enhanced through internships for students in the role of "tutors" during workplace practice, as well as workplace masterclasses where enterprise specialists demonstrate advanced technologies and modern equipment to future professionals. Additionally, the use of simulation technologies and virtual simulators ensures the safe practice of complex or risky operations (Lavrentieva, et al., 2019, March 22). In turn, the introduction of digital assistants and artificial intelligence technologies (for example, ChatGPT, integrated Moodle modules, or specialized digital tutors) makes it possible to personalize learning paths, provide students with timely prompts and support, and also to model production situations with a high level of realism (Radkevych, & Pryhodii, 2024). All these tools combined form a flexible and multidimensional methodological system that corresponds to the specifics of dual education in the construction and welding industries. The training of bachelors of vocational education in the field of construction and welding for the organization of dual education occurs in stages (Kovalchuk, & Soroka, 2022), which ensures the consistent formation of professional knowledge, skills, and practical experience (see Fig. 2). In the first stage (foundational-orientational), students are introduced to the conceptual foundations of dual education, its place in the system of vocational training, and the legal and regulatory documents that govern the interaction between the educational institution and employers. This creates a foundation for understanding the importance of partnership in the professional development of a future teacher. The second stage (theoretical-methodological) is aimed at mastering the methodological foundations of organizing dual education. It is implemented in the content of such academic disciplines as "Professional Pedagogy" and "Theory and Methodology of Vocational Training," where future specialists master the forms and methods of combining classroom and workplace training, and practice the skills of developing educational-production tasks, process charts, and case studies. The third stage (practice-oriented) focuses on applying the acquired knowledge in real production conditions. During pedagogical and workplace practice, students perform the functions of tutors, organize educational and virtual excursions, and participate in project-based tasks in collaboration with partner enterprises. An important component of this stage is the mastery of elective courses, particularly "Dual Education: Challenges, Opportunities, and Career Prospects," "Management of the Educational-Production Process," and "Digital Tools in the Organization of Dual Education." This allows students to delve deeper into the subject matter and to test methods for organizing the educational-production process. The fourth stage (final-diagnostic) involves the generalization and assessment of the formed readiness of future teachers to organize dual education. At this stage, the completion of coursework and thesis projects that integrate the results of practical and theoretical training, as well as conducting diagnostics of the students' preparedness level, become key. This helps to determine the level of their ability for the

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independent organization of dual education and ensures the adjustment of the educational process.

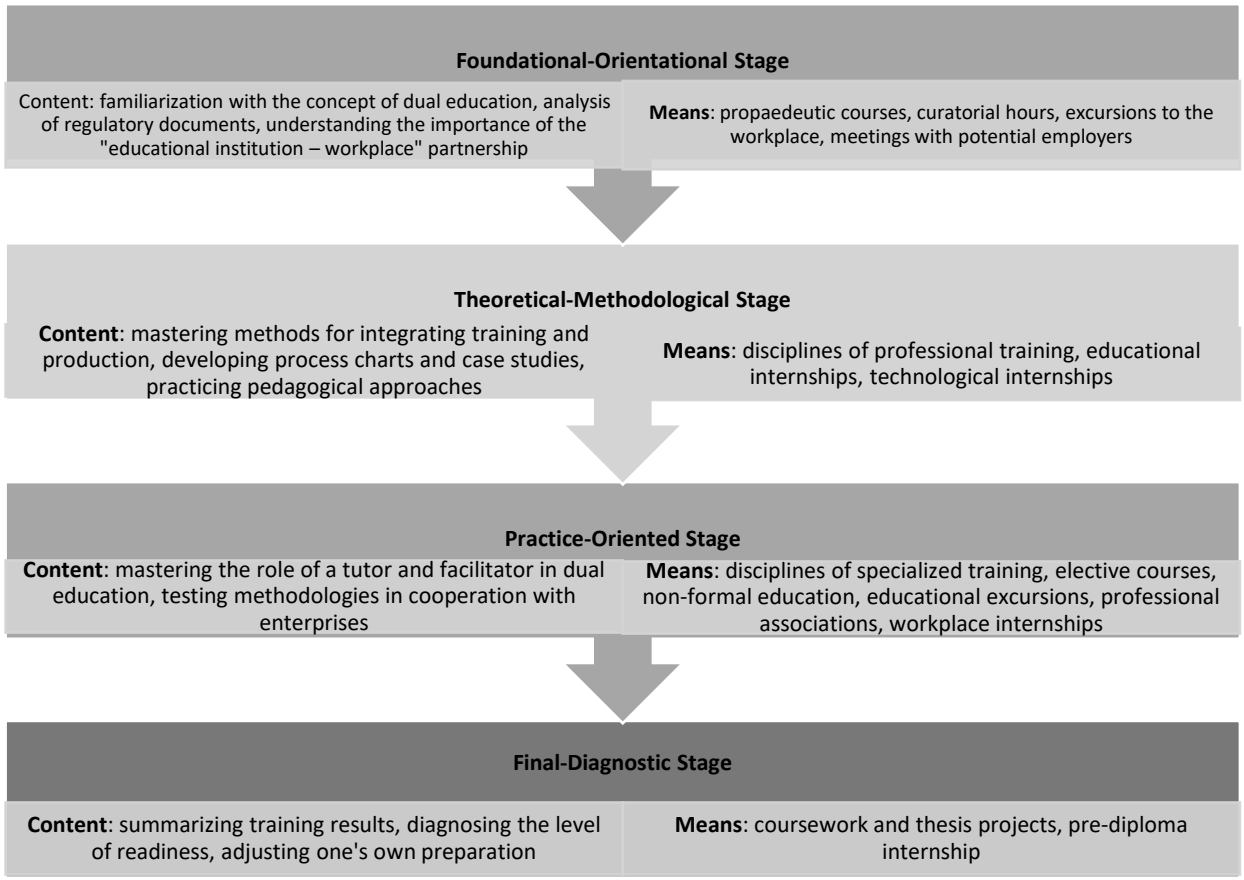

Fig. 2. Stages of preparing bachelors of vocational education in the construction and welding profiles for the organization of dual education

Thus, the proposed model for preparing bachelors of vocational education in the field of construction and welding for the organization of dual education is phased and comprehensive. It combines legal, organizational, methodological, and digital aspects, involves the use of modern methodological tools, and creates conditions for the formation of a teacher's holistic readiness for interaction with employers. The implementation of this model contributes to the integration of theoretical knowledge and production experience, ensures practice-oriented training, and increases the competitiveness of graduates in the labor market.

Conclusions. The conducted research allows us to state that the effective preparation of bachelors of vocational education in the field of construction and welding for the organization of dual education requires a comprehensive update of the content and methodology of their professional-pedagogical training. It has been determined that the key guidelines are the formation of the legal, organizational, methodological, psychological-pedagogical, and information-digital readiness of a vocational education teacher to work in a dual environment.

The presented training model includes four interconnected stages: foundational-orientational, theoretical-methodological, practice-oriented, and final-diagnostic. Within each of them, specific methodological tools (informational, practice-oriented, interactive) should be applied, taking into account the specifics of the construction and welding profiles, as well as the need for students' gradual entry into the real professional environment and mastery of the methods and technologies of dual education.

The developed model considers the advisability of implementing special blocks dedicated to the issues of dual education into the content of the courses "Professional Pedagogy," "Theory and Methodology of Vocational Training," and "Methodology of Teaching Specialized Disciplines in Vocational Education Institutions," as well as introducing elective academic disciplines,

particularly "Dual Education: Challenges, Opportunities, and Career Prospects" (3 ECTS credits). Such an integration of professional training elements creates a holistic system in which theoretical knowledge, methodological skills, and practical experience of future vocational training teachers are combined.

Thus, the proposed model can become a basis for the further improvement of educational and professional programs for preparing vocational training teachers, and its approbation will contribute to enhancing the quality of dual education organization in institutions of vocational and professional pre-higher education.

Further scientific research should be directed towards identifying the pedagogical conditions that ensure the effectiveness of preparing bachelors of vocational education in the field of construction and welding for the organization of dual education, as well as towards the experimental verification of the proposed model in the educational process of institutions of vocational and professional pre-higher education.

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МЕТОДИЧНІ АСПЕКТИ ПІДГОТОВКИ БАКАЛАВРІВ З ПРОФЕСІЙНОЇ ОСВІТИ У ГАЛУЗІ БУДІВНИЦТВА І ЗВАРЮВАННЯ ДО ОРГАНІЗАЦІЇ ДУАЛЬНОГО НАВЧАННЯ

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Реферат:

Актуальність у сучасних умовах трансформації системи професійної освіти України зростає потреба у впровадженні дуальної форми навчання, що забезпечує підвищення конкурентоспроможності майбутніх фахівців і посилює зв'язок закладів освіти з ринком праці; водночас спостерігаються труднощі, пов'язані з недостатньою підготовленістю педагогів професійного навчання.

Мета: висвітлити теоретичні та методичні засади підготовки бакалаврів з професійної освіти у галузі будівництва і зварювання до організації дуального навчання, розкрити специфіку етапів та методичних інструментів цієї підготовки.

Метод: аналізу, синтезу, порівняння, систематизації і узагальнення, проєктування та моделювання – для виявлення сутності та специфіки дуальної освіти, розроблення змісту й етапів підготовки бакалаврів до організації дуального навчання.

Результати: встановлено, що ефективна підготовка бакалаврів з професійної освіти у галузі будівництва і зварювання до організації дуального навчання передбачає комплексне оновлення змісту й методики професійної підготовки; визначено її ключові орієнтири (формування правової, організаційної, методичної, психолого-педагогічної та інформаційно-цифрової готовності педагога до роботи у дуальному середовищі); розроблено відповідну модель, що охоплює чотири взаємопов'язані етапи (базово-орієнтаційний, теоретико-методичний, практико-орієнтований, підсумково-діагностичний); розкрито напрями оновлення змісту навчальних дисциплін професійної і фахової підготовки педагогів професійного навчання в контексті організації дуального навчання; презентовано зміст та методичний інструментарій для курсу «Дуальна освіта: виклики,

можливості і кар’єрні перспективи».

Висновки: запропонована модель може стати основою для подальшого вдосконалення освітньо-професійних програм підготовки педагогів професійного навчання до організації дуального навчання, а її впровадження сприятиме підвищенню якості надання освітніх послуг у закладах професійної та фахової передвищої освіти.

Ключові слова: *дуальна освіта, професійна підготовка, педагог професійного навчання, методика, методичний інструментарій, модель підготовки.*

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