

ISSN Online 2707-3092

# Professional PEDAGOGICS

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Професійна  
ПЕДАГОГІКА

Institute of Vocational Education  
of the National Academy  
of Educational Sciences of Ukraine

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1(28)'2024

ISSN 2617-1759 (Online)

<https://doi.org/10.32835/2707-3092.2024.28>

# Professional Pedagogics

## No 1(28)'2024

### **Founded**

April 07, 2011

### **Founder**

The Institute of Vocational Education  
of the NAES of Ukraine

### **Editor-in-chief**

Valentyna Radkevych

**Publication frequency:** 2 times a year

**From 2011 to 2019:** "Scientific Herald of the Institute of Vocational Education and Training of the NAES of Ukraine. Professional Pedagogy" (The certificate of state registration of a print media: Series No 17626-6476P as of April 07, 2011)

**Since 2020:** "Profesiina pedahohika" /"Professional Pedagogics" (ISSN 2707-3092) – an electronic professional edition (The decision of the Academic Board of the Institute of Vocational Education of the NAES of Ukraine as of June 15, 2020, Minutes No 7)

### **Recommended for publishing**

by the Academic Board of the Institute of Vocational Education of the NAES of Ukraine (Minutes No 7 as of June 15, 2020)

**Papers are reviewed** by editorial board members and external reviewers

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**The Journal is an electronic periodical (ISSN (Online) 2707-3092), included in the B category of the list of scientific professional editions of Ukraine, in which the results of theses for academic degrees of Candidate of Sciences, Doctor of Sciences and Doctor of Philosophy can be published (Order of the Ministry of Education and Science of Ukraine as of March 17, 2020, No 409).**

### **Indexed in:**

Index Copernicus International (since July 12, 2018)

CrossRef (since November 22, 2018)

ERIH PLUS (since January 20, 2020)

PKP index (since July 09, 2019)

Google Scholar (since August 25, 2014)

Academic Resource Index: ReserchBib (since January 01, 2019)

**Added** to the Ulrich's Periodicals Directory database since August 25, 2014)

**Reviewed by:** the Ukrainian abstract journal "Dzherelo" (Source), the abstract database "Ukrainika naukova" (Scientific Ukrainika), the sectoral abstract database of V. O. Sukhomlynskyi State scientific and pedagogical library of Ukraine, Directory of Open Access Journals, WorldCat, Education Resources Information Center (ERIC)

**Archived** by Vernadsky National Library of Ukraine

**Represented** in digital catalogues of Yaroslav Mudryi National Library of Ukraine, V. O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine

The Institute of Professional Education of the National Academy of Pedagogical Sciences of Ukraine is an entity in the field of online media (Decision of the National Council on Television and Radio Broadcasting No. 1430 of 16.11.2023)

**Kyiv 2024**

<https://doi.org/10.32835/2707-3092.2024.28>

The journal substantiates topical issues of modernisation of professional and vocational higher education, including: search for new approaches to the formation of professional qualifications, development of professional standards, use of public-private partnership tools, creation of virtual educational space in educational institutions, ensuring quality control of professional training of future specialists, improving professional development of teachers, management of educational institutions as project-oriented organisations. The practical aspects of optimising distance learning, using networked educational and methodological complexes in the educational process, testing test tasks, developing the moral and volitional qualities of students, and forming their entrepreneurial, career, intercultural, and methodological competencies are revealed. The tendencies of transformational changes in vocational education in the era of Ukraine's independence are characterised.

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ISSN 2707-3092 (Online)

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*The publication has been prepared as part of fulfilling the research tasks of the laboratory for foreign professional education and training systems of the Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine on "Trends in the development of public-private partnership in the field of vocational (vocational-technical) education" (state registration number 0122U000539, years of execution: 2022-2024).*

# MODERN MECHANISMS FOR THE DEVELOPMENT OF PUBLIC-PRIVATE PARTNERSHIPS IN VOCATIONAL (VOCATIONAL AND TECHNICAL) EDUCATION IN THE POST-WAR PERIOD

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## Abstract

*The relevance* of this article is defined by the need to substantiate the modern mechanisms for the development of public-private partnerships in vocational (vocational and technical) education to attract private investment and innovative technologies into professional training of skilled workers for various sectors of the economy in the post-war period. It will be based on mutually beneficial economic and organisational relations between state authorities, local governments, the private sector and vocational education institutions.

*The aim* is to identify and justify the modern mechanisms for the development of public-private partnerships and to find out the possibilities of their use in improving the quality of vocational (vocational and technical) education in line with the demands of the labour market in the post-war period.

*Methods*: studying of scientific sources, legislative and regulatory documents, empirical data to determine the state of public-private partnerships in the field of vocational (vocational and technical) education; theoretical analysis and synthesis, generalisation of scientific approaches to the problem under study in order to determine the mechanisms for the development of public-private partnerships in vocational (vocational and technical) education and drawing conclusions.

*Results*: there are identified and substantiated the modern mechanisms for the development of public-private partnerships, including forms, means, and tools that are key to ensuring effective interaction between partnership participants to improve the quality of vocational (vocational and technical) education and meet the needs of the labour market in the post-war period.

*Conclusions*: the modern mechanisms for the development of public-private partnerships in vocational (vocational and technical) education, which define the framework for cooperation between the state and the private sector and are implemented to improve the quality of vocational (vocational and technical) education, include: contract, institutional, investment, concession, leasing, franchise and project forms of partnership; means (contract for the provision of educational services, outsourcing, councils for vocational (vocational and technical) education and labour market, educational programmes, direct investment in infrastructure development, joint investment projects, leasing of equipment and technologies, leasing of educational premises; franchise of educational programmes, franchise of educational services, joint educational projects, joint research projects); instruments (service agreement, outsourcing agreement, agreement on the establishment of joint educational institutions, charter of a joint educational institution, concession agreement, agreement on the development and implementation of educational programmes, investment agreement, memorandum of understanding, leasing agreement, maintenance agreement, franchise agreement, educational services agreement, joint project implementation agreement, research cooperation agreement). Their use is key to achieving sustainable development and introducing innovations in vocational (vocational-technical) education.

**Introduction.** The heroic struggle of the Ukrainian people against the Russian invasion is soon to end in our victory, and after the military actions, Ukraine will focus on the restoration of all sectors of the economy to return prosperity to social life. Among the immediate tasks of the state's reconstruction will be the restoration of the system of vocational (vocational-technical) education (hereinafter referred to as V(TE)E), which includes the reconstruction of damaged institutions, modernization of existing ones, and creation of new ones, including through consolidation, to expand the opportunities for various population categories to obtain vocational qualifications according to their own desires and labor market demands. In solving these tasks, public-private partnership (hereinafter referred to as PPP) is effective as a form of cooperation between the state and the private sector, where both sides are involved in the implementation of projects or services aimed at providing conditions for vocational training of qualified personnel, expanding the accessibility of educational programs, and increasing their relevance according to labor market needs.

According to the author, PPP in the sphere of V(TE)E should be understood as a system of long-term mutually beneficial contractual economic and organizational relations between state and non-state entities, whose task is to attract additional investments in the development of vocational education, increase the level of joint responsibility for decision-making that serves the public interest, and achieve pedagogical, social, and economic effects (Radkevich, 2022). PPP in the field of V(TE)E should be directed towards the integration of resources and expertise by specialists from the state and private sectors on innovative educational projects that encompass modern technologies and methodologies for the vocational training of qualified personnel. The main goal of PPP in the field of V(TE)E is to improve the quality of educational services, taking into account technical and technological changes in the economy.

The demands of the present highlight the necessity of developing modern vocational qualifications, standards, educational and training

programs that reflect current trends and employer requirements, as well as the demands of V(TE)E seekers regarding the acquisition of practical skills necessary for their future employment and career development. In this context, the importance of modern mechanisms for the development of PPP in the field of V(TE)E is significant, namely: forms, means, tools, the selection of which is based on specific principles that influence the successful interaction between partnership subjects and ensure mutual benefit, transparency of cooperation, social responsibility, accessibility, and quality of education, and its adaptability to social and economic changes (Radkevich, 2022).

The implementation of modern mechanisms for the development of PPP in the field of V(TE)E is based on the consideration of systemic approach provisions, which allow taking into account the impact of a particular PPP element on the entire V(TE)E system and ensuring their interaction and synergy; economic and analytical approaches that involve evaluating the costs and benefits associated with PPP in the field of V(TE)E based on the results of economic analysis for making informed financial decisions, efficient use of resources; social approach, which helps to take into account the social aspects of PPP in the field of V(TE)E, understand the interaction of various social groups, identify the needs and expectations of different stakeholders, and develop strategies that consider their interests. Therefore, the use of modern mechanisms for the development of PPP in the field of V(TE)E enables a predictive response to labor market needs in the context of forming and developing the state's labor potential for participation in successful post-war recovery of Ukraine.

**Sources.** The principles of state policy in the field of V(TE)E include: public-private partnership and its varieties, as well as public-community partnership, as a tool for utilizing additional resources from the community sector, which facilitates the development of educational infrastructure, implementation of innovative educational programs, creation of joint educational centers, etc. In the case of public-community partnership, the focus is on involving civic

organizations representing citizens' interests, rather than private capital. Public-community governance ensures the interaction of state authorities and local self-government with civic associations to make effective management decisions in the field of V(TE)E (About Education, 2017). The implementation of these principles not only improves the quality of V(TE)E but also contributes to the social and economic development of the country, forming a solid foundation for future progress.

The legal foundations for implementing PPPs in the field of Vocational Education and Training (VET) are defined in the Constitution of Ukraine (1996), stating that "the state ensures the accessibility of VET by creating conditions and equal opportunities in choosing a profession, implementing vocational training programs, retraining, and qualification improvement of personnel according to social demands." The Civil Code of Ukraine (2003) elaborates on the legal mechanisms for state and local community participation in civil-law relations, for instance, by establishing state and municipal educational institutions. According to the provisions of the Commercial Code of Ukraine (2003), "an enterprise ensures the training of qualified workers and specialists, their vocational education both in its own educational institutions and in others under agreements." The Law of Ukraine "On Public-Private Partnership" (2010) clarifies PPP features, rights and obligations of public and private partners, principles of PPP implementation, application areas, particularly in the context of providing educational services (Article 4), forms of state support, state guarantees, and state control. According to the Law of Ukraine "On Education" (2017), PPP in the field of VET may involve: joint financing of educational institutions, development of bases for practical training; development and advancement of modern VET technologies; vocational and practical training; implementing measures for social protection and improving the living conditions of VET system employees and students.

In accordance with the Law of Ukraine "On Vocational (Vocational-Technical) Education" (1998), the state regulates the development of national standards, educational programs based on a competency-based approach, licensing and

accreditation of VET institutions and teaching staff, etc. Meanwhile, the Law of Ukraine "On Employers' Organizations, Their Associations, Rights, and Guarantees of Their Activity" (2013) determines that employers' organizations interact with VET institutions in ensuring the training, retraining, and qualification improvement of enterprise personnel, forming state and regional orders for the training of qualified workers. Approaches to the implementation of the concessional form of PPP in the field of VET, preparation of concession agreements containing detailed conditions for implementing educational projects are defined in the Law of Ukraine "On Concessions" (2019).

The theoretical foundations for the development of PPPs in the field of VET have been revealed in the research of domestic and foreign scientists. For instance, the specifics of interaction among all interested PPP parties in the field of VET were substantiated by O. Radkevych (2022); the specificity of concluding PPP contracts on a competitive basis was explored by D. Voronina-Pryhodii, & V. Popova et al. (2022); principles for the development of PPPs in the field of VET in post-war times were justified by V. Radkevych (2022); mechanisms for financing PPP projects that would contribute to the effectiveness and sustainability of VET were disclosed by N. Nazukova (2022); approaches to developing cooperation between public and private partners in the context of implementing the principle of mutual benefit in PPPs in the field of VET were determined by S. Hanzhyuk & O. Brezhneva-Yermolenko (2022); innovative public-private partnership projects that are promising for use in Ukraine were characterized by I. Hussain, Z. Farooq, W. Akhtar (2012); features of using digital technologies for monitoring and managing PPP projects were revealed in the works of J. Roehrich, M. Lewis, G. George (2014); approaches to developing new financial instruments to attract investors were substantiated by E. Engel, R. Fischer, A. Galetovic (2014). However, modern mechanisms for the development of PPPs in the field of VET in Ukraine remain insufficiently researched.

**The aim of the article** is to identify and substantiate modern mechanisms for the development of public-private partnerships and to explore the possibilities of their use in improving the quality of vocational (vocational-technical)

education according to labor market needs in post-war times.

**Results and discussion.** A key element of modern economic, social, and educational policies in many countries around the world, including Ukraine, is the development of PPPs.

This process encompasses a broad spectrum of forms, means, and tools that constitute an integral part of modern mechanisms for stimulating effective interaction between the public and private sectors in the field of Vocational Education and Training (VET). This is particularly relevant in the context of post-war reconstruction in Ukraine, necessitating the adaptation of VET to the labor market needs. The form of Public-Private Partnership (PPP) in the field of VET should be understood as a comprehensive mechanism that defines the framework of partnership subjects' cooperation to achieve common goals regarding the development of VET, enhancing its quality, accessibility, and prestige in society. The most effective forms of PPP in the development of VET are contractual, institutional, investment, concessionary, leasing, franchising, and project-based forms. For the implementation of each of these forms, appropriate means and tools are selected, which enable the effective use of resources, knowledge, and competencies of partners for the professional training of qualified workers according to labor market needs.

One of the main forms of PPP in the field of VET is the contractual form, aimed at attracting investments, particularly for modernizing educational infrastructure, updating the material and technical base of VET institutions, developing new professional qualifications, educational programs, etc. The contractual form of PPP defines the legal, financial, and organizational aspects of cooperation between public and private structures. This form can be represented through relevant PPP means, namely: contracts for providing educational services and outsourcing. These means ensure access to specialized resources that may be absent in the public sector, and allow focusing on the main educational tasks, improving efficiency and quality of VET.

For the realization of the means of the contractual form of PPP, service provision agreements and outsourcing agreements are applied. Meanwhile, the conditions of contractual

agreements should be beneficial for all parties of the PPP. For example, companies may finance VET institutions or specific educational programs to prepare qualified specialists who will subsequently work in these companies. From their side, VET institutions may provide companies with access to use their resources for organizing professional training of their personnel. For instance, in the Chernihiv region, the following are successfully functioning: the Regional Center for Innovative Construction Technologies "KNAUF" (Chernihiv Professional Railway Lyceum); the Training and Practical Construction Center based on "CERESIT" materials (Chernihiv Professional Construction Lyceum), the Interregional Training and Practical Center for the Training of Sanitary and Technical Systems Installers and Equipment (Chernihiv Professional Railway Lyceum), financed by the Swiss Agency for Development and Cooperation (SDC) in partnership with Geberit International AG and the GURT resource center (Mohylnytskyi, 2022). In the Ivano-Frankivsk Professional Lyceum, a training and practical center for construction was established by the KNAUF company in 2023 (Starchenko & Ostapchenko, 2023).

To address strategic tasks of educational policy in the field of VET, the institutional form of PPP is applied, based on the creation of: joint educational institutions (the result of cooperation between the public and private sectors for developing innovative educational programs in the field of VET); councils on VET and labor market issues (forming specialized councils or committees comprising representatives of government institutions, the private sector, and industry to develop educational strategy and policy according to labor market and educational sector needs), etc. The established PPP institutions anticipate the development of: cooperation agreements, setting the framework for cooperation between public and private partners to create joint educational institutions; statutes of joint institutions, defining the rules and principles of operation of newly established educational institutions. The mentioned means and tools of the institutional form of PPP enable, primarily, the formation of joint organizational structures, namely: consortia, clusters, funds, specialized agencies managing projects in the field of VET. At the same time, the

institutional form of PPP in the field of VET requires continuous monitoring and evaluation of project effectiveness, which involves a systematic study of not only financial indicators but also social characteristics, including student satisfaction with the quality of the educational process and the effectiveness of educational institutions' interaction with the labor market.

*The concession form* of PPP (Public-Private Partnership) in the field of VET (Vocational Education and Training) entails the transfer of rights to operate or manage the educational infrastructure of a VET institution to a private partner for a specific period. This collaboration form is typically used for implementing large investment projects that require significant financial resources and technological innovations. Among the means and tools of the concession form of PPP in VET, the most effective are: managing VET institutions – private companies can take over the management of educational institutions, covering their modernization, staff management, introduction of new technologies, and methods of organizing the educational process; creating educational programs – private companies can undertake the development and implementation of new educational programs or courses that meet current labor market demands and technological trends. The instruments of the concession form of PPP are: the concession agreement (a legal document that defines the terms of transferring the management of a VET institution or program to the private sector); the contract for the development and implementation of educational programs (a document that defines the terms of cooperation in the field of developing and implementing new educational programs).

An example of the concession form of PPP could be the transfer of management of VET institutions to private partners. In such cases, the private partner gains the right to manage the education institution and its development for a certain period with the aim of improving the quality of the educational process and management efficiency. Accordingly, the state retains control over the strategic directions of the development of VET institutions and the quality of training future specialists. Thus, the concession form of PPP in the field of VET is promising in ensuring effective interaction between all partnership participants and

is aimed at forming competitive personnel for the labor market. However, in implementing the concession form of PPP, it is important to consider the provisions of the Law of Ukraine "On Education" (2017) regarding the prohibition of transferring state and/or municipal property, including land plots, to private partners for lease, concession, or operational management. Moreover, any actions that could result in the termination of state or municipal ownership of the respective objects are not allowed.

The investment form of PPP in the field of VET, which involves direct financing or co-financing of projects by the private sector, is considered quite effective. Co-financing is defined as the joint investment of resources by two or more PPP parties to achieve a common goal. This process usually involves the participation of state, private, or non-profit organizations in a single PPP project, enhancing its efficiency and ensuring the sustainability of results. The investment form of PPP in the field of VET is implemented through: direct investments in infrastructure development (the private sector can invest funds in the construction or modernization of VET institutions, which entails expanding physical infrastructure, updating equipment, and technologies); joint investment projects (development of joint educational programs or projects financed by both sides, creation of specialized courses, research programs, digital platforms that meet current market needs), etc. Appropriate instruments for implementing the investment form of PPP include: the investment agreement (a document that defines the terms of financing, rights, and obligations of investors and beneficiaries); the memorandum of understanding (a document that outlines the general principles and intentions of the parties regarding joint investment projects).

An important aspect of the PPP investment model also includes investments in the development or restoration of infrastructure of VET institutions due to destruction from military aggression by Russia against Ukraine or other reasons. Private investors can finance the construction of educational buildings, sports complexes, or student dormitories. Such investments not only improve the conditions of study and living for students but also enhance the attractiveness of VET institutions for future

applicants. Moreover, the investment form of PPP envisages the creation of special funds or grant programs to support students and teaching staff of VET institutions.

*The leasing form* of PPP in the VET sector is particularly suitable for implementing short-term projects or projects with limited budgets. The implementation of this PPP form is based on means such as: equipment and technology leasing (VET institutions can use modern equipment and production technologies provided on leasing terms by private companies); leasing of educational premises (private companies can provide premises to VET institutions on leasing terms), and more. For the realization of the leasing form of PPP, it is advisable to develop leasing contracts or technical service agreements (documents that define the conditions for providing equipment or premises, as well as their maintenance and support). The leasing form of PPP involves the temporary use of assets or resources of the educational institution, for example, equipment, premises, or even complete VET institutions. This approach allows for the rapid updating of the material and technical base of educational institutions without significant capital investments from the state.

Within the framework of the leasing partnership form, the private partner often takes on the responsibilities of technical maintenance and repair of equipment, implementation of new technologies and teaching methods, positively affecting the quality of educational services provided. Leasing schemes can be used to meet the transport needs of VET institutions. For instance, buses or minibuses of the business partner can be provided on a leasing basis for organizing student transportation to places of study, internships, teacher training, etc. Such a PPP form relieves the budget of the VET institution and allows the use of modern transportation means. An important aspect of this interaction form also includes the possibility of leasing computer equipment and software for organizing the educational process. Private companies can provide specialized software on a leasing basis to educational institutions for the professional training of future qualified specialists. This approach facilitates the integration of the latest technologies into the educational process and improves the quality of VET.

*The franchise form* of PPP in the VET sector is also effective for implementing projects over large territories with various regional characteristics. This form entails transferring the rights to use the brand, production technologies, teaching methods, and other intellectual resources. The franchise form of PPP allows for the rapid expansion of the VET institution network while ensuring uniform quality standards and methodology. Within the franchise form of PPP, the state often acts as the franchisor, transferring to private partners the rights to use developed methodologies, educational programs, and other resources. The franchise form of interaction includes the transfer of intellectual property, provision of support in the form of consultations, staff training, and other mutually beneficial activities, positively affecting the quality of educational services.

To implement the franchise form of PPP, means such as educational service franchises (private companies can grant VET institutions the right to use their educational programs, methods, and brands); educational service franchises in the form of training (private companies can provide VET institutions with a franchise to conduct specialized training, workshops, educational courses), and more are used. The franchise partnership form involves developing franchise agreements that define the conditions for granting the right to use educational programs, methods, brand, and contracts for educational services, which reveal the specifics of providing educational services or conducting training within the franchise. The advantages of the franchise form of PPP include its adaptability. In this context, franchise agreements that can be adapted to specific needs and conditions are effective means of implementing PPP, allowing for a responsive approach to changes in the educational environment and labor market. For the successful implementation of such agreements, interaction and coordination of actions among all partnership participants are necessary. At the same time, this context highlights the role of the state in developing effective regulatory mechanisms for the franchise form of PPP and controlling its implementation, necessitating the development of an appropriate regulatory base and monitoring mechanisms for the effectiveness of ongoing projects. The franchise form of PPP in the VET

sector activates private partners to assume a part of the risks, including those related to the financial stability of the project, depreciation of used equipment, and changes in legislation.

Within the framework of the franchise form, PPP projects in the field of VET (Vocational Education and Training) are implemented, involving international partners. This enables students to undergo internships in foreign companies, and business partners, in turn, to gain access to qualified labor. For instance, under the franchise form of PPP, VET institutions collaborate with energy companies to train specialists in the field of renewable energy, including experts in the operation of solar panels, wind turbines, and other renewable energy sources. In the context of dynamic changes in the technological landscape and the labor market, the franchise form of PPP in the field of VET allows for rapid adaptation to new challenges in the training of qualified specialists.

*The project form* of PPP in the field of VET represents a specific mechanism that provides funding for a particular project through the attraction of investments. This approach differs from traditional funding methods, as funds are attracted based on the efficiency of the project itself rather than the overall competitiveness of the partners. Such a mechanism enables the concentration of financial resources on achieving specific tasks and goals of the partnership.

In the implementation of the project form of PPP in the field of VET, effective approaches include joint educational projects (development and execution of joint educational projects by VET institutions with private companies) and joint research projects (private companies can collaborate with VET institutions in developing innovative technologies, teaching methods, etc.). The implementation of the project form of PPP involves developing agreements on joint project implementation (documents defining the terms of cooperation, distribution of responsibility, financing, and management of joint educational projects between VET institutions and private companies) and agreements on cooperation in research projects (documents establishing the framework for cooperation in experimental research, including the distribution of resources, intellectual property rights, etc.).

The advantages of the project form of PPP in the field of VET include the possibility of attracting significant investment for the implementation of complex and long-term projects. This entails the creation of new VET institutions, the modernization of existing infrastructure, the development of innovative educational programs, etc. However, the success of the project form of PPP depends on the presence of a project culture among educators and employers (Kravets, 2023), which facilitates the quality preparation of PPP projects in the field of VET based on a thorough analysis of risks, costs, and potential returns. Particularly, within the framework of the project form of PPP, risks are typically distributed in such a way that each partnership party is responsible for aspects of the PPP project within its competencies.

An important means of implementing the project form of PPP is dual education programs, supported financially by private partners. This type of education opens opportunities for the direct involvement of the private sector in the educational process. Enterprises take on part of the responsibility for training future specialists, providing them with the necessary conditions for practical training in production settings. However, the effectiveness of dual education depends on several factors, such as the quality of educational programs, the level of teacher preparation, modernized material and technical base, and requires coordination of efforts by the state, educational institutions, enterprises, etc. In the context of implementing the project form of PPP, dual education is promising for acquiring practical experience that learners can immediately apply at the workplace (Rayter, & Davlikanova, 2017), and also positively affects the improvement of the quality of training and their quick adaptation to changes in the labor market (Strilets, 2019).

**Conclusions.** Practical experience in utilizing contemporary mechanisms for Public-Private Partnership (PPP) development in the sphere of Vocational Education and Training (VET) delineates the framework of collaboration primarily between the state and the private sector, implemented with the aim of enhancing the quality of VET. These mechanisms demonstrate the efficacy of contractual, institutional, investment, concessionary, leasing, franchising, and project partnership forms. Such forms vary from traditional contracts and service provisions to more

complex structures like concessions and joint ventures, enabling the amalgamation of resources and expertise from both the public and private sectors to achieve common goals, namely: infrastructure development, improvement of educational service quality, and stimulation of innovation among others.

Effective PPP tools in the VET sector include: educational service contracts, outsourcing, councils on VET and labor market issues, educational programs, direct investments in infrastructure development, joint investment projects, equipment and technology leasing, educational premises leasing; educational program franchises, educational service franchises, joint educational projects, and joint research projects. Their application fosters the creation of a transparent and stable environment for PPPs, attracting private investments into the VET sector.

In regulating licensing and accreditation of professions, educational programs, intellectual property, and investments in the VET sector, legal, financial, and other instruments prove effective (service provision contracts, outsourcing agreements, joint educational institution creation agreements, statutes of joint educational institutions, concession agreements, educational program development and implementation contracts, investment contracts, memorandums of understanding, leasing agreements, technical maintenance agreements, franchise agreements, educational service contracts, joint project implementation agreements, and scientific research

collaboration agreements). Moreover, PPP monitoring and effectiveness evaluation are crucial tools, facilitating timely strategic adjustments for VET institutions, ensuring their adaptability to evolving conditions and post-war labor market needs.

Thus, leveraging modern PPP development mechanisms in the VET sector enables, firstly, the attraction of additional investments for the modernization of educational and social infrastructure; secondly, meeting the needs of private companies in training qualified personnel for their businesses; thirdly, aligning VET content with real labor market demands through educational program updates; and fourthly, implementing innovative teaching technologies, as the private sector often thrives on high technologies.

In the future, business structure investments in the VET sector should become an integral part of the country's overall economic and social development strategy, a source of additional opportunities to overcome the consequences of wartime, and to create a stable, secure, and democratic society. For this purpose, VET development will require systematic interaction and coordination of actions among various partnership stakeholders, including government structures, educational institutions, the private sector, and civil society, to develop joint strategies and programs that meet the society's current needs and labor market demands in the post-war period.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.1-11>

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*Публікація підготовлена в рамках виконання завдань наукового дослідження лабораторії зарубіжних систем професійної освіти і навчання Інституту професійної освіти НАПН України "Тенденції розвитку державно-приватного партнерства у сфері професійної (професійно-технічної) освіти" (державний реєстраційний номер 0122U000539, роки виконання: 2022-2024 рр.)*

## **СУЧАСНІ МЕХАНІЗМИ РОЗВИТКУ ДЕРЖАВНО-ПРИВАТНОГО ПАРТНЕРСТВА У СФЕРІ ПРОФЕСІЙНОЇ (ПРОФЕСІЙНО-ТЕХНІЧНОЇ) ОСВІТИ В ПОВОЄННИЙ ЧАС**

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## Реферат:

*Актуальність* статті визначається необхідністю обґрунтування сучасних механізмів розвитку державно-приватного партнерства у сфері професійної (професійно-технічної) освіти для залучення приватних інвестицій та інноваційних технологій у професійну підготовку кваліфікованих робітників для різних галузей економіки в повоєнний час на основі взаємовигідних економічних та організаційних відносин між органами державної влади, місцевого самоврядування, приватним сектором і закладами професійної (професійно-технічної) освіти.

*Мета:* визначити та обґрунтувати сучасні механізми розвитку державно-приватного партнерства і з'ясувати можливості їх використання у підвищенні якості професійної (професійно-технічної) освіти відповідно до потреб ринку праці в повоєнний час.

*Методи:* вивчення наукових джерел, законодавчих, нормативно-правових документів, емпіричних даних – для з'ясування стану державно-приватного партнерства у сфері професійної (професійно-технічної) освіти; теоретичний аналіз і синтез, узагальнення наукових підходів щодо досліджуваної проблеми з метою визначення механізмів розвитку державно-приватного партнерства у сфері професійної (професійно-технічної) освіти, формування висновків.

*Результати:* визначено та обґрунтовано сучасні механізми розвитку державно-приватного партнерства, зокрема форми, засоби, інструменти, що є ключовими у забезпеченні ефективної взаємодії між учасниками партнерства для підвищення якості професійної (професійно-технічної) освіти й відповідності потребам ринку праці в повоєнний час.

*Висновки:* до сучасних механізмів розвитку державно-приватного партнерства у сфері професійної (професійно-технічної) освіти, що визначають рамки співпраці між державою та приватним сектором і реалізуються з метою підвищення якості професійної (професійно-технічної) освіти віднесено: контрактну, інституційну, інвестиційну, концесійну, лізингову, франшизну і проектну *форми* партнерства; *засоби* (контракт на надання освітніх послуг, аутсорсинг, ради з питань професійної (професійно-технічної) освіти та ринку праці, освітні програми, прямі інвестиції у розвиток інфраструктури, спільні інвестиційні проекти, лізинг обладнання та технологій, лізинг навчальних приміщень; франшиза освітніх програм, франшиза освітніх послуг, спільні освітні проекти, спільні дослідницькі проекти); *інструменти* (договір про надання послуг, угода про аутсорсинг, угода про створення спільних освітніх установ, статут спільної освітньої установи, концесійний договір, договір про розроблення та впровадження освітніх програм, інвестиційний договір, меморандум про взаєморозуміння, лізинговий договір, угода про технічне обслуговування, франшизний договір, договір про освітні послуги, договір про спільне провадження проекту, угода про співпрацю в наукових дослідженнях). Їх використання є ключовим у досягненні сталого розвитку та впровадженні інновацій у сфері професійної (професійно-технічної) освіти.

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**Ключові слова:** *державно-приватне партнерство, сучасні механізми, форми, засоби, інструменти, професійна (професійно-технічна) освіта, роботодавці, освітні послуги, якість освіти, ринок праці.*

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Received: 01 December 2023

Accepted: 08 February 2024



# METHODICAL SYSTEM FOR THE PEDAGOGICAL EXCELLENCE DEVELOPMENT OF GENERAL EDUCATION TEACHERS OF VOCATIONAL EDUCATION INSTITUTIONS

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## Abstract

*The relevance.* The issue of developing teacher's pedagogical excellence is one of the most significant in pedagogical theory and practice, especially at the current stage of overcoming the consequences of the pandemic and martial law. The article proves the importance of process studying of the pedagogical excellence developing of general education teachers of vocational education institutions as a goal-oriented, dynamic system.

*The aim is* to substantiate the methodical system for the development of pedagogical excellence of general education teachers of vocational education institutions.

*Methods:* the study used theoretical methods, which provided an opportunity to examine the state of the research problem in scientific sources, compare different views, analyse the process of development of pedagogical excellence of general education teachers of vocational education institutions as a methodical system. This study used the methods of analysis and synthesis, systematization, abstraction, generalization, and modelling, which resulted in building a structure of functional components of the system of teachers' pedagogical excellence development and clarifying the interconnection of the selected components.

*Results:* the article deals with the concept of "system" as a structure that combines naturally arranged elements, components grouped by some common feature; the principles of functioning and development of pedagogical systems are highlighted, the types and structural components of pedagogical systems are analyzed; the design of a system for the development of pedagogical excellence of general education teachers as a certain type of pedagogical system is considered. The main structural components of the designed system (*target, conceptual and methodological, subjective, content, technological, diagnostic and resultant*) are characterized; the functional components of the system for developing pedagogical excellence of general education teachers in a vocational education institution are allocated; the place of the proposed system for developing pedagogical excellence of general education teachers among the systems of vocational education is determined.

*Conclusions:* the designed system for the development of pedagogical excellence of general education teachers in a vocational education institution, as a certain type of pedagogical system, combines certain structural components (target, conceptual and methodological, subjective, content, technological, diagnostic and resultant, and functional components: design, constructive, gnostic, prognostic, organizational, communicative, evaluative and corrective); the general pedagogical system of a vocational education institution includes a system of pedagogical staff professional development, which in turn combines the system of pedagogical staff advanced training and the pedagogical excellence development system of general education teachers of a vocational education institution as a subsystem; prospects for further research will be devoted to substantiating the goals and designing the content of the development of pedagogical excellence of general education teachers.

**Keywords:** *pedagogical excellence; vocational education; general education; methodical system; teacher.*

**Introduction.** The issue of developing pedagogical skills in educators is among the most critical in educational science and practice, especially in the current phase of overcoming the consequences of the pandemic and the state of war. In today's conditions, where autonomy is expanding and the complexity of professional-pedagogical activity is increasing, a teacher's mastery gains particular significance: the effectiveness of the educational process, in line with the social mandate of society, depends on the teacher's pedagogical skills. Pedagogical mastery is a core component of pedagogical culture, defined as a synthesis of developed psycho-pedagogical thinking, professional-pedagogical knowledge, skills, abilities, and emotional-volitional means of expression, which, in interaction with the personality traits of the educator, enable them to successfully address various educational tasks. Hence, investigating the development of pedagogical skills in teachers of general education disciplines as a system is of paramount importance.

**Sources.** The relevance of this research is determined by theoretical and practical tasks for achieving quality results in pedagogical activity under modern conditions of education modernization in the country. The role of the teacher's personality and their pedagogical skills in the education and upbringing of the younger generation was examined in the works of J.A. Comenius, A. Diesterweg, K.D. Ushinsky, A.S. Makarenko, V.A. Sukhomlynsky. They linked the teacher's mastery to a deep knowledge of the subject taught, the essence of the pedagogical process, and the teacher's personal qualities.

The significance and multifaceted nature of the pedagogical skills issue is evidenced by a substantial number of studies on this problem. The essence of pedagogical mastery, its psychological structure, and the peculiarities of its development were investigated by E. Barbina, A. Gritsenko, I. Ziazuiun (2000), O. Kalinska, V. Kovalchuk (2011), O. Krasnytska, P. Luzan (2010), N. Ostroverkhova, O. Otych (2014), V. Palamarchuk, M. Paltysh, S. Sysoieva, T. Sushchenko, N. Telichko, V. Teslyuk (2010), I. Uchitel, L. Filatova (2021), L. Shovkun (2010), and others.

The educational process as a system is studied by domestic scientists I. Androshchuk (2017), O. Borodienko (2018), O. Dysa (2019), I. Kankovskyy (2009), R. Kurok (2022), V. Proshkin (2015), and others. Despite the broad range of research, the de-

velopment of pedagogical skills in teachers of general education disciplines in professional education institutions as a system remains insufficiently studied.

**The aim of the article** is to justify the methodological system for developing pedagogical skills in teachers of general education disciplines in professional education institutions.

**Methods.** The research utilized theoretical methods that enabled the examination of the problem's state in scientific sources, comparison of different viewpoints, and analysis of the development process of pedagogical skills in teachers of general education disciplines in professional education institutions as a methodological system. The work employed analysis and synthesis methods, systematization, abstraction, generalization, and modeling methods, facilitating the construction of the functional components' structure of the system for developing pedagogical skills in teachers, clarifying the interconnections of the identified components.

**Results and discussion.** In modern educational practice, the professional development of teachers in professional education institutions is identified as a priority direction for modernizing the educational process, studied as a purposeful, dynamic system. These thoughts resonate with the views of L. Pukhovska, who asserts that "...one of the key tasks of modern educational reforms worldwide is to create conditions for the professional development of teachers" (Pukhovska, 2011, p. 99).

The prominent methodologist of Ukrainian educational science, S. Honcharenko (2008, p. 93), stated: a systemic approach as a direction of scientific knowledge assumes that the research object should be studied as a system. Therefore, the methodology of the systemic approach, adopted in our study as the primary, dominant concept, necessitates the consideration of the researched phenomenon as a system. The concept of "system" is a structure that collectively combines regularly arranged elements, components, grouped by some common feature.

Scholars such as Dysa (2019), Kankovsky (2009), Orshansky, Sydorenko (2006), and Proshkin (2015) identify the following as key features of a system: the presence of parts, elements that can be considered in certain isolation, outside of connections with other phenomena, objects, or processes; the existence of an internal structure of connections between these parts, objects, which can be combined into subsystems; the presence of a certain integrity, which ensures the purposeful achievement of an integral result thanks to the constant interaction be-

tween the components of the system or its subsystems; the presence in the structure of connections between parts, which unite elements into subsystems or blocks and form the system as a whole; the hierarchy of the system, expressed in the vertical subordination of parts, subsystems, elements within the construct, as well as a certain "right" of intervention by higher-level subsystems and components in the functioning of lower-level parts, subsystems; dependencies of the functioning of upper-level subsystems, blocks on the results of the functions performed by subsystems, blocks of lower levels; the presence of functional characteristics of the system and its individual subsystems, blocks; a certain interrelation with systems of another order.

Based on the analysis of works by renowned domestic and foreign systemologists, Y. Lodatko (2022, pp. 24-25) highlights the following properties as relevant for our research on "complex" systems: each complex system has a certain multi-link structure, determined by the form of spatial-temporal connections or interactions between the elements of the system; the system cannot consist of identical components devoid of individuality, diversity; the properties of the system cannot be understood merely on the basis of comprehending the properties of its components – the interaction between them is crucial; the formation of the system leads to the division of the space of its functioning into two parts – the system itself and the surrounding environment; internal, inter-component interactions prevail over external ones in the system; changes in the system's behavior due to qualitative transformations in the structure and content of the interaction between components reflect on the stability of its functioning and activate processes of adaptation to new conditions; the evolution of systems is characterized by unevenness and absence of monotony; any real system can be represented in the form of a materially similar or symbolic image.

The functioning of complex systems, including educational systems, is subject to certain principles, which, in our opinion, Y. Lodatko (2022) rightly includes such prescriptions as: the principle of closure, according to which the behavior of a complex system is not subject to external influences but is constructed within a certain closed construct surrounding the system; the principle of resistance, according to which a complex system is characterized by a certain stability, the ability to resist external influence factors; the principle of openness, asserting that a complex system and the external environment are independent, dynamically distant phenomena; the principle of integrity: in the system,

when transitioning from one equilibrium state to another, nonlinearity is enhanced due to the effect of internal unity; the principle of threshold sensitivity, explaining that the system's state remains unchanged until a certain threshold value of its characteristics; the principle of amplification of fluctuations, according to which nonlinearity can increase the risk of random deviations of some parameter from its average value, thereby slowing down the system's development; the principle of counterintuitiveness, which stipulates that it is nearly impossible to predict the behavior of the system in the distant future; the principle of the plurality of models, standardizing the possibility of constructing several models for studying the structure and functioning of the system; the principle of incompatibility, declaring that the more complex a system, the less accurate the results of its analysis are. Agreeing in general with such prescriptions regarding the functioning and development of systems, it is noted that the principle of openness, in our view, somewhat contradicts the principle of resistance, which recognizes the influence of "external influence factors."

In the second edition of the "Encyclopedia of Education," the pedagogical system is defined as a "polysystemic formation (integrity) consisting of many interacting and complementary parts" (2021, pp. 727-728). Without disputing the use of the generic concept "polysystemic formation (integrity)" in the definition, it must be noted that the definition lacks significant specific features. Moreover, the article does not detail the component composition of the pedagogical system, the peculiarities of its structure, and so forth. However, in the "Encyclopedia of Education" previous edition (2008, p. 649), the article "Pedagogical System" by S. Kushniruk is considered, in our opinion, more detailed. Here, the author argues that in a broad sense, the pedagogical system is "an association of participants in the pedagogical process, where a pedagogical goal is set, and pedagogical tasks are solved; an association of participants in the pedagogical process, where their activity (cognitive, educational, labor, moral, socio-political, artistic-aesthetic, gaming, etc.) is simultaneously the source of the pedagogical goal and the means of its achievement."

Without dwelling in detail on the definitions of the pedagogical system as a structural integrity, which number more than 40 in the available scientific literature (Kurok, 2022), let us briefly consider their varieties. Pedagogical systems are classified according to various characteristics. They are divided into simple and complex, open and closed, static and dynamic, managed and self-managed,

probabilistic (by the method of determination), real and imaginary (by their origin), social and physical (by their substantial characteristic), etc. (Kankovsky, 2009; Karabet, 2002; Proshkin, 2015). The classification of pedagogical systems of vocational and technical education proposed by V. Karabet (2002) is particularly compelling. Following I. Kankovsky (2009), the scholar suggests grouping such systems depending on the general educational preparation of students, the type of vocational and technical institution, the form and level of vocational training of students (workers), as well as the sectoral specialization of training. Regrettably, the author does not provide detailed content-structural characteristics of these systems, limiting himself to the position that "each of the presented pedagogical systems, along with the general properties inherent in pedagogical systems, has its own, reflecting their specificity" (Karabet, 2002, p. 37).

In existing scientific works, scholars present various structural components of pedagogical systems, considering them as the basic characteristics of the educational process that distinguish these systems from other social (humanistic) systems. Specifically, V. Proshkin (2015), based on the results of in-depth analysis of research dedicated to pedagogical systems, makes extremely important conclusions for understanding the essence of the phenomenon: 1) the goal, determined by the demands of society and the requests of the individual learner, is a system-forming factor of the pedagogical system; 2) the goal requires means and methods of its achievement; 3) the goal correlates with the results, as a result of which a closed cycle of system functioning is formed; 4) comparing the goal with the result determines the efficiency of the educational process. The closed cycle of the pedagogical system's functioning is also recognized by O. Dysa (2019), who argues that its components include: the goal, educational information, methods of pedagogical communication, student (learner), and educator. It is not difficult to notice that the "closure" of such a structural construct is somewhat unclear. It concerns the absence of means to achieve the goal, evaluative component, and the actual result of "pedagogical communication." These debatable positions have been considered in the structural model of the pedagogical system by V. Skvyrs'kyi, whose components include: objectives of the educational process; the activity of the teacher; the activity of the student; emotional interaction; intellectual interaction; result.

Educational processes are viewed as systems by V. Haluziak, M. Smetanskyi, and V. Shakhov, who define them as "a set of interrelated elements

that interact with each other and form a certain integrity" (2007, p. 61). This structure comprises objectives, content, forms, methods, learning and upbringing outcomes, the activity of educators, and the activity of students. Since the pedagogical system usually aims to reflect the comprehensive educational process, attention is drawn to its variety – the methodical system. Specifically, I. Androschuk (2017) explores the theoretical and methodological foundations of preparing future teachers of labor studies and technologies for pedagogical interaction in professional activities, viewing the methodical system as a complex dynamic formation that includes a set of equal, interrelated components: goals, content, forms, learning methods, innovative methodologies and technologies, educational-methodological support, reflection, self-education activities of students, and outcomes. Furthermore, R. Kurok (2022) developed a methodical system for developing legal competence of pedagogical workers in economic colleges, identifying its structural components as objectives and tasks, content, methods, forms, means, digital technologies. In the work of O. Borodiyenko (2018), a pedagogical system for developing the professional competence of managers of service sales units in the communications industry is substantiated as a set of interrelated structural and functional components.

Without delving into these aspects in detail, the positions highlighted can be summarized in the following manner:

– *In scientific and pedagogical research*, scholars use terms such as "pedagogical system," "methodical system," "didactic system," "learning system," "pedagogical system of an educational institution," "education system," "system of educational sessions," "system of teaching methods," yet they do not demonstrate a unity of opinions regarding their structure, principles of operation, number of components, etc.;

– *When considering the different component composition of the phenomenon*, researchers interpret this formation as a set of interrelated elements that interact with each other and form a certain integrity;

– *The peculiarities of the component composition*, laws, principles, conditions of functioning of the pedagogical system and its varieties are still awaiting their independent research.

Thus, let us move to the design of the system for developing pedagogical skills among teachers of general education disciplines, considering it as a specific type of pedagogical system. We view the mentioned system as a stable set of interconnected

structural and functional components (Borodiyenko, 2018; Proshkin, 2015), subordinated to the objectives and tasks of the purposeful development of teachers' pedagogical skills. The main structural components of the designed system are considered as follows:

- *The target component*, which includes: the main goal - systematic, continuous development of pedagogical skills among teachers of general education disciplines in vocational education institutions; a complex of tasks that reflect the tactics of achieving strategic goals of the studied process;

- *The conceptual-methodological component*, which includes: a set of methodological approaches, taking into account which the process of developing the studied integrative personality property is purposefully carried out; the main conceptual ideas for the development of teachers' pedagogical skills, which, by design, are the support of the concept of the studied process, define the "road map" for the implementation of defined goals (strategic, tactical, operational) and tasks; principles (general and specific) for the development of pedagogical skills;

- *The subject component*, which combines participants of the educational process - teachers of general education disciplines, masters of production training, teachers of general professional, professional-theoretical, professional-practical training, leaders of vocational education institutions, methodologists, parents, employers, etc., for organizing productive pedagogical interaction;

- *The content component*, the components of which are: directions for the development of teachers' pedagogical skills (professional-personal self-development, advanced training courses, conducting scientific-pedagogical research, participation in methodical work events of vocational education institutions, in the work of schools, workshops, studios, in preparing and conducting classes and educational events, etc.); the content of developing the studied personal property - general scientific, psychological-pedagogical, methodical, subject, industry knowledge and skills of teachers;

- *The technological component*, which includes: pedagogical technologies (blended learning

technologies, training technologies, project technologies, case technologies, distance learning technologies, etc.); methods, forms, means of developing teachers' pedagogical skills;

- *The diagnostic-resultative component*, which contains: criteria, indicators, levels of development of pedagogical skills among teachers of general education disciplines; the result as a positive dynamic in the levels of development of the phenomenon (Kabysh, 2021).

- *The functional components* of the system for developing pedagogical skills among teachers of general education disciplines in vocational education institutions are considered as follows (Fig. 1):

- *The design component*: involves goal-setting (formulation of strategic, tactical, operational goals and tasks for the professional growth of the teacher) as an important component of the structure of pedagogical activity; properly formulated goals are a systemic factor in the development of a teacher's pedagogical skills, since it is the goals that are sources of defining stages, methods, forms, means of activity, directing the personality to achieve a result, evaluate their own achievements by comparing planned and actual gains; the goal integrates and organizes the necessary actions and operations; includes designing directions for the development of teachers' pedagogical skills, methods, and means of formal, non-formal, and informal education, ways of evaluating the results of the development of the studied property of the teacher;

- *The constructive component*: involves the selection and composition of the content of the development of pedagogical skills among teachers of general education disciplines (general scientific, psychological-pedagogical, methodical, subject, industry knowledge and skills of teachers); planning professional growth depending on pedagogical experience, individual abilities, preferences, interests, needs, and motives; realization in accordance with the directions of the process of personal growth to achieve the set goals and tasks.

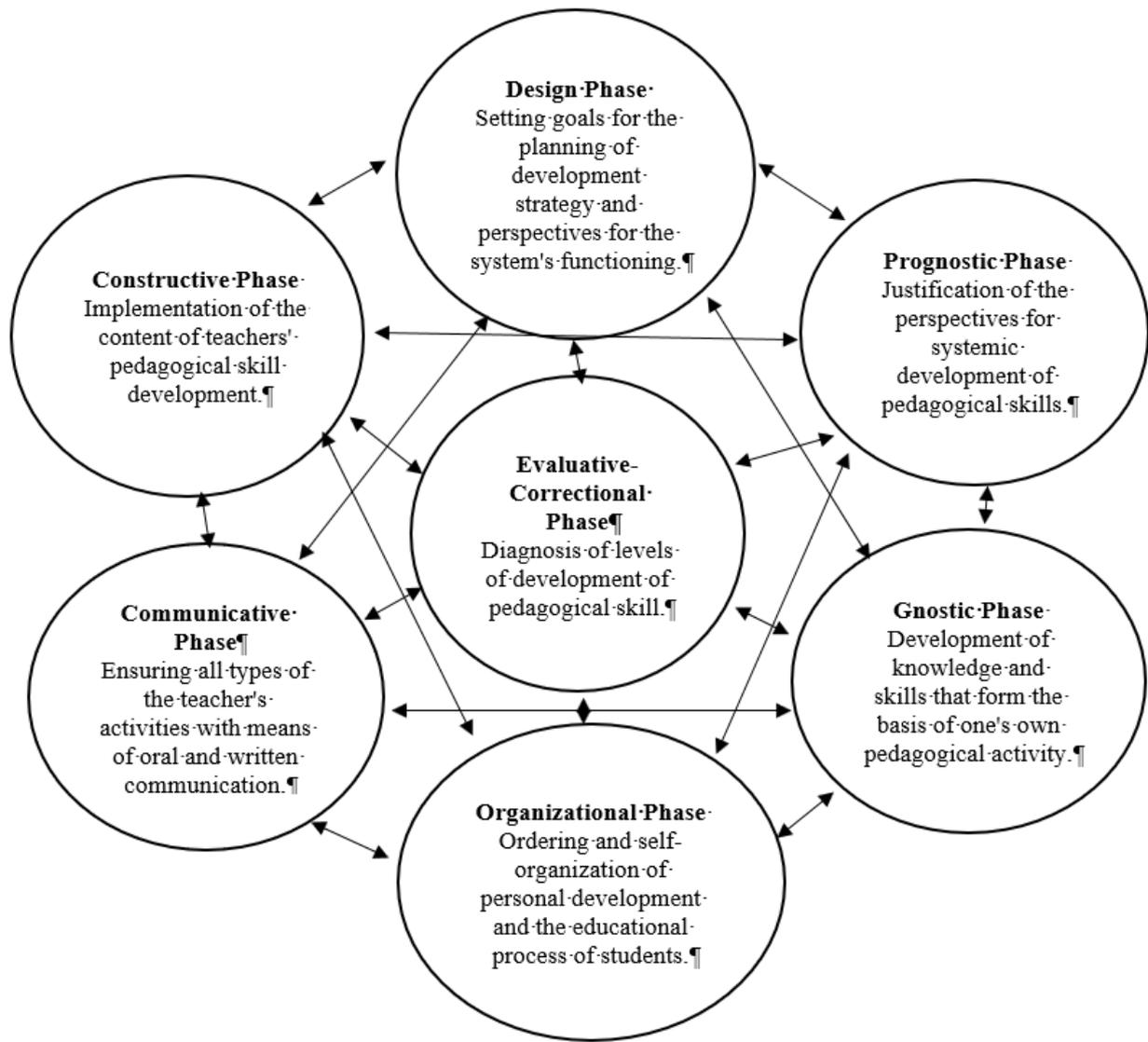


Fig. 1. Structure of functional components of the teacher pedagogical mastery development system in general education subjects

– *Gnostic*: ensures the ability of general education subject teachers for professional growth and self-development; includes actions related to the accumulation and deepening of new knowledge about methodology, theory, teaching methods, pedagogical techniques, and means of achieving objectives; based on the ability to use educational and reference literature, skills in implementing methods and forms of pedagogical integration, skills in analyzing the conditions of the educational process, and personal reasons for success and failure in organizing pedagogical interaction, etc.

– *Prognostic*: determines the strategy for the professional growth of pedagogical staff in a specific institution of vocational education (VE), substantiates the prospects for the functioning of the system for the development of pedagogical skills in teachers of general education subjects, its interaction with external factors and socio-economic conditions

of VE institutions; uses prognostic information to define long-term prospects for the continuous development of teachers.

– *Organizational*: encompasses the organization of various types of pedagogical activities to match the results with planned goals; aimed not only at ordering the educational process but also at the self-organization of the teacher's activities; modern organizational activity of the teacher involves interaction with all participants of the educational process – students, colleagues, parents, employers, and other stakeholders; manifests in the teacher's ability to properly organize their work time, individual and group activities of students in blended learning conditions.

– *Communicative*: involves establishing tolerant relationships among the participants of pedagogical interaction, specifically establishing proper re-

lations with those who lead the system for the development of pedagogical skills in teachers of general education subjects; based on the skillful use of the main means of communication – oral and written language; a condition for improving professionalism and a powerful source of professional and personal development of the pedagogical worker.

*Evaluative-corrective:* includes monitoring and self-diagnosis of the levels of development of pedagogical skills of the teacher, constant evaluation of scientific-methodological achievements based on a set of criteria and indicators for measuring the phenomenon, application of valid, reliable, and accurate diagnostic methods of the levels of development of pedagogical activity and timely correction (partial or complete) of identified deficiencies using pedagogical techniques and actions.

It is now deemed necessary to define the place of the proposed system for the development of pedagogical skills in teachers of general education subjects among the systems of vocational and technical education. Let us remind that systems scientists indicate: any system is always an element of another system of a higher level, which is called a supersystem or metasystem. For example, if a student group is considered a system, then for it, a vocational school is a system of a higher level (metasystem, general system). In turn, the vocational school is an element of the regional or provincial system of vocational and technical education, and the provincial system of vocational and technical education is a component of the system of vocational and technical

education of Ukraine, etc. Additionally, if elements of certain systems themselves function as systems, they are called subsystems of this system, which is treated as a general system. At this stage of scientific inquiry, we note the research on pedagogical systems of vocational and technical education conducted by V. Karabet (2002). The author asserts that the classification of pedagogical systems is related to internal systemic factors that "reflect the state of the components of pedagogical systems," including: goals and tasks of vocational and technical education; content of vocational and technical education; students and pedagogical workers of the institution of vocational education as subjects and objects of pedagogical systems; educational-production process as a didactic system of professional competence of skilled workers; material and technical base of the institution of vocational education; comprehensive normative-methodological and scientific-didactic provision of the educational process. Utilizing these approaches, in the study, we consider the pedagogical system of the institution of vocational education as a general system, which includes the system of professional development of pedagogical workers as a subsystem, its component, element (Fig. 2). In turn, this pedagogical system combines the system of professional development of pedagogical workers and the system for the development of pedagogical skills in teachers of general education subjects of the vocational education institution as subsystems.

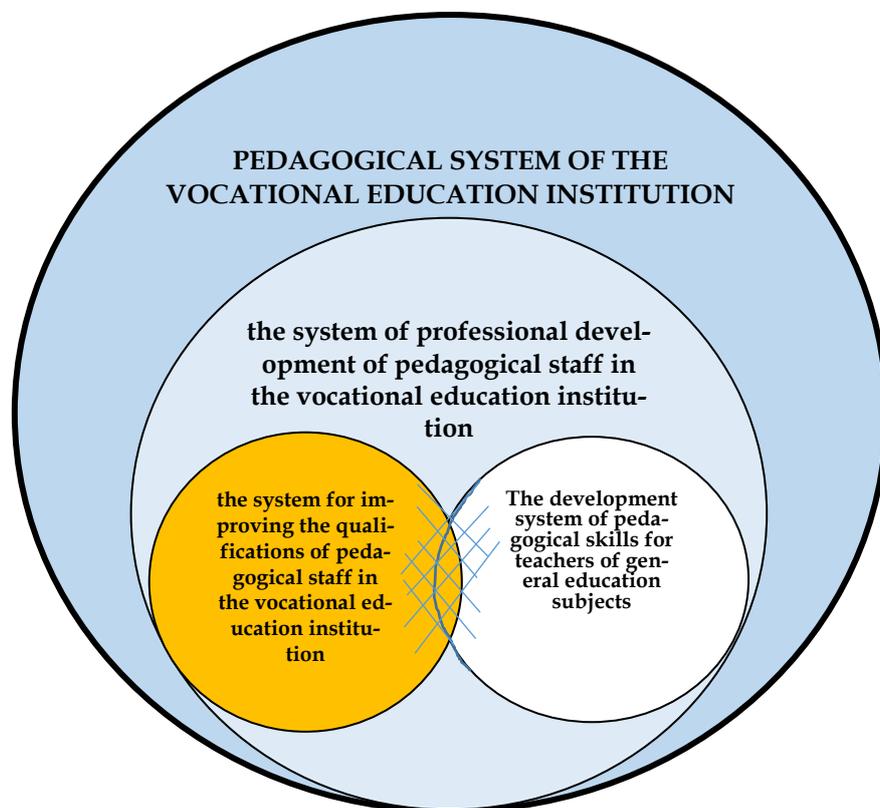


Fig. 2. Illustration of the relationships between the development system of pedagogical skills for teachers of general education subjects in the vocational education institution, the system for improving the qualifications of pedagogical staff in the vocational education institution, and the pedagogical system of the vocational education institution using Euler's circles

**Conclusions.** Thus, the designed development system of pedagogical skills for teachers of general education subjects in the vocational education institution, as a specific type of pedagogical system, combines structural components (target, conceptual-methodological, subject, content, technological, diagnostic-resultative) and functional (design, constructive, gnoseological, prognostic, organizational, communicative, evaluative-corrective). The overall pedagogical system of the vocational education institution

includes the system of professional development of pedagogical staff, which in turn, combines the system for improving the qualifications of pedagogical staff and the development system of pedagogical skills for teachers of general education subjects of the vocational education institution as subsystems. The prospects for further scientific research will be dedicated to justifying the goals and designing the content of the development of pedagogical skills for teachers of general education subjects.

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# МЕТОДИЧНА СИСТЕМА РОЗВИТКУ ПЕДАГОГІЧНОЇ МАЙСТЕРНОСТІ ВИКЛАДАЧІВ ЗАГАЛЬНООСВІТНІХ ДИСЦИПЛІН ЗАКЛАДІВ ПРОФЕСІЙНОЇ ОСВІТИ

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## Реферат:

*Актуальність:* Проблема розвитку педагогічної майстерності викладача є однією з найважливіших у педагогічній науці та практиці, особливо на сучасному етапі подолання наслідків пандемії та воєнного стану. У статті доведено важливість дослідження процесу розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти як цілеспрямованої, динамічної системи.

*Мета:* обґрунтування методичної системи розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти.

*Методи:* у дослідженні використовувалися методи теоретичного характеру, що дали можливість вивчити стан проблеми дослідження у наукових джерелах, зіставляти різні погляди, проаналізувати процес розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти як методичної системи. У роботі були використані методи аналізу та синтезу, систематизації, абстракції, узагальнення, метод моделювання, що уможливив побудувати структуру функціональних компонентів системи розвитку педагогічної майстерності викладачів, уточнити взаємозв'язок виділених компонентів.

*Результати:* у роботі розглянуто поняття «система», як структура, що в сукупності поєднує закономірно розташовані елементи, складники, згруповані за якоюсь спільною ознакою; виділено принципи функціонування і розвитку педагогічних систем, проаналізовано різновиди, структурні компоненти педагогічних систем; розглянуто проектування системи розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін, як певний різновид педагогічної системи. Охарактеризовано основні структурні компоненти спроектованої системи (*цільовий, концептуально-методологічний, суб'єктний, змістовий, технологічний та діагностувально-результативний*); виділено функціональні компоненти системи розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін у закладі професійної освіти; визначено місце запропонованої системи розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін серед систем професійно-технічної освіти.

*Висновки:* спроектована система розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін у закладі професійної освіти, як певний різновид педагогічної системи у своєму складі об'єднує певні структурні компоненти (*цільовий, концептуально-методологічний, суб'єктний, змістовий, технологічний, діагностувально-результативний та функціональні компоненти: проєктувальний, конструктивний, гностичний, прогностичний, організаційний, комунікативний, оцінювально-корекційний*); загальна педагогічна система закладу професійної освіти включає систему професійного розвитку педагогічних працівників, яка у свою чергу, поєднує систему підвищення кваліфікації педагогічних працівників і систему розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін закладу професійної освіти як підсистеми; перспективи подальшого наукового пошуку будуть присвячені обґрунтуванню цілей та проектуванню змісту розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін.

**Ключові слова:** педагогічна майстерність; професійна освіта; загальноосвітня підготовка; методична система; викладач.

Received: 06 December 2023

Accept: 15 February 2024



# DESIGN THINKING FOR THE DEVELOPMENT OF CREATIVE ABILITIES OF ELECTRICAL TECHNICIANS IN VOCATIONAL COLLEGES

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## Abstract

*Relevance:* it arises from the necessity to look for new ways and means of professional training of future specialists in the context of the renewal of the educational paradigm and the expansion of society's technological capabilities. The article reveals the urgency of the research topic, analyses existing approaches to the interpretation of the term design thinking. In the course of the scientific research, it was found that in the context of applying effective ways to form the professional competence of electrical technicians, the design thinking technology deserves attention, the use of which is a powerful effective tool for developing innovative thinking of students, what is extremely important in an era of rapid change, innovation and increased mobility in all spheres of life in the modern world.

*Aim:* to determine the prospects for introducing design thinking technology to develop the creative abilities of future electrical engineers in vocational colleges.

*Methods:* analysis and synthesis – to determine the stage of problem progress under study and the peculiarities of applying design thinking technology for the improvement of future electrical engineers' creative abilities; generalisation – to formulate conclusions and recommendations for the implementation of design thinking technology for the students' development in vocational colleges; diagnostic (testing, conversation, interview) - to find out the development level of future electrical engineers' design thinking; application of Pearson's  $\chi^2$  (chi-square) consistency criterion for statistical analysis of the experimental study results.

*Results:* A system for developing design thinking in future electrical technicians within the framework of the course "Power Supply of Enterprises and Civil Engineering Structures" has been designed to increase the effectiveness of using a modern approach to designing innovative products and developing creative abilities. To develop this system, we identified and analysed the methodological principles that characterise the design thinking process. The highlighted stages of applying the design thinking method in the professional training of future electrical technicians are focused on solving a problem situation and getting out of it, the ability to generate ideas, change and improve their project based on the identified shortcomings, and develop skills in working with digital technologies.

*Conclusion:* design thinking is a tool that can be used to project the future and find innovative ways to solve complex problems. It is a technology that meets all the challenges of the times, improves the quality of professional training, and contributes to the formation of the professional competence of future electrical engineers in professional pre-higher education institutions.

**Keywords:** *professional competence; design thinking; new educational technologies; electrical technician; training; professional higher education.*

**Introduction.** In the current conditions, an important task of the vocational education system is the preparation of competitive specialists characterized by flexibility and mobility in the labor market, capable of making independent decisions, transforming the social environment, and their

professional activity. The competency of a specialist is a set of objectives—specific requirements for his level of preparedness. Contrary to classical education, based on the triad of knowledge, skills, and abilities, the competency-based approach assumes that the main emphasis is not just on

mastering certain sums of knowledge and skills, but also on forming a systemic set of competencies that enable solving professional problems as well. Herein, the aim of education becomes not the process, but achieving a certain result by the learners.

At the modern stage of vocational education modernization, the concept aimed at organizing the educational process, whose main goal is involving students in active independent cognitive activity that models their further self-education process, is gaining wider recognition (Mykhailov et al., 2023). As a general conceptual basis for improving the organization of educational work in the educational process, competency-based, activity-based, personally oriented, and systemic approaches serve (Gurzhiy et al., 2023).

The economy of Ukraine and its development prospects dictate entirely different requirements for the future specialist. He must not only possess technologies but also have creative abilities, imagination, intuition, flexible and imaginative thinking, be able to quickly navigate changes in external circumstances, and easily adapt to constantly changing conditions. Being creative to become effective.

In this context, the problem of forming the correct emphases in the preparation of future specialists, with the aim of developing not only professional qualities but also creative potential, in the conditions of modernization of contemporary domestic education and the integration of Ukraine into the European educational space, acquires special relevance (Kowalewska & Soltysik, 2017).

The modern specialist should not be a designer, an engineer, or a project manager, but must be able to use the tools and ready-made algorithms of the services they work with for the effective presentation of the results of creative activity (Pryhodii, 2023).

**Domestic scientific research in the field** of vocational training of future electric technicians and the formation of the main methodological orientations was carried out in the context of: component-structural analysis of the phenomenon "Culture of logical thinking" of future electric technicians (Prodaiko, 2013); determination of the state of formation of motivation for future professional activity among future electric

technicians of agriculture (Kostyuk, 2015); study of the role of self-education as an important factor in the preparation of future electric technicians (Bilyk, 2016); formation of economic culture of junior specialist electric technicians in the process of vocational training in college (Gargaun, 2019) and others.

The issues of improving education, its role in the socio-economic life of society and economic development, the formation of human potential have been dedicated to their work by numerous researchers. A significant contribution to the creation and improvement of educational technologies, the development of design thinking was made by Ukrainian and foreign scientists, including: S. Alekseeva (2020), B. Barnett and D. Evans (2019), V. Ivanova (2019), I. Kalenyuk and L. Tsimbal (2011), O. Prosina (2022), V. Tyahur (2023), A. Tkachenko and D. Plynykos (2021), N. Cross (2018), J. Kowalewska and M. Soltysik (2017), J. Liedtka (2013), and T. Ogilvie (2011) among others. The effectiveness of the design thinking technology has been analyzed in many studies, including data on the successful implementation of this methodology in primary and secondary education (Noel & Liu, 2016), as well as its application to meet the needs of students (Holliad & Tropina, 2022). However, the features and effectiveness of the use of design thinking technology in vocational education have not been actively researched.

**The purpose of the study** is to identify the perspective of implementing design thinking technology to develop the creative abilities of future electric technicians in vocational colleges.

**Research methods.** Analysis and synthesis - to determine the state of development of the problem and the peculiarities of applying design thinking technology to develop the creative abilities of future electric technicians; generalization - to formulate conclusions and recommendations on the implementation of design thinking technology for the development of students in vocational colleges; diagnostic (testing, conversation, interview) - to clarify the level of development of design thinking among future electric technicians; application of the  $\chi^2$  (chi-square) criterion for statistical analysis of the results of experimental research.

**Results and discussion.** There are several approaches to interpreting the term design thinking (Design Thinking), which explain and reveal its essence as a way of thinking, an approach, a method, methodology, tool, or process.

The theoretical-methodological analysis of the scientific literature has revealed that the concept of "design thinking" began to be actively used by foreign entrepreneurs and business schools at the end of the 20th and the beginning of the 21st century. They considered it in the process of project activities as a manifestation of a person's ability for intuitive pattern recognition and the generation of creative ideas, on one hand, and as a means of forming original thinking and the overall creative potential of an individual, on the other (Barnett & Evans, 2019, p. 159).

Creative thinking is limited by four main positions. Originality, the non-standard combination of ideas that express a pursuit of novelty. A creative individual is in a constant state of searching for their own, unique solution. Semantic flexibility involves the ability to see objects and subjects from an unusual perspective, which allows for the discovery of their alternative applications and the expansion of functional possibilities that are applied to practical activity. Imaginative adaptive flexibility represents the ability to change perceptions of objects in a way that reveals fresh areas hidden from ordinary observation (Ferrari et al., 2009).

Design thinking is an approach to designing innovative solutions that is human-centered. It is based on tools used by designers and is utilized with the aim of integrating the needs of people, business requirements, and technological possibilities (Kelly & Kelly, 2017, p. 43).

The tools used for design thinking (Liedtka & Ogilvie, 2011) include:

- Visualization (using visual images to represent possibilities and realize them in life);
- Empathy map (evaluating feelings and impressions from the user's point of view);
- Value chain analysis;
- Mind mapping (idea generation based on conducted research);
- Brainstorming (generation of new possibilities);
- Concept development based on the collection of innovative elements;
- Hypothesis testing;
- Rapid prototyping (realizing the concept in a physical form for research, testing, and

improvement);

- Co-design with users (involving them in decision-making to meet their needs);
- Pilot testing.

Undoubtedly, design thinking and its approaches have a clear connection with conventional heuristic techniques that help solve problems under uncertainty when tasks are non-standard. An important feature of design thinking, compared to analytical thinking, is not a critical approach but a creative one, which sometimes proposes the most unconventional ideas that lead to effective problem-solving. The basis of design thinking is the ability to produce schematic images in imagination for the subsequent identification of patterns and the generation of ideas with functional and emotional content (Ivanova, 2019).

Design thinking technology is considered an effective means of developing reflection and the ability to think outside the box. Based on this, the following parameters of design thinking technology are highlighted: creative approach, teamwork, focus on people, curiosity, and optimism (Kelly & Kelly, 2017).

These characteristics enable the application of this technology in the practical professional activities of educators in higher vocational education institutions. Thus, design thinking enables understanding how the thought process is organized, to design a new model of thinking, and to learn how to generate ideas, think unconventionally, and creatively.

The main goal that can be achieved by applying design thinking technology is the development of creative abilities, which is so crucial for students of technical specialties. However, for creativity to emerge, the brain must constantly "resist monotony." Game mechanics and cases that allow generating solutions in non-standard situations are the best tools for developing the skills to resist patterns. Then, the number of bright ideas will increase. Creative and inventive people are suitable for any area of new technologies (Calvo-Morata et al., 2016).

Energy is one of the key sectors that determine the viability of a country's economy. Efficient operation of energy supply systems is necessary for the sustenance of the population, the functioning of production, and development. One of the important tasks of the sector is the strategic planning of the energy complex's development and, accordingly, the training of specialists to work in this field. Supporting the energy sector at the

necessary level for the state and especially its development is impossible without the continuous training of highly qualified personnel.

The modern information society is a system that enables "mining" knowledge from a vast amount of sources, shaping, and developing the competencies of each user through teamwork based on the development of intellect, critical, and creative thinking. An effective environment for forming these competencies becomes project and research activities, where learners through activity and communication acquire the necessary new knowledge, develop competencies as a result of personal experience in solving a problem task (Kalenyuk & Tsymbal, 2011, p. 167).

Assessing the level of design thinking in educational applicants is a complex task, as it focuses on unconventional and creative solutions. However, several key indicators can be employed to gauge this aspect:

1. The ability to generate new and original ideas (the educational applicant can produce many ideas in a short time; the ideas are original and unconventional; the applicant can refine and develop their ideas) (Pontis et al., 2023).

2. Empathy and understanding of clients (the educational applicant can explore the needs and problems of clients; is able to empathize with clients and see the world through their eyes; uses knowledge about clients to make design decisions) (Davis, 1983).

3. Skills in prototyping and testing (the educational applicant can create prototypes of their ideas, which are understandable and convenient for testing; can analyze feedback from clients on their prototypes; uses feedback from clients to improve their products) (Carfagni et al., 2020).

4. Teamwork and communication (the educational applicant can work effectively in a team; can express their ideas clearly and concisely; can give and receive constructive feedback) (Kamarudin et al., 2012).

5. Creativity and innovative thinking (the educational applicant can think outside the box and find new solutions to problems; is not afraid to take risks and try new ideas; can see opportunities where others see problems) (Varianytsia et al., 2020).

Accordingly, each of these indicators can be evaluated on a four-level scale, where a low level indicates the absence of a clear manifestation of the indicator; a sufficient level – the first characteristic of the indicator is exhibited; a medium level – the educational applicant is characterized by the first

and second feature of the indicator; a high level – all characteristics of the indicator are inherent in the educational applicant.

To determine the level of design thinking in electrician technicians, a comprehensive diagnostic toolkit was developed:

1. A variety of methods were employed to assess the ability to generate new and original ideas, including:

- Brainstorming, where the quantity, originality, and practicality of ideas generated by the student are evaluated;

- Portfolio assessment, to evaluate the portfolio of projects to see how capable the student is of generating new and original ideas.

2. Empathy and understanding of clients are complex skills determined indirectly through:

- Observation, noting how the future technician communicates with clients, their ability to listen carefully and understand the clients' needs, the appropriateness of questions to better understand the client, and demonstration of empathy and understanding of the client's issues;

- Interviews, conducted with the client (practice supervisor) to gather their opinion on how well the student understood the tasks set and their satisfaction with the work outcome, and how well the student grasped the needs and wishes;

- Project evaluation, assessing how well the project meets the client's needs, the extent to which the student's efforts to create a needed product for the client are evident, and whether the developed product considers the requirements of a specific target audience;

- Self-assessment, to evaluate one's ability for empathy and understanding of clients.

3. The skills of prototyping and testing the produced product can be assessed by:

- Quality analysis of the prototype, evaluating how well-made the prototype is, its adherence to functional requirements, and its user-friendliness;

- Speed of prototyping, determining how quickly the student can create a prototype, whether they can develop a prototype quickly with minimal costs;

- Analysis of the suitability of the chosen prototyping method (paper, low-fidelity, high-fidelity, 3D printing, digital);

- Review of modifications to the prototype, assessing how easily the student can make changes to the prototype and whether they can efficiently refine the prototype based on customer feedback.

4. To evaluate the level of teamwork and communication skills of the student, the following

methods were used:

- Observation, to see how the student works in a team, their clarity of expression, attentiveness to others, willingness to compromise, and readiness to take responsibility and assist others;

- Interviews, with classmates and teachers to gather their opinion on the student's teamwork and communication skills;

- Project evaluation, analyzing projects the student participated in as part of a team: the differentiation of each team member's contribution to the project, team working efficiency, and project quality;

- Testing and exercises, including Belbin's team roles, "Strength of the Team," and "Team Climate" tests for teamwork, and Rotter's, Thomas', and Firo-B tests for communication, plus exercises like "Tower Building" and "Debates";

- Self-assessment, to evaluate one's teamwork and communication skills.

5. Creativity and innovative thinking are assessed based on:

- Creativity tests (such as Torrance Tests of Creative Thinking and the "Incomplete Sentences" test);

- Observation, noting how the student generates new ideas, solves problems, and adapts to changes;

- Interviews with the student, discussing the creative process, how the student generates new ideas, and how they overcome the fear of failure.

In the initial experiment, 46 future electrical technicians, 7 college teachers, 4 industrial training masters, and 2 practice supervisors were involved. The experiment lasted 4 months. The obtained results are presented in the diagram (Fig. 1).

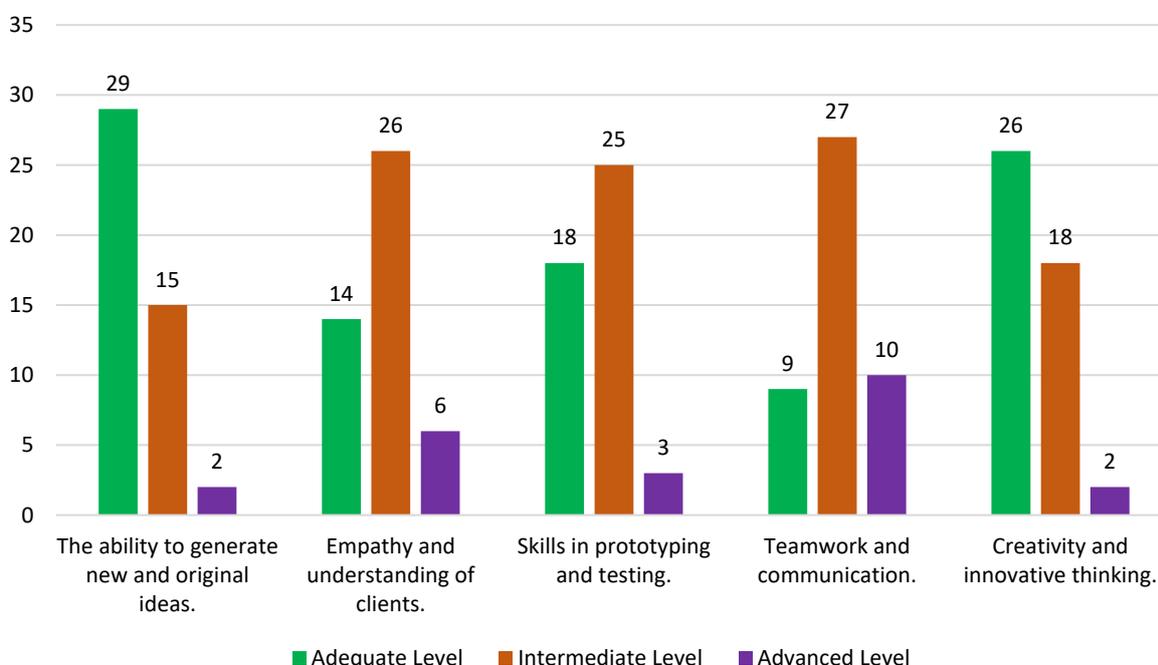


Fig. 1. Levels of Development of Design Thinking in Future Electrical Technicians (Diagnostic Stage)

It should be noted that none of the respondents demonstrated a low level of performance. Future electrical technicians are best prepared for teamwork and communication (22% of the experiment participants demonstrated a high level, 59% a medium level), and require additional attention from teachers and industrial training masters on training aspects related to the analysis of customer needs (only 13% of learners demonstrated a high level) and project development skills (61% of evaluation participants showed a medium and high

level). Special attention should be given to the development of the ability to generate new and original ideas, which is interrelated with the development of creativity and innovative thinking (accordingly, a sufficient level was demonstrated by 63% and 57% of learners, with only 4% showing a high level). Thus, the results of the initial experiment indicate the need to search for an optimal design thinking technology to develop creative abilities of future electrical technicians in vocational colleges. Design thinking technology is one of the most

powerful tools for stimulating creative ideas, which can be successfully implemented in the educational process of preparing electrical technicians for the energy sector. Therefore, during the formative stage of the research, a system for developing design thinking among future electrical technicians within the educational component "Electricity Supply for Enterprises and Civil Structures" was developed, which will increase the effectiveness of using the modern approach to designing innovative products - "design thinking". For the development of this system, certain methodological principles characterizing the "design thinking" process were identified and analyzed: an effective working environment, the interdisciplinary nature of project work, focusing on consumer needs, practice-oriented design, prototyping and prototype testing, and a holistic approach to product design. The characteristic features of the operation of these principles and their application in the educational context are then highlighted and discussed. An effective working environment. Creating an effective working space is one of the most important tasks in organizing "design thinking" processes. One of the main criteria for such a space is the ability to transform for a specific project task, meaning the space must be primarily mobile. At each stage of the "design thinking" process, fundamentally different tasks are solved, and thus the working environment, where the research team solves these tasks, should provoke the project team to work effectively (Quinton, 2010). For instance, at the first stage of researching a problem, the team actively uses the workspace, filling it with their research materials (notes, drawings, photos, etc.). Consequently, the simultaneous visibility of all research materials allows the team to form a holistic perception of the situation under study. Next, at the idea generation stage, interaction among team members is important, so the space should facilitate team unification. During presentations, the space should combine teams with each other, creating a common discussion space. The mobility of the space allows forming an experimental nature of work on the project. The effectiveness of operations within the educational space is also contingent upon resource provisioning, especially during the prototyping phase, where accurately visualizing the idea is critical. This underscores the importance of

resources in ensuring the successful realization of educational projects, particularly at the initial stages of development.

The interdisciplinary nature of project activities is increasingly becoming a necessity in contemporary settings, demanding the development of complex interdisciplinary projects and the employment of creative methods and approaches. Such interdisciplinarity facilitates a multifaceted examination of issues, thereby enabling the identification of innovative solutions. To enhance the efficiency of project work through interdisciplinary teamwork, it is crucial for each team member to possess both specialized professional skills relevant to the specific project and experience across multiple professional disciplines, a concept known as the T-shaped personality (Barnett & Evans, 2019). The psychological context of teamwork within an educational course influences the overall dynamic of team collaboration through the emotional states of its members.

Focusing on consumer needs, the identification of these needs is based on observation and testing of consumers in their natural environments (Zhegus, 2023). A key skill at this stage is empathy, which allows researchers to see from the consumer's perspective, a research type referred to as design research. The mission of design research is to immerse fully in reality and pay close attention to everyday life and the average person to uncover "hidden" needs. In this educational course, students are tasked with research challenges aimed at gathering necessary information through design research methods.

Practice-oriented design, utilizing the design thinking approach, focuses closely on real-world problems and involves conducting research in actual conditions. Thus, students are assigned real tasks, such as studying urban environments and the people living within them, to ensure that learning is directly applicable to real-world scenarios (Kuijjer, 2017).

Prototyping and prototype testing accelerate the understanding of a product's details and functions, while also helping to avoid mistakes in later development and implementation stages. Within this educational course, it is mandatory for students in teams to go through the prototyping stage and to test the prototype under real conditions to be used by potential consumers (Prototype Testing: 6 Steps to Successfully Design, Test, and Implement Your Ideas, 2022).

A holistic approach to designing a new product covers the entire process from product creation to its sale, allowing for the identification of strengths and weaknesses. Project teams of students in the course go through all stages from problem identification to product creation and promotion (Saleem, 2015). The course structure is based on the design thinking process, which is not linear but cyclical, reflecting the iterative nature of design thinking as fundamentally a research process.

The design thinking technological cycle is logical and sequential, incorporating five stages: empathy, defining the problem, ideation, prototyping, and testing (Tkachenko & Plyinokos, 2021). This methodology ensures a comprehensive and systematic approach to addressing and solving problems.

Let's consider the defined stages within the context of organizing research projects during the course "Electrical Supply for Enterprises and Civil Structures".

*Stage 1 – Empathy.* This stage focuses on creating human-centered solutions through immersion in studying needs. The following set of methods is used: observation, data gathering, analysis, synthesis of information about human behavior in various situations related to problem-solving. The outcome of this stage becomes the direction for seeking the needed solution. The selection of an idea for a creative project at the empathy stage starts with specifying whose and which exact need should be satisfied. At this stage, "it is worth ensuring that the problem is current, interesting, and fairly specific; finding out, by consulting the opinion of competent individuals, ways of solving it; processing various sources of information on the chosen topic, as well as identifying analogies to rely on existing experience" (Holiiad & Tropina, 2022). An example of a problem that needs to be solved by students of the course could be energy saving during the design of electrical supply.

*Stage 2 – Problem Statement.* To implement this stage, it is necessary to create a team consisting of representatives from different professions and social roles. Such a composition allows examining the problem from various angles, utilizing accumulated professional experience and knowledge. The simplest, hence most brilliant solutions, are born at the intersection of cultures, knowledge spheres, ideas, and experiences. For the selection of ideas, it is advisable to use scientific methods that enable the preparation of justification,

collection, and systematization of information (Venn diagram, "Cartesian coordinates", method of random objects, etc.). At this stage, when the collected information is actively analyzed and interpreted, the main task for solving the problem is formulated, and the use of a SWOT analysis is recommended. All the gathered information in the form of specific tasks is grouped into four directions: strengths that can be used in the development strategy; weaknesses that can be eliminated, compensated; opportunities, open paths for development; threats and ways to protect against them.

*Stage 3 – Idea Generation.* The main rule for the team's discussion of the solution – propose your own solution, support the solutions of others, developing them. This principle fosters the communication culture among participants, regulating behavioral norms at the personal level. Idea generation is the process of transforming a conceptual idea into a concrete one (Cross, 2018). At this stage, brainstorming is most effective. It is the most intensive, yet the most productive stage of the team's work. To obtain the maximum number of ideas, game formats of brainstorming can be used: "Brainwriting", "5 Whys" analysis, "Mind Mapping", "Rapid Ideation", "Reverse Brainstorming", etc. Brainwriting is a method of collective idea generation based on written, not verbal communications. Instead of exchanging ideas verbally, each participant writes their thoughts on a given topic over a set period. Afterwards, they pass their written ideas to another participant, who develops these ideas further or proposes new ones. This process continues over several rounds, allowing all participants to contribute and expand the pool of ideas. The collected ideas are later discussed and evaluated, potentially leading to innovative solutions or ideas.

The "5 Whys" analysis is a problem-solving method used for brainstorming the causes of a problem by repeatedly asking "why" until the root cause is discovered. This structured approach helps teams to delve deeper into the problem to understand not just the symptoms but the fundamental causes behind them. It encourages critical thinking and a holistic understanding of complex issues, making it a valuable tool for process improvement.

Mind mapping is a creative and versatile tool for visually representing ideas or information. It begins with a central idea, theme, or topic at the core of the map. From this central point, lines or branches spread out in various directions, representing

subtopics, concepts, or thoughts related to the central idea. This graphical tool aids in organizing, exploring, and conveying complex thoughts and their interconnections. Mind maps encourage non-linear thinking and provide a structured way to depict the relationships between ideas, valuable for brainstorming, planning, and understanding complex subjects.

Rapid ideation is a creative process where individuals or groups quickly generate a multitude of ideas without thorough analysis or evaluation. The goal is to stimulate free, unfiltered idea generation, focusing on quantity over quality to generate as many ideas as possible in a short period. This approach often involves setting time constraints and encouraging participants to think creatively and spontaneously. Rapid ideation can be a valuable brainstorming method, problem-solving technique, or innovation generator, allowing exploration of a wide range of possibilities and potentially leading to unique discoveries.

Reverse brainstorming is a method used to explore a problem or task by intentionally generating ideas that are opposite or contrary to the desired outcome. Instead of seeking solutions, participants in reverse brainstorming focus on identifying potential causes or factors that contribute to the problem. This process includes encouraging participants to think creatively and even humorously

about how to worsen the situation. By doing so, the group can gain a deeper understanding of the underlying causes of the problem and understand what to avoid or correct to achieve the desired outcome. Reverse brainstorming can be a valuable tool for problem analysis and developing more effective problem-solving strategies.

At this stage, the focus is on mastering ways of positive interaction, generating and developing one's ideas and the ideas of team members.

*Stage 4 - Prototyping.* Within "design thinking," any idea or thought is quickly realized into a prototype. Prototyping and the experience gained are more important than the outcome. A prototype can be presented in the form of a drawing, diagram, infographic, cardboard, plastic construction, etc. Creating a prototype solves the task of testing the feasibility of ideas in practice. The result of this stage is the trial of the model and its refinement through physical and visual modeling.

*Stage 5 - Testing.* The prototype is tested, refined, simplified, allowing to get closer to the expected image of the product. At the testing stage, the team receives feedback from users in the form of reviews, requests, suggestions on using the idea.

Upon completing the formative stage of the experiment, a reassessment of the levels of design thinking development of the learners was conducted (Fig. 2).

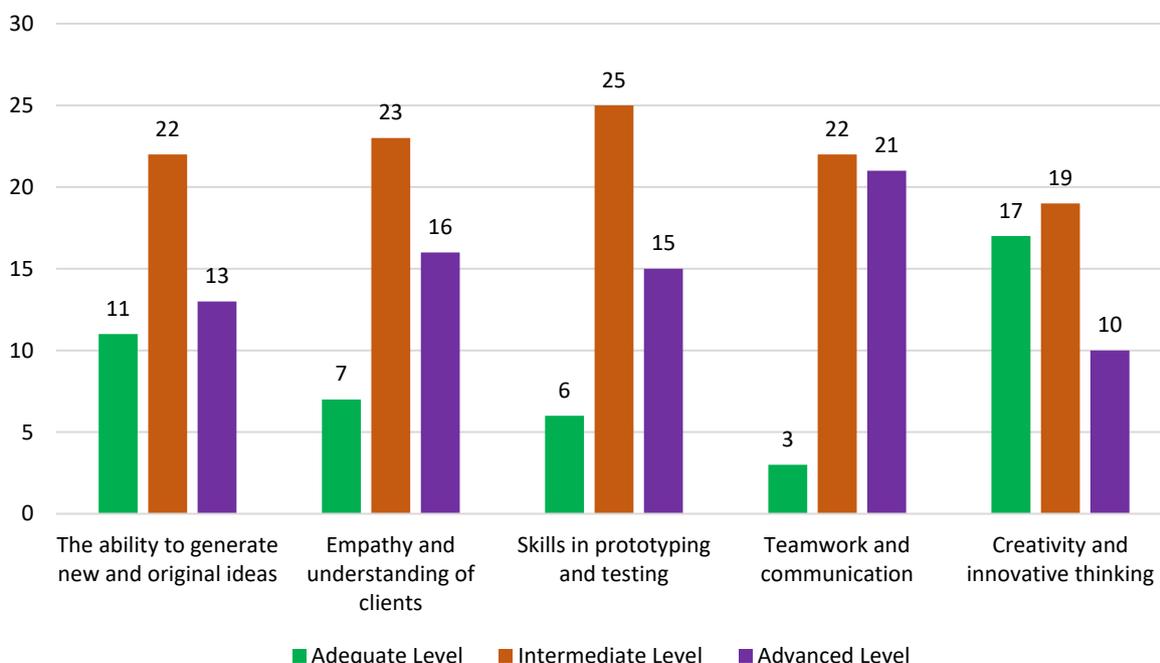


Fig. 2. Levels of Design Thinking Development in Future Electrical Technicians (Formative Stage)

Let's use the chi-square ( $\chi^2$ ) criterion for assessing statistically significant changes in the

distribution of education seekers' design-thinking levels (Table 1).

Table 1

### Evaluation results of future electrician technicians' design-thinking levels

Indicator	Sample	Sufficient Level	Average Level	High Level	Criterion Statistics $T_{actual}$
The ability to generate new and original ideas	Initial stage ( $n_1=46$ )	$Q_{11}=29$	$Q_{12}=15$	$Q_{13}=2$	16,171
	Formative Stage ( $n_2=46$ )	$Q_{21}=11$	$Q_{22}=22$	$Q_{23}=13$	
Empathy and understanding of clients	Initial stage ( $n_1=46$ )	$Q_{11}=14$	$Q_{12}=26$	$Q_{13}=6$	6,877
	Formative Stage ( $n_2=46$ )	$Q_{21}=7$	$Q_{22}=23$	$Q_{23}=16$	
Skills in prototyping and testing	Initial stage ( $n_1=46$ )	$Q_{11}=18$	$Q_{12}=25$	$Q_{13}=3$	14,000
	Formative Stage ( $n_2=46$ )	$Q_{21}=6$	$Q_{22}=25$	$Q_{23}=15$	
Teamwork and communication	Initial stage ( $n_1=46$ )	$Q_{11}=9$	$Q_{12}=27$	$Q_{13}=10$	6,901
	Formative Stage ( $n_2=46$ )	$Q_{21}=3$	$Q_{22}=22$	$Q_{23}=21$	
Creativity and innovative thinking	Initial stage ( $n_1=46$ )	$Q_{11}=26$	$Q_{12}=18$	$Q_{13}=2$	7,218
	Formative Stage ( $n_2=46$ )	$Q_{21}=17$	$Q_{22}=19$	$Q_{23}=10$	

To calculate the chi-square ( $\chi^2$ ) criterion statistics, we will use the formula:

$$T_{actual} = \frac{1}{n_1 \cdot n_2} \cdot \sum_{i=1}^C \frac{(n_1 \cdot Q_{2i} - n_2 \cdot Q_{1i})^2}{Q_{1i} + Q_{2i}}$$

where,  $T_{actual}$  – actual is the chi-square ( $\chi^2$ ) criterion statistics;  $n_1$  and  $n_2$  are the number of participants at the beginning and at the end of the experiment, respectively;  $Q_{1i}$  and  $Q_{2i}$  are the number of sample objects in each category;  $i$  is the category number (1 – adequate level; 2 – medium level; 3 – high level);  $C$  is the maximum number of categories (the number of levels for analysis – 3).

ased on the table data (Shvachych et al., 2017, p. 47), for  $\alpha=0.05$  and the degree of freedom  $v=C-1=2$ , we determine the critical value of the criterion statistic:  $T_{crit.}=5,991$ .

It has been established that across all indicators, statistically significant changes ( $T_{actual} > T_{crit.}$ ) have been observed in the distribution of levels of design thinking formation among future electrical technicians.

Consequently, the application of design-thinking technology has revealed several positive effects:

- the development of logical thinking and creativity in the idea generation phase;

- increased efficiency and quality of teamwork and group interaction;
- the development of critical thinking by considering empathy, attention to details in their work;
- the game-like nature of the method makes it easier to perceive and assimilate the theoretical information of the course.
- The implementation of design-thinking technology for developing the creative abilities of future electrical technicians in vocational colleges is carried out through:
  - the integration of design thinking into educational programs (including modules, courses, or projects with design thinking in the training programs of electrical technicians);
  - using design-thinking methods (applying methods such as empathy, brainstorming, prototyping, testing, etc., to solve real problems in electrical engineering);
  - creating a favorable environment (encouraging creativity, innovation, and teamwork in the educational process);

- engaging design-thinking professionals (collaborating with designers, engineers, and other professionals who have experience with design thinking);
- using online resources (for studying design thinking by engaging in courses, webinars, studying articles, books, and blogs);
- conducting training for educators (training teachers in design-thinking methods in their work to make the learning process more interesting and effective).

**Conclusions.** Therefore, design thinking is a tool that enables the design and identification of unconventional solutions to complex tasks. This mindset, thanks to technologies and techniques that

facilitate the accumulation of ideas and stimulate unconventional thinking, encourages the acceptance of risky decisions, ultimately mitigating fears of failure. Design thinking is a technology that meets all the challenges of the times, enhances the quality of professional training for specialists, and supports the development of professional competence in future electricians at vocational and higher education institutions.

**We see the prospects for further research** in exploring the potential of various tools and methodologies of design thinking for the development of professional competence in future electricians in vocational colleges.

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# ДИЗАЙН-МИСЛЕННЯ ДЛЯ РОЗВИТКУ КРЕАТИВНИХ ЗДІБНОСТЕЙ ТЕХНІКІВ- ЕЛЕКТРИКІВ У ФАХОВИХ КОЛЕДЖАХ

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## Реферат:

*Актуальність* обумовлена тим, що в умовах оновлення освітньої парадигми, розширення технологічних можливостей суспільства необхідно шукати нові шляхи і засоби професійної підготовки майбутніх фахівців. Виявлено актуальність досліджуваної теми, проведено аналіз існуючих підходів до трактування терміну дизайн-мислення. У перебігу наукового пошуку встановлено, що в контексті застосування дієвих способів формування фахової компетентності техніків-електриків заслуговує на увагу технологія дизайн-мислення, використання якої є потужним ефективним інструментом для розвитку інноваційного мислення здобувачів освіти, що надзвичайно важливо в епоху швидких змін, розвитку інновацій та зростання мобільності у всіх сферах життя сучасного світу.

*Мета:* виявлення перспективи впровадження технології дизайн-мислення для розвитку креативних здібностей майбутніх техніків-електриків у фахових коледжах.

*Методи:* аналіз та синтез – для визначення стану розробленості досліджуваної проблеми та особливостей застосування технології дизайн-мислення для розвитку креативних здібностей майбутніх техніків-електриків; узагальнення – для формулювання висновків і рекомендацій щодо впровадження технології дизайн-мислення для розвитку здобувачів освіти у фахових коледжах; діагностичні (тестування, бесіда, інтерв'ю) – для з'ясування рівня розвитку дизайн-мислення майбутніх техніків-електриків; застосування критерію узгодженості Пірсона  $\chi^2$  (хі-квадрат) для статистичного аналізу результатів експериментального дослідження.

*Результати:* представлена система формування дизайн-мислення у майбутніх техніків-електриків у рамках навчального курсу «Електропостачання підприємств та цивільних споруд», яка дозволить підвищити ефективність використання сучасного підходу до проектування інноваційних продуктів та розвитку креативних здібностей; для розроблення цієї системи було виявлено та проаналізовано методологічні принципи, що характеризують процес «дизайн-мислення»; висвітлено етапи застосування методу дизайн-мислення професійній підготовці майбутніх техніків-електриків спрямовані на вирішення проблемної ситуації і виходу з неї, можливості генерувати ідеї, змінювати та покращувати свій проєкт з урахуванням виявлених недоліків, формувати навички роботи із цифровими технологіями.

*Висновок:* дизайн-мислення є інструментом, за допомогою якого можна проєктувати майбутнє та знаходити нестандартні способи вирішення складних завдань; це – технологія, що відповідає всім викликам часу, дає змогу підвищувати якість професійної підготовки фахівців, сприяє формуванню фахової компетентності майбутніх техніків-електриків у закладах фахової передвищої освіти.

**Ключові слова:** фахова компетентність; дизайн-мислення; нові освітні технології; технік-електрик; підготовка кадрів; фахова передвища освіта.

Received: 21 December, 2023.

Accept: 13 March 2024



# THE ESSENCE AND STRUCTURE OF THE ECONOMIC CULTURE OF FUTURE TECHNICIANS IN TRANSPORT TECHNOLOGIES AND MANAGEMENT OF TRANSPORTATION BY ROAD TRANSPORT

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## Abstract

*Relevance* of the article is due to the need to define and substantiate the essence and structure of the economic culture of future technicians in transport technologies and transportation management in road transport, to reveal the content of each component of the structure of economic culture, as well as to determine the key factors that contribute to its formation in the process of professional training of future technicians in transport technologies technologies and management of road transport.

*The purpose* of the article is to determine the essence and structure of the economic culture of future technicians in transport technologies and management of road transport.

*Methods*: the study of scientific sources regarding the interpretation of the essence of the concept "economic culture of the culture of future technicians in transport technologies and management of transportation by road transport" - to formulate one's own views on defining the content of this phenomenon; structural-component analysis - to distinguish the components of the economic culture of future technicians in transport technologies and transportation management by road transport; generalization and systematization - and formulation of conclusions and prospects for further research.

*Results*: the main approaches in scientific sources to the interpretation of the concept of "economic culture of future technicians in transport technologies and management of road transport" were determined; the main components of the structure of economic culture and the components of the formation of the economic culture of future technicians in transport technologies and management of road transport are characterized.

*Conclusions*: the essence of the economic culture of future technicians in transport technologies and transportation management in road transport is an integrative formation of the personality of a specialist, reflecting a system of professionally important qualities, values, knowledge, abilities and skills in planning technologies for the organization of transportation, providing transport and warehouse services, using resource potential for development transport enterprises in market conditions; characterized by a high degree of discipline, responsibility, independence with an awareness of the priorities of economic culture in the performance of professional tasks.

The component structure of the economic culture of technicians in transport technologies and transportation management in road transport includes motivational-value, innovative-cognitive, activity-technological, personal-reflexive.

**Keywords:** *vocational education, logistics, road transport, economic culture of future technicians in transportation technologies and transport management.*

**Introduction.** As of today, Ukraine is actively improving its social infrastructure and directing efforts towards integration with the international community. This entails the revision and reform of all economic systems, including the

transportation sector, where specialists are expected to implement strategic development plans across all branches of the economy. The enhancement of efficiency and competitiveness in the transport sector through the formation of an economic culture among

future specialists, particularly technicians in transport technologies and management of vehicle transportations, is currently pressing. The National Transport Strategy of Ukraine for the period up to 2030 (2018) stipulates that the transport sector generally meets only the basic needs of the population and economy in terms of transportation volume, but not quality. The current state of the transport sector does not fully meet the requirements for the integration of the national transport network into the Trans-European Transport Network and the effective implementation of Ukraine's European integration course. It is important to emphasize that the contemporary labor market's requirements for the level of economic culture in the transport sector are determined not so much in terms of knowledge of professional activity peculiarities but in terms of practical application methods. This involves the skills, ability, and readiness to apply acquired knowledge in specific production situations, hence future technicians in transport technologies and management of vehicle transportations need to have a broad outlook, be prepared not only for the development of technical skills but also for managing complex economic interrelations in the transport sector, be capable of adapting to complex economic conditions, develop their own views on reality, and introduce economic culture into their professional activities. Considering these requirements, the problem of economic culture of future technicians in transport technologies and management of vehicle transportations is highlighted.

In current educational regulatory documents of Ukraine, the task of preparing a new generation of specialists who would not only possess professional knowledge but also have a developed culture of continuous professional and cultural self-improvement is set (National Strategy for the Development of Education in Ukraine for the period up to 2021 (2013), National Transport Strategy of Ukraine for the period up to 2030 (2018), Laws of Ukraine "On Education" (2017), "On Professional Pre-Higher Education" (2019)). Various aspects of economic culture at different stages have been studied by representatives of different fields of science, such as sociology, jurisprudence, philosophy, cultural studies, ethics, psychology. Scientific explorations into economic culture have been conducted by Ukrainian and foreign scientists such as F. Bacon (1627), N. Vynnyk (2023), I. Todryna and S. Yevseyev (2016). An important

aspect of the problem is the study of the structure of economic culture, which was considered in the works of H. Rebrova (2014), N. Hargaun (2022), and others. General issues of the content, methods, and ways of forming and developing economic culture were substantiated by L. Tandyр (2009), I. Prokopenko (1996), and others. However, despite the existence of individual scientific developments on this issue, the essence and structure of the economic culture of future technicians in transport technologies and management of vehicle transportations still require further substantiation.

**The objective** is to define the essence and structure of the economic culture of future technicians in transport technologies and management of vehicle transportations.

**Methods** include the study of scientific sources on the interpretation of the concept of "economic culture of future technicians in transport technologies and management of vehicle transportations" – for formulating one's own views on defining the content of this phenomenon; structural-component analysis – for identifying components of the economic culture of future technicians in transport technologies and management of vehicle transportations; generalization and systematization – for formulating conclusions and prospects for further research.

**Results and discussion.** The concept of "economic culture" presents a complex issue that sparks lively discussions among scholars. Some researchers assert that economic culture is a key element for a deeper understanding of the socio-economic reality of society (Andriyako & Rossoha, 2014), while others argue from the perspective of personality (Moskalenko, 2007). The concept of economic culture is used to describe behavior models (Lozhkin, Spasyennikov, & Komarovska, 2004), the value system of an individual or social groups (Krupsky & Stasyuk, 2012). When considering economic culture, various aspects should be taken into account: it may reflect the perception and evaluation of the economic system, be related to economic values, or act as an ideology or economic behavior of a professional, conditioned both by the historical economic experience of society and by the personal life experience of the individual (Fedyntsyn et al., 2011).

The review of scientific literature indicates that economic culture is a complex phenomenon that integrates economic and social aspects of human life. On one hand, it is part of the general culture of society, which is based on economic activities such as business management, finance, marketing, and

more (Dzundza, 2005). On the other hand, it represents a sphere of human spirituality, a general characteristic that influences an individual's relationships with the economic institutions of society. It determines the level of development and activity in the economy, as well as the ability to apply economic knowledge in practice (Nesterova, 2012).

Economic culture includes several important components that researchers identify as fundamental. Among these are economic awareness, which encompasses knowledge about the country's economic system and its institutions, ideology, views, beliefs, and traditions (Marx, 1867). Additionally, economic culture comprises economic skills and experience, values and norms, and personal qualities that have economic significance (Matviyev & Lyasota, 2006).

The economic consciousness of future technicians in transport technologies and transportation management on road transport is based on developed economic thinking. This includes knowledge of competition principles and the importance of time economy, awareness of the essence and peculiarities of evolutionary changes in the economy, and the ability to adapt socio-economic systems to new conditions while preserving the principle of succession. Understanding the processes of forming regional economic systems, factors of competitive struggle, and considering existing contradictions at international, regional, and micro levels is also crucial. Equally important is the ability to transform theoretical concepts into practical solutions, programs, and actions (Romanovska, 2011).

Another aspect of the economic culture of future technicians in transport technologies and transportation management on road transport is the development of economic skills and abilities. This includes the capability to analyze economic information, mastery of specific terminology and rules of economic behavior, and skills in effectively solving production tasks, using resources rationally, and anticipating economic events. The experience of independently applying economic knowledge in practical activity also plays an important role in shaping the economic culture of future technicians in this field.

Elements of the economic culture of future technicians in transport technologies and transportation management on road transport include internal values and norms that define socio-economic behavior and activities, and are manifested through an individual's attitude towards economic reality and relations with others (Andriyako & Rossokha, 2014).

These social norms, formed outside the economic sphere, acquire special significance within it according to its needs, and become economic values. They play a crucial role in the economic socialization process of future technicians, enabling them to function as part of an internal system of psychological adaptation to the economic environment (Moskalenko, 2007).

Current elements of the economic culture of future technicians in transport technologies and transportation management on road transport should include professionally important personal qualities that are crucial for successful professional activity. These include economic intuition, discipline, thrift, creativity, initiative, diligence, responsibility, frugality, business acumen, independence, and others. These qualities are expressed in the individual's approach to professional activity and communication with others, reflecting in their goals, motives, intentions, expectations, and other aspects of personal development (Nesterova, 2012).

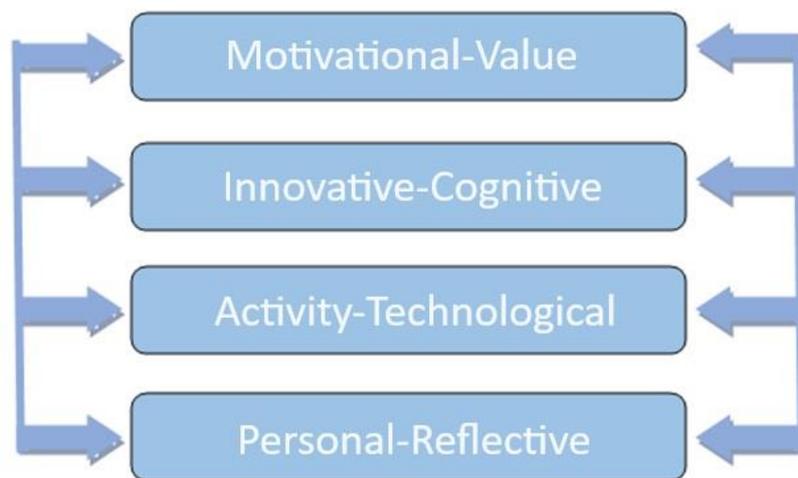
In the process of analyzing scientific literature, it has been discovered that the term "economic culture" is utilized in two aspects: as a social phenomenon and in the context of personal development. In the first instance, "economic culture" is considered a component of society's overall culture, encompassing the achievements of economic science and practice. This interpretation emphasizes the importance of societal cultural development associated with the renewal of its economic values and norms, replacing the outdated with the new. In the second instance, "economic culture" is described as an integral quality of an individual, reflected in their spiritual and professional life, marking a significant indicator of economic competence in the process of professional formation. By proposing such a definition, the author acknowledges that "economic culture" is an essential component of an individual's overall culture, reflecting the conditions of the specific stage of humanity's development in which it functions.

Based on the study of philosophical, sociological, cultural, psychological-pedagogical scientific literature, and a structural-component analysis, the author believes that significant elements of the economic culture of future technicians in transportation technologies and management of transportations by road include the presence of economic awareness and practical experience in the economic sphere, the development of economic skills and abilities, adherence to economic values and norms, and the existence of certain personal qualities that have significant importance in current socio-

economic conditions. Accordingly, the essence of the economic culture of future technicians in transportation technologies and management of transportations by road is an integrative formation of a professional's personality, reflecting a system of professionally important qualities, values, knowledge, skills, and abilities in planning technologies for organizing transportations, providing transportation and warehousing services, and utilizing the resource potential for the development of transportation enterprises in market

conditions; characterized by a high degree of discipline, responsibility, independence with an awareness of the priorities of economic culture in performing professional tasks.

The economic culture of future technicians in transportation technologies and management of transportations by road is a complex phenomenon and has the following component composition: motivational-value, innovative-cognitive, activity-technological, personal-reflective (Fig. 1).



*Fig. 1. Structure of the economic culture of future technicians in transportation technologies and transportation management in automotive transport at vocational education institutions (developed by the author).*

All components of the economic culture of future technicians in transport technologies and transportation management by road are closely interconnected, while maintaining their substantive characteristics.

**The motivational-value component** implies the presence of value orientations and motives, enabling future technicians to set goals (operational, tactical, strategic) in their professional activity, and recognizing their personal benefit from the economic, social, and ecological advantages of their economic labor activities. It is the awareness that prompts the initiative to rationally perform technological operations from an economic viewpoint, as prescribed by the production process. Conscious engagement in practical exercises enhances the level of their mastery. Emotional attitudes (positive, negative, neutral) toward the outcomes of their professional activities serve as an indicator of integration in addressing situational tasks.

**The innovative-cognitive component** encompasses a body of theoretical knowledge on the effective use of economic insights, including a legal knowledge system tailored to the specifics of the technical-technological development of the automotive transport sector. This enables future

professionals to understand the regularities of economic processes, and to perceive them holistically and systematically. Such understanding is essential for implementing specific practical measures aimed at preventing economic losses, identifying negative factors destabilizing the economy or the life of the population.

**The activity-technological component** in developing the economic culture of future technicians in transport technologies and transportation management by road involves practical skills, planning and coordination skills, and the use of modern technologies in the automotive transport sector, fostering the development of professional skills and economic awareness in learners. This component includes: an in-depth study of technical aspects; financial management of automotive transport; methods for effective resource use; practical exercises and simulations; market analysis and competitiveness. This component is directed not only at professional competence but also at economic competence, enabling them to understand effective methods for managing transportation processes economically.

Given the development of economic culture among future professionals in transportation

technologies and management, the focus on enhancing personal qualities such as self-analysis, self-reflection, ethics, adaptability, and flexibility, and the ability to practically apply knowledge and skills has led to the introduction of a personal-reflective component. This component, within the structure of the economic culture of future technicians in the field, manifests in an individual's ability to self-analyze, comprehend their actions and reactions during professional activities. It assists in identifying strengths and weaknesses, developing self-improvement strategies, and fostering professional growth. This component not only aids in acquiring technical knowledge but also in developing essential personal qualities such as self-discipline, responsibility, adaptability, and teamwork skills—all vital for a successful career in transportation technology and management.

The structure of the economic culture of future technicians is represented by the following components of their formation during professional training in vocational education institutions:

- Theoretical knowledge involves acquainting with main economic theories, concepts, and models that reflect processes in the economy and transportation sector. It provides knowledge about economic laws, market functioning principles, management mechanisms, and other aspects related to transport economics.

- Practical skills are focused on developing practical abilities and skills in economics. They include learning methods of economic analysis, budget planning, financial management, accounting organization, and other practical aspects related to logistics management.

- Communication skills: Successful operation in the transportation and shipment sector requires the ability to interact with various stakeholders, including clients, suppliers, partners, and others. Communication skills help effectively communicate, negotiate, resolve conflicts, and build mutually beneficial relationships.

- Analysis and evaluation of economic factors involve the ability to analyze economic factors that affect transportation operations, assess their impact on work and efficiency, gather and analyze economic data, evaluate risks and opportunities, and develop strategies to ensure economic stability and growth.

- Ethics and responsibility involve understanding the ethical standards associated with the economy and managing transportation operations and adhering to them in professional activities.

The implementation of these components contributes to the quality professional training of specialists who can effectively utilize their economic knowledge, skills, and abilities in practical activities, considering the modern challenges and trends in the transportation and shipment industry.

**Conclusions.** Based on the presented analysis, the essence of the economic culture of future technicians in transport technologies and transportation management in automotive transport is an integrative formation of the specialist's personality. It reflects a system of professionally important qualities, values, knowledge, skills, and abilities for planning transport organization technologies, providing transport and warehousing services, and utilizing the resource potential for the development of transport enterprises in market conditions. It is characterized by a high degree of discipline, responsibility, independence with an awareness of the priorities of economic culture in performing professional tasks.

The structure of the economic culture of technicians in transport technologies and transportation management in automotive transport is represented by a complex of key components: motivational-value (entails the presence of value orientations and motives), innovative-cognitive (comprises a system of legal knowledge considering the specifics of technical-technological development), activity-technological (practical skills, planning and coordination skills, studying and utilizing modern technologies), and personal-reflective (expressed in personal evaluation (characterization) of oneself).

The components of the formation of economic culture include theoretical knowledge (involves acquainting with the main economic theories, concepts, and models reflecting processes in the economy and the transport sector); practical skills (aimed at the development of practical abilities and skills in the field of economics); communicative skills (successful functioning in the transport and transportation sector requires the ability to interact with various stakeholders, including clients, suppliers, partners, and other parties); analysis and evaluation of economic factors (the ability to analyze economic factors affecting transportation operations and to evaluate their impact on work and efficiency); ethics and responsibility (understanding of ethical standards related to economics and management of transportation operations, and adhering to them in professional activity). Each of these components

plays a crucial role in preparing future specialists in transport technologies and transportation

management, aiding them in becoming professionally competent and successful in their chosen profession.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.38-46>

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## СУТЬ І СТРУКТУРА ЕКОНОМІЧНОЇ КУЛЬТУРИ МАЙБУТНІХ ТЕХНІКІВ З ТРАНСПОРТНИХ ТЕХНОЛОГІЙ ТА УПРАВЛІННЯ ПЕРЕВЕЗЕННЯМИ НА АВТОМОБІЛЬНОМУ ТРАНСПОРТІ

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### Реферат:

Актуальність статті зумовлена необхідністю визначення та обґрунтування суті і структури економічної культури майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному

транспорті, розкритті змісту кожного компонента структури економічної культури, а також визначенні ключових факторів, що сприяють її формуванню в процесі фахової підготовки майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті.

*Метою* статті є визначення суті і структури економічної культури майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті.

*Методи:* вивчення наукових джерел щодо трактування суті поняття «економічна культура майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті» – для формулювання власних поглядів на визначення змісту цього феномена; структурно-компонентний аналіз – для виокремлення компонентів економічної культури майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті; узагальнення й систематизація – для формулювання висновків і перспектив подальших досліджень.

*Результати:* визначено основні підходи у наукових джерелах до трактування поняття «економічна культура майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті»; схарактеризовано основні компоненти структури економічної культури та складники формування економічної культури майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті.

*Висновки:* суть економічної культури майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті є інтегративним утворенням особистості фахівця відображає систему професійно важливих якостей, цінностей, знань, умінь і навичок планування технологій організації перевезень, надання транспортних та складських послуг, використання ресурсного потенціалу для розвитку транспортних підприємств в ринкових умовах; характеризується високим ступенем дисциплінованості, відповідальності, самостійності з усвідомленням пріоритетів економічної культури у виконанні професійних завдань. Компонентна структура економічної культури техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті охоплює мотиваційно-ціннісний, інноваційно-когнітивний, діяльнісно-технологічний, особистісно-рефлексивний.

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**Ключові слова:** професійна освіта, логістика, автомобільний транспорт, економічна культура майбутніх техніків з транспортних технологій та управління перевезеннями на автомобільному транспорті.

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Received: 09 February 2024

Accept: 12 April 2024



# READINESS OF FUTURE EDUCATIONAL INSTITUTION LEADERS TO APPLY INNOVATIVE MANAGEMENT TECHNOLOGIES

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## Abstract

*The relevance* of this article is determined by the necessity to ensure the competitiveness of educational institutions in the educational services market. Modern challenges require educational institutions to continuously improve their activities. Successful development of an educational institution is possible only through the integration of innovations that stimulate the achievement of its goals and contribute to improving the quality of education for students. This aligns with the interests of Ukrainian society, which, like any other developed society, is interested in a high level of educational services.

With the growth of the educational services market and increasing competition, it is important for leaders of educational institutions to focus on searching for and implementing innovative management technologies to secure significant competitive advantages. Thus, the current market conditions and the need for competitive struggle highlight the importance of innovations for leaders, with innovative management technologies becoming key to achieving the goals of the educational institution and enhancing the quality of education.

*Objective:* To analyze the readiness of future leaders of educational institutions to implement and apply innovative management technologies to enhance the competitiveness of their organizations in the educational services market.

*Methods:* Study of scientific sources, legislative and normative-legal documents, surveys and interviews, case studies, SWOT analysis, expert assessments, and modeling.

*Results:* During the study, the readiness of future educational institution leaders to implement innovative management technologies was evaluated; key barriers and challenges faced by future leaders, including limited resources, fear of change, and an insufficient level of knowledge about innovative technologies, were identified. At the same time, positive aspects were also discovered, namely a high level of motivation for learning and improvement, and readiness to introduce innovations to enhance the quality of education and adapt to modern labor market requirements.

A comprehensive set of measures to increase the readiness of future leaders for innovation was developed and substantiated. This includes professional development programs, mentorship, and the creation of innovative educational spaces for experimentation and practical application of new approaches. The role of strategic planning in the successful implementation of innovative management technologies was also determined, which involves clear formulation of the mission, vision of the educational institution, as well as the development of specific goals and tasks to achieve defined results.

*Conclusions:* This article examined the readiness of future educational institution leaders to apply innovative management technologies, which is crucial for enhancing competitiveness and the quality of educational services provided. The main barriers and challenges leaders may face when implementing innovations were identified, and methods to overcome these challenges were proposed. Special attention was given to the importance of a systematic approach and strategic planning in the process of adapting and implementing new practices in management.

Developed and substantiated recommendations for focusing on innovative management practices include: enhancing the qualifications of future leaders, developing openness to change, and stimulating creativity and innovative thinking. It was determined that the successful implementation of innovative management technologies depends on a comprehensive approach that takes into account the specifics of the educational institution, the readiness of the staff for changes, and the presence of the necessary material and technical base.

The findings of the study make it clear that innovative management technologies play a decisive role in forming an effective management model in modern educational institutions. Their implementation not only improves the quality of educational services but also ensures the sustainable development of educational organizations, meeting the challenges of the contemporary dynamic educational environment.

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**Keywords:** *development, readiness, future leader, innovative management technologies, educational institution.*

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**Introduction.** Modern challenges pose to educational institutions the task of constant improvement in their activities. The successful development of an educational institution is only possible through the integration of innovations that stimulate the achievement of its goals and contribute to improving the quality of education for students. This aligns with the interests of Ukrainian society, which, like any other developed society, is interested in a high level of educational services. Due to the growth of the educational services market and increasing competition, it is crucial for educational institution leaders to focus on finding and implementing innovative management technologies to secure significant competitive advantages.

In the contemporary world, where the pace of technological development and societal changes set new standards for the quality and accessibility of education, special attention is not only paid to the content of educational programs but also to the management methods of educational institutions. This poses a range of challenges for future educational institution leaders, the most crucial of which is the readiness to apply innovative management technologies. This readiness becomes a decisive factor in enhancing the effectiveness of the educational process and the competitiveness of the institution in the educational service market, ultimately affecting the quality of education that students receive.

The transformation of traditional management approaches in education, the introduction of innovative technologies and methods, and the adaptation to continuously changing external conditions require from future leaders not only a high level of professionalism but also a readiness for continuous learning and development. These challenges highlight the need for research into the level of readiness of future leaders to apply innovative management technologies in their professional activities.

This article identifies key aspects and conditions that either facilitate or, conversely, limit the readiness of future educational institution leaders to implement and effectively use innovative

management technologies. Analyzing current research, legal frameworks, and the results of empirical studies, we aim to identify factors that influence such readiness and propose ways to enhance it.

**Sources.** The problems of innovation in Ukrainian education have been the subject of research by a number of well-known domestic scholars, including: L. Vashchenko, L. Danylenko, L. Kalinina, L. Karamushka, and others. The issues of implementing innovations in education have been significantly addressed by well-known domestic and foreign scientists, such as: K. Angelovsky, I. Bogdanova, L. Burkova, I. Dychkivska, O. Kozlova, O. Marmaza, L. Momot, V. Palamarchuk, and others. The innovative culture as a component of the general culture of professionals was studied by scholars like S. Bykonja, V. Husev, V. Kurok, T. Davil, J. Epstein, B. Santa, G. Ternkvist, R. Shelton, and others. The management of innovative processes has been covered in the scientific work of L. Vashchenko, L. Danylenko, O. Marmaza, N. Pogribnaia, E. Fateeva, and others. Applied problems of management were researched by O. Baieva, I. Zavadsky, A. Mazaraki, M. Martynenko, and others. The peculiarities of innovative management have been characterized in the works of V. Vasylenko, V. Demchuk, O. Marmaza, L. Zabrodska, I. Shorobura, and others. The formation of innovative competence in educational institution leaders has been dedicated to the scientific works of N. Alekseenko, S. Zavgorodny, O. Yevdokymov, and others.

In the majority of studies, it is noted that innovative activity in education, especially in educational institutions, significantly depends on two main factors – effective management of this activity and the psychological readiness of educational staff and leaders to apply innovative technologies. However, to date, the development of readiness among educational institution leaders to implement innovative management technologies has not been the subject of research by Ukrainian scholars.

**The aim** is to conduct a theoretical analysis of the concept of "readiness of future leaders of higher education institutions to implement and apply innovative management technologies."

**Methods** include reviewing scientific sources and legislative and normative documents to perform a theoretical analysis of the key concepts of the study; synthesis is used to define the essence of the concept of "readiness of future leaders of higher education institutions to implement and apply innovative management technologies."

**Results and discussion.** Research on innovative processes in education and innovative technologies in educational institutions is currently primarily focused on educational staff and educational teams, leaving management subjects of innovative activity unnoticed. Moreover, the development processes of educational institutions cause the dynamics and ambiguity of the volume, content, and nature of innovative processes, which directs leaders' activities predominantly towards implementing innovative educational technologies rather than focusing on applying innovative management technologies. This also necessitates further scientific research in this area as the content and structure of leaders' management activities continuously evolve, as does the structure of management of innovative processes in educational institutions. This underscores the theoretical, practical, and psychological readiness of leaders to apply innovative management technologies, as well as the need to possess unique innovative skills, abilities, and qualities.

It is believed that the term "innovation" as a new economic category was introduced by Austrian scholar Joseph Schumpeter. In scientific use, the definition of "innovation" appeared in the 19th century and meant the penetration of some elements of one culture into another. Subsequently, it was adopted by representatives not only of the economic field of science but also by many others (1883-1950) (Sumets, & Ignatova, 2010).

Schumpeter defined innovation as the "non-permanent" conduct of "new combinations" in five typical cases of changes (Schumpeter, 1939), namely:

- the introduction of a new product, i.e., a product with which consumers are not yet familiar, or a new variety of a product;

- the introduction of a new production method, i.e., a method not yet practically tested in the production sphere;

- the discovery of a new market, i.e., a market in which a certain area of a country's economic activity was not previously present, regardless of whether such a market existed before or not;

- mastery of a new source of raw materials or semi-finished products, regardless of whether this source existed or was newly created;

- the creation of a new organization of industry, for example, achieving a monopolistic position, or losing it.

As we can see, this definition includes only the technical, economic, and organizational aspects of innovation, predominantly concerning the new organization of industry, the discovery of new markets, and new production methods, as well as the introduction of products unknown to consumers. Thus, according to J. Schumpeter, the subject of innovation can be a product, a production process, or an organization, if all are new and already implemented in practice. At the same time, Schumpeter posits that innovation is the primary source of profit, which itself results from the implementation of innovations: without development, there is no profit, and without profit, there is no development.

We fully support such a stance of the researcher and consider development an integral component of any organization, enterprise, institution, or facility whose activities are aimed at creating a product with specified qualities and characteristics.

Let's consider the definition of the concept under study in normative legal documents and scholarly sources. The Law of Ukraine "On Innovation Activity" (2013) provides the following definition of the term we are analyzing: "Innovations are newly created (applied) and/or improved competitive technologies, products, or services, as well as organizational and technical solutions in production, administrative, commercial, or other aspects that significantly improve the structure and quality of production and/or the social sector" (Law of Ukraine "On Innovation Activity," 2013). This definition is significant for our research as it highlights the importance of improving both the structure and quality not only in the production sphere but also in the social sector, including educational

institutions. Thanks to new or improved competitive innovative technologies, educational institutions are capable of achieving higher education quality.

In the Regulation of the Ministry of Education and Science of Ukraine "On the Procedure for Conducting Innovative Educational Activities," the term "innovation" is defined as follows: "For the first time created, improved, or applied educational, didactic, educational, management systems, their components, which significantly improve the results of educational activities" (Ministry of Education and Science of Ukraine, 2000). As we can see, it discusses significantly improving the results of educational activities. In our view, this can be ensured by applying innovative management technologies, which, besides their direct purpose—ensuring the effectiveness of the leader's activities—significantly affect the quality of activities of all participants in the educational process and ensure the quality of education for students.

As V. Kremen (2010) notes, "Innovations are an integral part of educational pedagogical theory and practice, as it is through innovations that education takes a progressive step forward. Moreover, innovations help solve a number of tasks, which allows for significant changes in the existing state of socio-economic and cultural existence. Every actor—politician, administrator, scientist—must realize that innovation enables the achievement of new results in any sphere, which, in turn, develops and enhances the spectrum of other practices. Advanced science develops through the constant search for innovations and their energetic and effective implementation."

In this manner, innovation serves as an active source for educational development. Innovations facilitate new progressive changes in the pedagogical, educational, and administrative subsystems, preventing these subsystems from operating at the level of outdated standards, and instead promoting and ensuring their continuous development. Accordingly, the development of higher education, professional training, and general secondary education systems involves the creation and implementation of innovations and innovative educational and administrative technologies.

The innovative process in managing an educational institution involves the incorporation of novelties in methods, forms, techniques, and means (technologies), as well as in the content of

administrative activities or its objectives, conditions, and technologies. This primarily requires the subject of management to be prepared to engage in such activities. Thus, the formation of theoretical, practical, and psychological readiness of future educational institution managers to apply innovative management technologies also involves conducting a theoretical analysis of the concepts: "readiness," "theoretical readiness," "practical readiness," and "psychological readiness."

The term "readiness" is defined in the World Dictionary of the Ukrainian Language (2017) as "agreement, the desire to immediately do something." According to Gnedko (2015), there are three approaches to understanding the concept of "readiness": functional – readiness as a special mental state of the personality, a psychological condition for successful performance, selectively-conscious activity; readiness as a psychological set that conditions the individual's formation towards activity; and readiness as a complex personal formation, a multi-layered and multi-level structure of qualities, properties, and states that define a person's capacity for activity.

Readiness for professional activity is also defined as a mental state that includes: operational readiness, requiring urgent activation of a person, their involvement at a certain level of activity; functional readiness – an individual's awareness of their goals, assessment of existing postulates, and determination of the most probable means of action; personal readiness, which consists of prolonged high activity of the personality when involved in the production process, the necessity and distribution during motivational, volitional, and intellectual efforts, and assessment of the likelihood of achieving life successes through activity (Vasylenko, 2008).

The readiness of an educational institution's leader for various types of activities can be defined as:

- a complex of knowledge, skills, abilities, motives, and personal qualities that ensure effective management of changes in the organization (Karamushka & Moskalov, 2011);
- the integrative ability of an educational institution's leader, which depends on the special selection of educators potentially capable of managerial activities, is formed during their organized professional training, and is determined by

the level of development of professional and personal qualities of a school principal (Zhebrovsky, 2002);

- a complex, multifaceted personal formation containing a set of knowledge, skills, abilities, motives, and personal qualities that ensure effective management of the educational process (Bondarchuk & Pinchuk, 2013);

- a set of knowledge and skills necessary for performing specific functions that reflect the main directions, types, and forms of managerial activity and overall constitute the basic foundation of the job competence model (Yelnikova, Zaichenko, & Maslov, 2010).

Accordingly, based on these perspectives, it can be asserted that the readiness of the leader of a higher education institution to apply innovative management technologies should be considered from the positions of theoretical readiness, which is defined as the ratio of the ideal model of knowledge and its actual state, psychological readiness (motives and personal qualities), and procedural readiness, characterized by the general ability of the leader to perform all managerial functions of innovative activity and apply innovative management technologies.

In our study, the concept of "innovative management technologies" will be understood as modern diagnostic, economic, digital, information, and psychological technologies that enable the creation of conditions for effective influence of the management subject on the activity of the educational institution and the making of management decisions aimed at achieving the goals of the educational institution and ensuring the quality of education of its recipients. Accordingly, the concept of "readiness of future leaders of higher education institutions to apply innovative management technologies" we define as the theoretical, practical, and psychological ability of the leader of an educational institution to apply innovative management technologies. It is appropriate to develop the readiness of future leaders of educational institutions to apply innovative management technologies during their professional training in higher education institutions. Training represents a purposeful educational process, and readiness, accordingly, is the result of this process. Thus, the readiness of a future leader of a higher education institution to apply innovative management

technologies is an integrative systemic formation, the purpose, and the result of the special professional training of future leaders in higher education institutions.

**Conclusions.** Innovative management technologies play a crucial role in developing an effective management model for modern educational institutions and ensuring their sustainable development. The concept of "readiness of future leaders of higher education institutions to use innovative management technologies" is an integrative systemic formation, which demonstrates the theoretical, practical, and psychological ability of a leader to apply innovative management technologies. The readiness of future educational leaders to employ innovative management technologies enhances the competitiveness and quality of educational services provided. The effectiveness of management activities is decreased by limited resources, fear of change, and insufficient knowledge of innovative technologies, among others, while it is increased by a high level of motivation for learning and improvement, and readiness to implement innovations to enhance education quality and adapt to modern labor market demands. The development of management competence will benefit from the implementation of a comprehensive set of measures to enhance the readiness of future leaders for innovations (training programs, mentorship, creation of innovative educational spaces for experiments and practical application of new approaches, etc.). The role of strategic planning in the successful implementation of innovative management technologies lies in the clear formulation of the institution's mission and vision, as well as in developing specific goals and tasks to achieve the defined outcomes. Recommendations for educational institution leaders regarding the use of innovative management practices include: ensuring systematic enhancement of future leaders' qualifications, fostering openness to change, stimulating creativity and innovative thinking; considering the specifics of the educational institution, developing staff readiness for change, and modernizing the material-technical base. Among the promising directions for research is the design of a structural-functional model for developing the readiness of future leaders of higher education institutions to use innovative management technologies and the development of technology to foster this readiness.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.47-54>

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## ГОТОВНІСТЬ МАЙБУТНІХ КЕРІВНИКІВ ЗАКЛАДІВ ВИЩОЇ ОСВІТИ ДО ЗАСТОСУВАННЯ ІННОВАЦІЙНИХ УПРАВЛІНСЬКИХ ТЕХНОЛОГІЙ

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## **Реферат:**

*Актуальність* статті визначається необхідністю забезпечення конкурентоспроможності сучасних закладів освіти на ринку освітніх послуг.

*Мета:* здійснити теоретичний аналіз поняття «готовність майбутніх керівників закладів вищої освіти до впровадження та застосування інноваційних управлінських технологій» й обґрунтувати значення цього феномена для підвищення ефективності управлінської діяльності керівника закладу освіти.

*Методи:* вивчення наукових джерел, законодавчих і нормативно-правових документів – для здійснення теоретичного аналізу ключових понять дослідження; узагальнення – для визначення сутності поняття «готовність майбутніх керівників закладів вищої освіти до впровадження та застосування інноваційних управлінських технологій».

*Результати:* визначено сутність поняття «готовність майбутніх керівників закладів вищої освіти до впровадження інноваційних управлінських технологій»; ідентифіковано основні бар'єри й виклики, з якими стикаються майбутні керівники у процесі реалізації управлінської діяльності, та визначено можливості, що при цьому виникають; розроблено та обґрунтовано комплекс заходів для підвищення готовності майбутніх керівників до застосування інновацій; визначено роль стратегічного планування в успішному використанні інноваційних управлінських технологій; обґрунтовано відповідні рекомендації для керівників закладів вищої освіти.

*Висновки:* показано, що інноваційні управлінські технології відіграють важливу роль у формуванні ефективної моделі управління сучасними закладами освіти й забезпеченні їх сталого розвитку; поняття «готовність майбутніх керівників закладів вищої освіти до застосування інноваційних управлінських технологій» визначено як інтегративне системне утворення, що засвідчує теоретичну, практичну і психологічну здатність керівника до застосування інноваційних управлінських технологій; доведено, що готовність майбутніх керівників закладів освіти до застосування інноваційних управлінських технологій впливає на підвищення конкурентоспроможності та якості надання освітніх послуг; виявлено, що ефективність управлінської діяльності знижують обмежені ресурси, страх перед змінами, недостатній рівень знань щодо інноваційних технологій тощо, а підвищують – високий рівень мотивації до навчання та вдосконалення, готовність до впровадження нововведень для підвищення якості освіти та адаптації до сучасних вимог ринку праці; зазначено, що розвитку управлінської компетентності сприятиме запровадження комплексу заходів для підвищення готовності майбутніх керівників до інновацій (програми підвищення кваліфікації, менторство, створення інноваційних освітніх просторів для експериментів і практичного застосування нових підходів тощо); з'ясовано, що роль стратегічного планування в успішному впровадженні інноваційних управлінських технологій полягає в чіткому формулюванні місії, візії закладу освіти, а також розробленні конкретних цілей і завдань для досягнення визначених результатів; сформульовано рекомендації для керівників закладів освіти щодо використання інноваційних управлінських практик (забезпечення системного підвищення кваліфікації майбутніх керівників, розвитку в них відкритості до змін, стимулювання креативності та інноваційного мислення; врахування особливостей освітнього закладу, розвиток готовності персоналу до змін, модернізація матеріально-технічної бази).

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**Ключові слова:** вища освіта, керівники закладів вищої освіти, інноваційні управлінські технології, стратегічне планування, управлінська діяльність.

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Received: 23 February 2024

Accept: 22 April 2024



# UNIVERSITY AUTONOMY IN THE CONTEXT OF OPTIMISING THE NETWORK OF HIGHER EDUCATION INSTITUTIONS

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## Abstract

*The relevance* of the article is determined by the importance of strengthening the autonomy of higher education, its ability to really influence the acceleration of Ukraine's recovery and the need to resolve a number of contradictions (between the launched higher education reform and imperfect regulatory, legal and organisational mechanisms for its implementation; public awareness of the inefficiency of the higher education network and the importance of its optimisation, and the insufficient level of awareness of the importance of ensuring democratic and transparent processes by senior education managers).

*The aim* is to analyse the prerequisites, features and prospects for optimising the network of higher education institutions in the context of implementing the right of universities to autonomy for accelerating Ukraine's recovery.

*Methods:* theoretical analysis of official, statistical, scientific and journalistic sources – to study the functioning peculiarities of the higher education network in Ukraine and the development of their autonomy; comparison and generalisation – to identify factors that hinder the autonomy development of Ukrainian higher education institutions and conditions that facilitate it.

*Results:* the dynamics of the higher education institutions network expansion and their contingent is studied; the peculiarities of acquiring the "national" status by higher education institutions are analysed; the factors of inhibition of the university autonomy development in Ukraine are identified; the conclusions of Ukrainian scientists on creating conditions for ensuring the process effectiveness of the higher education institutions optimisation are summarised.

*Conclusions:* the autonomy development of higher education institutions in Ukraine is hampered by an imperfect regulatory framework, non-state actions of educational managers at the institutional and national levels, and an unbalanced national education system; uncontrolled expansion of the higher education institutions network has disrupted the balance of the national education system (decline in vocational education, deterioration in the quality of higher education); the autonomy of higher education institutions in the context of an unbalanced national education system, weakened links with regional labour markets, and underdeveloped public-private partnerships cannot become a means of a restorative breakthrough for the Ukrainian education system to ensure Ukraine's post-war recovery; the need to optimise the network of higher education institutions is obvious and urgent, but it is undemocratic and non-transparent, which provokes unhealthy sentiments among the scientific and pedagogical community and undermines the authority of higher education in Ukrainian society; the process of optimising the network of higher education institutions needs to be regulated (development of relevant regulations, methodological recommendations, clear algorithm), taking into account the achievements of Ukrainian scientists and European experience.

**Keywords:** *higher education, vocational education, network optimisation of higher education institutions, autonomy of educational institutions, academic freedom.*

**Introduction.** The autonomy of higher education institutions (hereinafter referred to as HEIs) is one of the fundamental principles of the Bologna Process, which entails "self-sufficiency,

independence, and responsibility of higher education institutions in making decisions regarding the development of academic freedoms, the organization of the educational process, scientific

research, internal management, economic and other activities, and the independent selection and placement of staff within the boundaries" established by the Law of Ukraine "On Higher Education" (2014). The implementation of ambitious post-war reconstruction plans in Ukraine forces the state and society to finally address the issue of imbalance between higher and vocational education, acknowledged in a 2014 letter from the Ministry of Education and Science of Ukraine to university heads (Ministry of Education and Science of Ukraine, 2014). For a long time, the Ministry of Education and Science of Ukraine hoped that the inflated network of higher education institutions would be "corrected" by the demographic crisis and changes in financing (Novosad, 2020). However, this did not happen, and it is now absolutely clear that the structure of higher education is suboptimal

and the network of its institutions is inefficient, as assessed by scientists as fragmented and dispersed, excessively duplicated, professionally inadequate, and resource-decentralized (Kremen, ed., 2021, p. 82). At the beginning of the 21st century, there was a rapid increase in the number of HEIs of III-IV accreditation levels in Ukraine (fig.1), which was not accompanied by adequate resource provision (financial, personnel, material-technical). Essentially, there were only two significant limiting factors for the expansion of the HEI network – the demographic factor and the financial capability of Ukrainian families. The classification in 2014 (Law of Ukraine, 2014) of colleges as higher education institutions led to many of them losing their production-oriented priority and transformed a significant portion into sources for replenishing the deficit in university contingents.

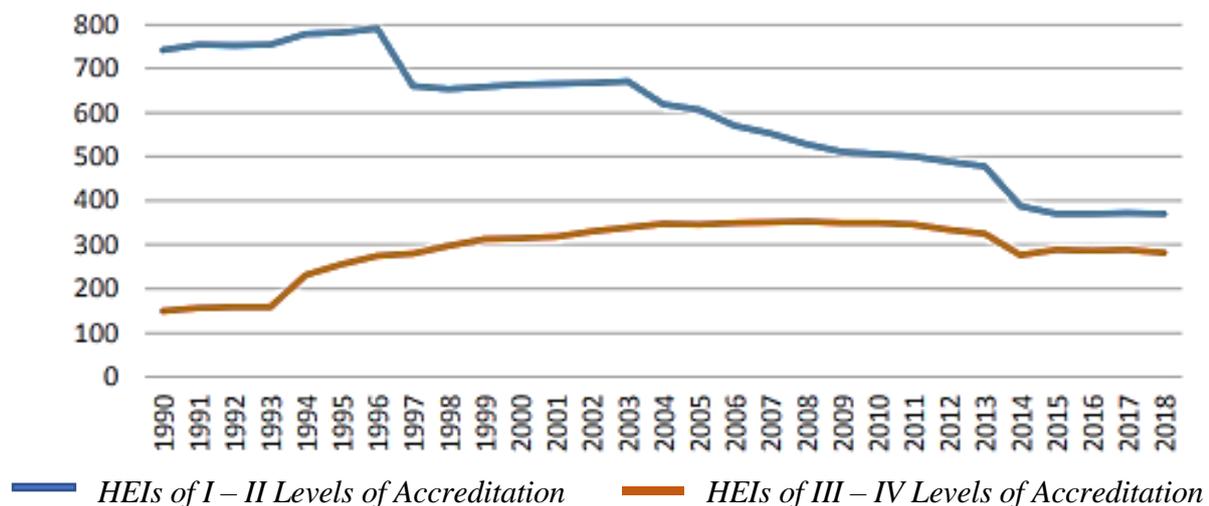


Fig. 1. Network of Higher Education Institutions by Levels of Accreditation  
(Source: Mykolaiev & Sovsun, 2019)

As a result of the change in the ratio between the number of applicants to professional and higher education institutions, the coverage of the Ukrainian population with higher education reached 73% in 2022 (Kremen, ed., 2021, p. 82). The rapid quantitative growth of HEIs (Fig. 2) formally raised

Ukraine's Human Development Index, but in practice, it adversely affected the development of domestic professional education and significantly reduced the quality of higher education, although the post-Soviet society has been quite tolerant towards this issue.

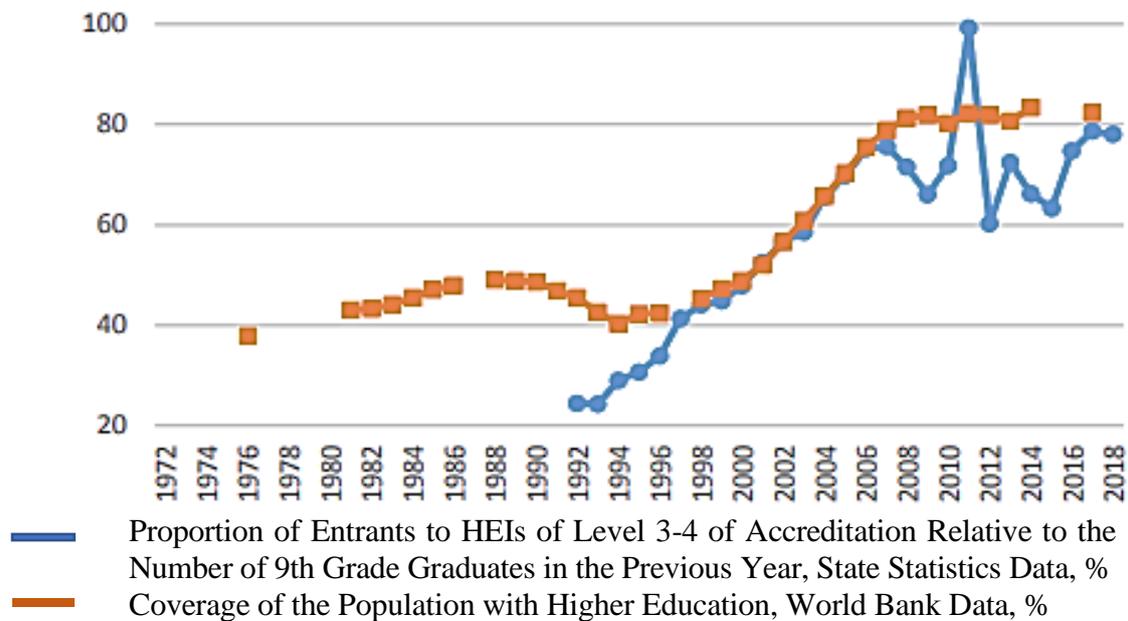


Fig. 2. Coverage of the Ukrainian Population with Higher Education (Source: Mykolaiev, & Sovsun, 2019)

Meanwhile, the demographic crisis of the early 21st century led to a significant drop in the number of higher education seekers, which only began to increase again after 2018 (Fig. 3). Thus, the

rapid growth in the number of higher education institutions was accompanied by an equally significant decrease in their student population.

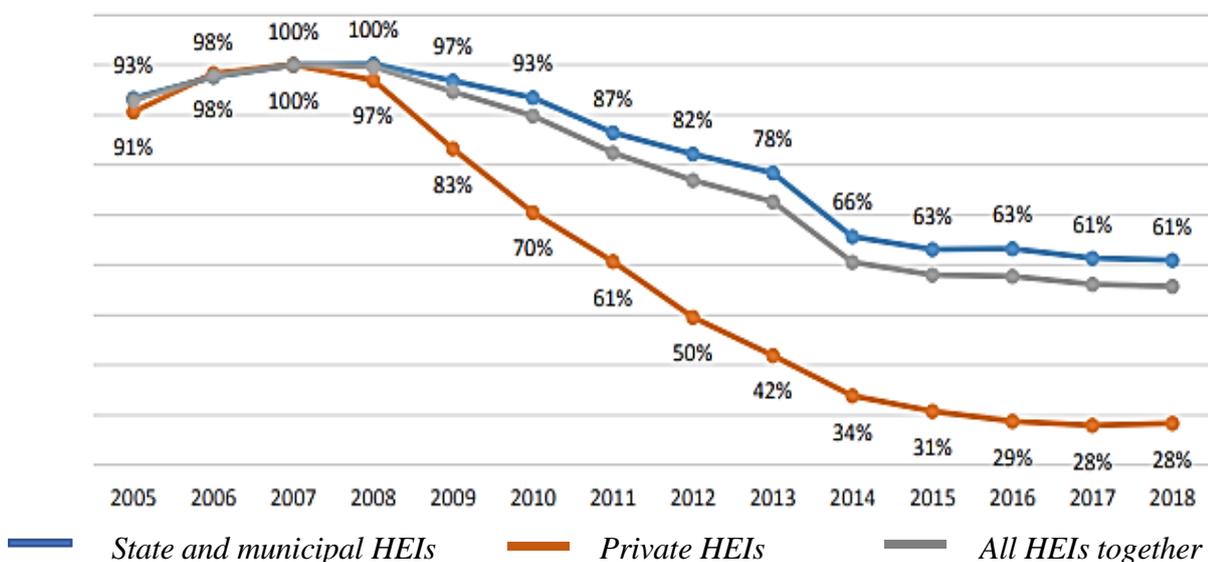


Fig. 3. Student enrollment in higher education institutions with II-IV levels of accreditation (Source: Nikolaiev, & Sovsun, 2019)

In 2008, there were 350 HEIs, and each had an average of 6,700 students, whereas in 2021, with 300 active HEIs, each had an average of only 3,400 enrollees (Tarasovskyi, 2024). During the years 2018-2019, there were approximately 10 students per Ukrainian lecturer (compared to 12-20 students per lecturer in European countries). However,

domestic higher education institutions, in an effort to prevent unemployment among teaching staff, did not carry out the objectively necessary reduction of teaching personnel. Consequently, their expenditures on the salaries of scientific and pedagogical staff reached 60-80% of the institution's budget, which hindered their full development,

especially in terms of updating material and technical resources and conducting scientific research.

It is worth noting that the quantitative expansion of the network of higher education institutions occurred simultaneously with several "waves" of their status enhancement. Starting in 1993, Ukraine saw a mass elevation of HEIs to the IV level of accreditation and their renaming from institutes to academies and universities, despite the inadequacies of their material-technical base and staffing to the assigned status. Thus, dozens of institutes (pedagogical, technical, economic, etc.) became universities. For instance, if in 1994 there were 118 institutes in Ukraine, by 1995 only 72 remained, as the others had formally changed their status to higher (Nikolaiev, & Sovsun, 2019).

At the end of the 1990s and the beginning of the 2000s, a new "wave" formed—the granting of "national" status to academies and universities. According to the Regulation on the National Institution (establishment) of Ukraine (1995), such

status should have been granted only to those educational institutions that achieved the highest indicators in their sectoral group in terms of utilizing the intellectual potential of the nation, realizing the idea of national revival, gaining international recognition, and leading in the development of the humanitarian field (Presidential Decree of Ukraine, 1995). There could be no more than three such institutions in each sectoral group (Presidential Decree of Ukraine, 1998). It should be noted that there were between 13 and 17 sectoral groups over various years. Hence, according to current legislation, the number of "national" educational institutions should not have exceeded 51. However, this process became widespread and by 2013, there were 117 national higher education institutions. Furthermore, the process of status elevation of educational institutions took on a distinct political hue, as most presidential decrees granting "national" status to educational institutions appeared particularly in presidential election years (Fig. 4)..

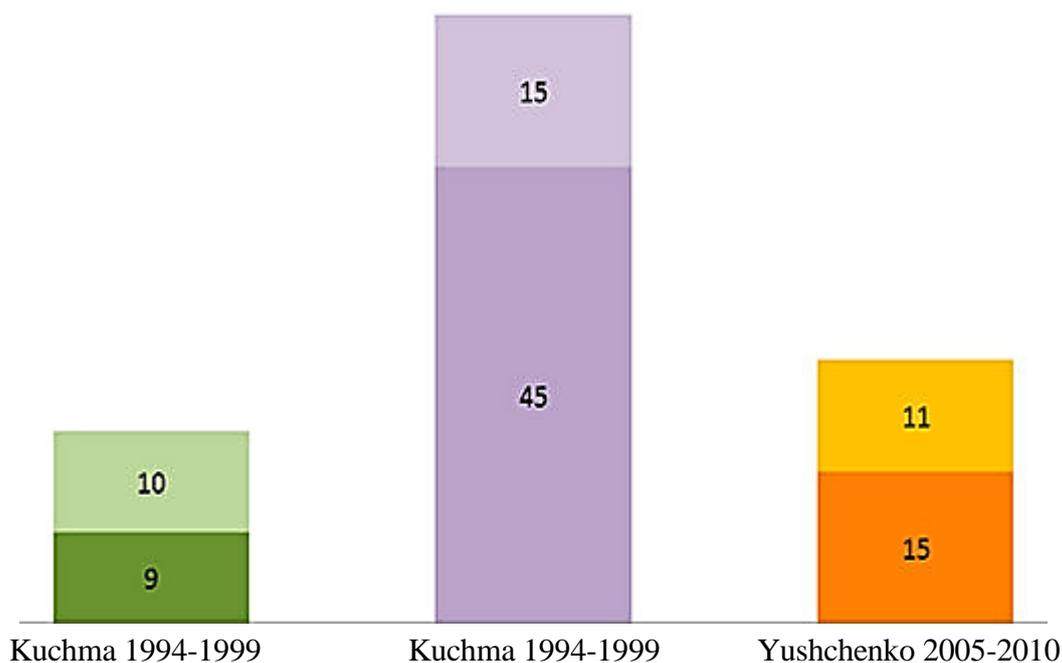


Fig. 4. Number of 'national' statuses granted (during the term and in the election year)  
(Source: Stadnyi, 2013)

In essence, the status of "national" has become a form of payment by presidents for the electoral loyalties of university collectives, which on the website of the National Agency for Corruption Prevention (2022) is termed "political patronage" (providing universities with charitable aid in exchange for informal services of higher education

institutions), and in scholarly publications, it is categorized as an intangible manifestation of corruption (nepotism, lobbying, clientelism) (Vdovichenko, 2016). On one hand, this demonstrated the non-statist values of the state leaders (who did not cultivate national values among Ukrainian citizens but openly traded them), and on

the other hand, the anticipated increases in state funding and autonomy for national universities turned out to be unrealized for most institutions due to a financial crisis and legal unregulatedness of this process (Stadnyi, 2013). Under such conditions, the "national" status not only failed to provide financial preferences to the educational institutions that received it, but also quickly depreciated, losing its expected image value. From today's perspective, this appears as a vivid testament that trading national interests yields only ephemeral dividends.

In 2022, representatives of the Association of Rectors of Ukraine approached the Minister of Education and Science of Ukraine, S. Shkarlet, with a proposal to enact a war-time reduction in the number of universities from 300 to 115 (Decision of the Presidium of the Association of Rectors of Ukraine, 2022). They also submitted a bill titled "On Ensuring the Competitiveness of Ukrainian Universities," which, however, was rejected that year (Zagorodny, 2022). The following year, the Ministry of Education and Science of Ukraine finally announced its intentions to optimize the network of higher education institutions, which in 2023 consisted of 332 institutions (191 state, 25 municipal, 116 private). These institutions educated 1,112,965 people, with 114,045 scientific and teaching staff members, all employed by institutions under the Ministry of Education and Science of Ukraine (Institute of Educational Analytics, 2024).

However, the initial practices of the declared optimization indicate a number of axiological and organizational problems that negate the autonomy of higher education institutions as an important achievement of the democratic development of society, education, and science, and undermine the significance of the critically important process for Ukraine of rebalancing its educational system.

**Sources.** The issue of developing autonomy and academic freedoms in higher education institutions has often been discussed by Ukrainian lawmakers and scholars in the context of the need to reform the education system in Ukraine. This is particularly evident in the search for approaches to optimize the national network of higher education institutions. The importance of this process is highlighted in the letter from the Ministry of Education and Science of Ukraine "On Optimizing the Network of Higher Education Institutions" (2014), in speeches and statements by ministers S. Kvit (2015), L. Hrynevych (2017), H. Novosad (2020), S. Shkarlet (Zagorodny, 2022), in the appeals of rectors of Ukrainian universities

(Decision of the Presidium of the Association of Rectors of Ukraine, 2022), and in analytical works by Ukrainian scholars (Nikolaiev & Sovsun, 2019; Kremen (ed.), 2021; Kremen et al., 2022; Kalashnikova & Orzhel, 2022), on the pages of many online publications (Educational Policy. Public Experts Portal (2016), Hlavkom (2017), Ukrainian Pravda (2022), Economic News (2024)). The analysis of these sources indicates a complete consensus among official, public, scientific, and scientific-pedagogical communities regarding the necessity of optimizing the network of domestic higher education institutions. At the same time, higher education institutions, their stakeholders, and authorities have been unable to develop a common vision for the mechanisms of its implementation.

**Objective:** To analyze the prerequisites, characteristics, and prospects of optimizing the network of higher education institutions in the context of implementing universities' right to autonomy to accelerate Ukraine's recovery.

**Methods:** Theoretical analysis of official, statistical, scientific, and journalistic sources – to study the characteristics of the functioning of the network of higher education institutions in Ukraine and the development of their autonomy; comparison and synthesis – to identify the factors that hinder the development of autonomy in Ukrainian higher education institutions and the conditions that facilitate it.

**Results and Discussion.** Ukrainian higher education institutions have been granted the right to autonomy since 2014. However, an overall assessment of the development level of various autonomy dimensions in Ukraine, according to the methodology of the European University Association (EUA), showed low scores across many criteria (Panych, 2019). For instance, in academic autonomy, the right of an institution to independently set admission rules is poorly implemented. In organizational autonomy, underdeveloped rights include the ability to independently (following its own procedure) choose a leader without subsequent approval by a government body; to independently set the criteria for the leader's candidacy, determine the term of office, and establish the procedure for their removal; and to invite non-employees to its governing bodies. In staff autonomy, the right to independently set salaries for teaching and senior administrative staff is poorly realized. In financial autonomy, five out of six criteria are underdeveloped, including the ability of the institution to take loans (including regulating

the interest amount, obtaining special permission, or the right to independently take a loan); to freely manage remaining funds; and to own buildings.

The problem of implementing academic autonomy in Ukraine is directly related to the quality of education issue. Opponents of academic autonomy argued that it would provoke substandard education. It must be acknowledged that experts and scholars indeed recognize the unfounded expectations regarding an increase in creativity in the process of improving educational programs, and thus regarding the pace of their quality improvement (Yershov, 2021; Petrenko, 2019; Research on the Readiness of Educational Staff..., 2020, pp. 13, 19, 34, 35, 37, 39, 44). The blame, in this case, is attributed not so much to the developers, guarantors, and educators of the programs as to their lack of motivation for creativity due to the need to increase the contingent, which, unfortunately, mostly focuses not on the content of the educational program but on the cost of education, the advantageous location of the educational institution, and the availability of opportunistic specialties. Therefore, as long as the competitiveness of an educational institution is determined by the preferences of potential students and not by the real needs of the labor market, the content of the educational program will remain on the margins of the developers' motivation.

Despite the fact that the organizational autonomy of modern higher education institutions fundamentally differs from those of the post-Soviet era, experts from the European Association of Universities (EAU) still believe that the way Ukrainian universities utilize their granted rights "preserves" university life, transforming it into a closed system overly dependent on internal influence groups, which does not promote the competitiveness of the educational institution.

The staffing autonomy of higher education institutions in the selection of executive personnel is often guided not so much by standardized qualification requirements for scientific and pedagogical staff, as by traditions and habits acquired over decades of practice. Therefore, in the competition for positions in higher education, high qualifications of the candidate do not always play a key role, often giving way to their loyalty to the institution's leadership and various types of nepotism (such as favoritism) (NAZK Website, 2022). The existing system of faculty salary payment remains rigid and lacks motivational potential.

The most problematic aspect remains the financial autonomy of Ukrainian higher education institutions. On one hand, the state continues to strictly regulate the flow of funds in public educational institutions. However, on the other, cases of improper use of university property are still found, provoking public suspicion towards any attempts to expand the financial autonomy of higher education institutions.

The war of the Russian Federation against Ukraine has forced Ukrainian society and the state itself to question many existing traditions and to start building new paradigms for the development of various spheres of life and state. One of these relates to revising approaches to the development of academic freedoms and autonomy of educational institutions. The essence of this lies in the need to maintain a balance between the economic and axiological components of the mission of higher education institutions.

On one hand, an institution of higher education should not only be viewed as a self-regulating and authoritative academic environment that creates and disseminates knowledge, but also as an independent financial-organizational structure that enables educational institutions to be effective and competitive in the educational service market. Given this, the autonomy of universities increasingly acquires economic significance (the concept of the "entrepreneurial university" by B. Clark). This implies that the instability of student populations, unpredictability of the labor market, and reductions in state funding can also be seen as opportunities for universities to diversify their funding sources, thereby enhancing their financial independence from the state (Panych, 2019). On the other hand, universities must finally create real conditions for the quality training of higher education seekers as effective individuals, conscious and active representatives of the national elite of the country, with a formed state-oriented stance, capable of defending the national interests of Ukraine in their professional and public activities. That is, the balance between the economic and axiological dimensions of autonomy is intended to change the image of the university, help respond more promptly to market needs, employ more flexible development strategies, cultivate the tastes of consumers of educational services, rather than appeasing them. However, an ineffective network of higher education institutions prevents the establishment of such a balance.

To describe the optimization process in the network of higher education institutions, a variety of terms are employed, the most resonant among them being: mergers, acquisitions, annexations, enlargements, and consolidations. Clearly, the content of optimization will depend on the choice of term, dictating policies, actions, tools, and mechanisms for its implementation (Kalashnikova & Orzhel, p. 96). In practice, optimization is typically implemented based on the principle of "annexation," which provokes a negative emotional reaction from the leadership of the education institutions being "annexed" or "acquired." Regrettably, they often disregard an important provision of the 2014 Law of Ukraine "On Higher Education," which requires that in implementing the principle of institutional autonomy, such self-organization and self-regulation should be introduced that are open to criticism, serve the public interest, and establish the truth regarding challenges facing the state and society. Instead, the leadership of these institutions often initiates real marginal wars not for a democratic mechanism of absolutely necessary unification, but for the "right of suzerainty" in this process. This undeniably indicates the non-state ambitions of many educational managers at the institutional level. Simultaneously, the unhealthy atmosphere around this critical issue of optimizing the network of domestic higher education institutions also indicates an undemocratic and opaque approach to optimization by educational managers at the national level.

In September 2023, the Ministry of Education and Science of Ukraine proposed for public discussion a draft Law of Ukraine "On Amendments to Certain Laws of Ukraine (Regarding Creating Preconditions for the Modernization of the Network of Higher Education Institutions)," developed by the Ministry with the aim of achieving Operational Goal 1.2 "An Effective Network of Higher Education Institutions: the system of higher education contributes to the state fulfilling its obligations, state higher education institutions are effective," and fulfilling Task 1.2.1, outlined in the Strategy for the Development of Higher Education for 2022 – 2032, as well as the Government's Priority Action Plan for 2023 (Ministry of Education and Science of Ukraine, 2023). The explanatory note to the draft law states that "the main goal of modernizing the network of higher education institutions is to enhance the quality and efficiency of the higher education

system, and to increase societal and business trust in higher education" (Ministry of Education and Science of Ukraine, 2023, p. 1). It is also mentioned that the draft law aims to "create preconditions for the modernization of the network of higher education institutions." However, these preconditions only concern "the regulation of changes in the organization of functionally detached structural subdivisions of higher education institutions, colleges, and the sphere of higher education management, as well as changes to the conditions of admission for obtaining a Ph.D. or Doctor of Arts degree." The term "optimization," which is delicately replaced with the term "effective network," is not used in the text of the draft law. Meanwhile, the explanatory note and the conclusions of the public discussion indicate that the development of this act "responds to the recommendations of the European Commission within the Framework of the 2023 Enlargement Package, which envisage the implementation of a plan to optimize the network of educational institutions" (Report on the Public Discussion of the Draft..., 2023, p. 1). Yet, despite expectations, the "regulation" of optimization has not occurred, resulting in loud scandals and intrigues surrounding the attempts by the Ministry of Education and Science of Ukraine to implement the unification program for 2024 (Economic News, 2024).

The concept of integrating weaker higher education institutions into stronger ones, as proposed by the ministry, remains unregulated and subjective, thus causing genuine outrage within the scientific and educational community. The negative emotional backdrop of this process will continue to grow until clear monitoring criteria for the effectiveness of educational institutions are developed and transparent mechanisms for their integration are introduced. The optimization process should be based on a special provision and relevant methodological recommendations. These documents should include tasks recognized and expected by the educational community, such as: facilitating the restoration of balance in the national education system and its consolidation; preserving the age-old academic and educational traditions of each institution, their property complexes, and material-technical equipment; rationalizing the use of personnel, financial, material, and property resources in each region; eliminating duplication of many specialties by several universities in one region; discontinuing non-profile specialties in educational institutions without proper staffing and corresponding scientific

traditions; strengthening the ties of higher education with the regional labor market; enhancing the research and competitive potential of universities and their competitiveness in the domestic and global market of educational services; improving the quality of higher education and strengthening its prestige in society and the world.

In developing the legal framework for optimizing the network of higher education institutions (HEIs), it is essential to consider the success factors identified by Ukrainian scholars, presented in three main dimensions: institutional (a trusted team; a clear and inspiring mission and strategy; engagement of the academic community; communication strategy and tactics; interaction with external stakeholders), systemic (directive state policy and legal framework; system-level vision; financial support for processes), and value-based (trust, cooperation, openness). Thus, optimizing involves considering key value dimensions and aligning goals at all levels, balancing objective and subjective factors at all decision-making stages (Kalashnikova & Orzhel, 2022, pp. 122, 124). Developing and implementing mechanisms for optimizing the domestic network of HEIs should also consider the rich European experience, thoroughly studied and summarized by Ukrainian scholars (Kalashnikova & Orzhel, 2022, p. 106; Nitcenko, Havrysh, & Zakharchenko, 2018, pp. 34-35). However, judging from the legal basis of the optimization process in Ukraine, it has not yet been sufficiently accounted for in Ukrainian educational legislation.

It is evident that in the context of unregulated network optimization of higher education institutions, the autonomy of universities ends where the will of the Ministry of Education and Science of Ukraine begins. Therefore, the state should provide the academic community with a democratic and transparent algorithm for optimizing the network of higher education institutions, which will not undermine the fundamental principles of their autonomy but will strengthen them. Considering this, the alternative concept of network optimization "One region - one national university" seems appropriate. This concept is based on the creation of a single national university in each region by merging public higher education institutions of that region. It is clear that this concept will most challenge the ambitions of university leaders, who find it difficult to relinquish power and who often use their administrative levers to stir up situations and incite protest sentiments within their communities. This could be avoided by

developing and implementing a detailed unification algorithm that would ensure the democracy, transparency, and fairness of the planned optimization. Undoubtedly, it is crucial to make this process not a manifestation of officials' will but a result of the consolidated efforts of the public and the academic staff of higher education institutions through the activation of all their possibilities for autonomy and academic freedom.

The first step could be, for example, the decision of the Ministry of Education and Science of Ukraine to create in each region a group of crisis managers to monitor the state of higher education and prepare for the merger of all public higher education institutions in the region into a single national university. Such a university, through the creation of relevant profile institutes required by the regional economy, must guarantee the preservation and rational use of the scientific and educational traditions, property complexes, material and technical equipment, and highly qualified personnel of each merged institution. The crisis management group could be formed from representatives of each higher education institution to be merged, authorized by the Ministry of Education and Science of Ukraine, local authorities, the National Agency for Higher Education Quality Assurance, professional associations of the region, and others. It would be appropriate for crisis managers from educational institutions to be elected by the general assemblies of their work collectives. During their tenure preparing educational institutions for unification, crisis managers may be relieved from their main jobs while fully preserving their salaries and employment records, particularly those representatives from higher education institutions.

During a clearly defined period (for example, six months), a group of crisis managers, with the support of local authorities and all educational institutions based on an analysis of their resources and populations, should: identify a list of specialties and specializations necessary for the region; justify the structure of the new university, the approximate staff of each structural unit (institutes - faculties - departments); prepare a provisional charter for the university and a strategy for its development over the first five years; establish clear and transparent criteria for the recruitment of teaching, scientific-pedagogical staff, and other personnel; develop the main provisions necessary for organizing the educational process, etc. The work of the crisis managers' group should be completed 4-5 months before the end of the academic year. Their results must be published and

approved at the meetings of the scientific councils of each of the higher education institutions involved in the merger.

It is advisable to open the new university after the crisis managers have developed and discussed its structure, staff, and foundational documents. To support the operation of the new university, an interim acting rector should be appointed (without the right to participate in his elections) and a competition committee formed, which, according to the criteria developed and approved by the educational institutions and current legislation, will announce and organize the recruitment of new staff. Faculty and other employees of the educational institutions to be merged can thus submit applications to the competition committee for vacant positions at the new university even before the dissolution of the institutions where they work. It is important to meticulously specify in the regulations for optimizing higher education institutions in the region the composition of the competition committee and the conditions ensuring its transparency and public visibility. The work of the competition committee must be completed before the start of the admissions campaign. The new staff should have the experience and time to organize it. In our opinion, it is advisable to hold the elections for the rector of the new university after the completion of the admissions campaign, according to current legislation and the provisions collegially developed in the newly established educational institution.

In our view, the campaign to develop such an algorithm should be open, transparent, and prompt. The Ukrainian education system cannot afford prolonged contemplation and disputes, as these undermine the authority of educational institutions, damage the image of Ukrainian higher education globally, and hinder Ukraine's recovery processes. The content generation of this algorithm should be the prerogative of the higher education institutions themselves and nationally conscious and active members of the scientific and pedagogical community, with the Ministry of Education and Science of Ukraine ensuring the legal and regulatory support for this process and its alignment with the country's economic and national interests. In this

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organized union, the essence of academic freedom is upheld (Petrenko, 2019), facilitating the integration of higher education institutions into regional and local communities to promptly respond to the challenges and needs of regional labor markets, eliminating the basis for unhealthy competition, and motivating the scientific and pedagogical community to actively participate in transforming universities into powerful regional hubs for professional training and scientific thought.

**Conclusions.** The uncontrolled expansion of the network of higher education institutions has disrupted the balance of the national education system (caused the decline of professional education, led to the deterioration of the quality of higher education, and resulted in its 'inflation' both in society and on the global market of educational services). The autonomy of higher education institutions in the context of an imbalanced national education system, weakened links with regional labor markets, and an underdeveloped public-private partnership is incapable of serving as a means for the educational renewal necessary for Ukraine's post-war recovery. The need for optimizing the network of higher education institutions is evident. Meanwhile, the optimization process is happening undemocratically and opaquely, provoking unhealthy sentiments within the scientific-pedagogical community and Ukrainian society, further undermining the credibility of Ukrainian higher education. This highlights the necessity of regulating the optimization process, for example, through the development and approval of regulations for optimizing the network of higher education institutions, appropriate methodological guidelines, and the justification of a clear algorithm for optimization procedures. Taking into account the work of Ukrainian scholars and European experience in optimizing the higher education sector, restructuring, and reorganizing to ensure the real autonomy of Ukrainian higher education institutions, enhancing their effectiveness and competitiveness on the global educational services market becomes crucial.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.55-68>

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## АВТОНОМІЯ УНІВЕРСИТЕТІВ У КОНТЕКСТІ ОПТИМІЗАЦІЇ МЕРЕЖІ ЗАКЛАДІВ ВИЩОЇ ОСВІТИ

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### Реферат:

*Актуальність* статті визначається важливістю посилення автономії вищої освіти, її здатності реально впливати на прискорення відновлення України та необхідністю розв'язання низки суперечностей (між розпочатою реформою вищої освіти та недосконалими нормативно-правовими й організаційними механізмами її реалізації; суспільним усвідомленням неефективності мережі закладів вищої освіти і важливості її оптимізації та недостатнім рівнем усвідомлення освітніми менеджерами вищого рівня важливості забезпечення демократичності і прозорості цього процесу).

*Мета:* проаналізувати передумови, особливості і перспективи здійснення оптимізації мережі закладів вищої освіти у контексті реалізації права університетів на автономію для прискорення відновлення України.

*Методи:* теоретичний аналіз офіційних, статистичних, наукових і публіцистичних джерел – для вивчення особливостей функціонування мережі закладів вищої освіти в Україні та розвитку їх автономії; порівняння й узагальнення – для виявлення чинників, що стримують розвиток автономії українських закладів вищої освіти, та умов, які йому сприяють.

*Результати:* досліджено динаміку розростання мережі закладів вищої освіти та їх контингенту; проаналізовано особливості набуття закладами вищої освіти статусу «національного»; виявлено чинники гальмування в Україні розвитку університетської автономії; узагальнено висновки українських учених щодо створення умов для забезпечення ефективності процесу оптимізації закладів вищої освіти.

*Висновки:* розвиток автономії закладів вищої освіти в Україні гальмується через недосконалу нормативно-правову базу, недержавницькі дії освітніх менеджерів інституційного і загальнодержавного рівнів, розбалансовану вітчизняну систему освіти; неконтрольоване розростання мережі закладів вищої освіти порушило баланс національної системи освіти (занепад професійної освіти, погіршення якості вищої освіти); автономія закладів вищої освіти в умовах розбалансованої національної системи освіти, ослаблених зв'язків з регіональними ринками праці, нерозвиненого державно-приватного партнерства не спроможна стати засобом

відновлювального прориву української освітньої системи для забезпечення повоєнного відновлення України; потреба в оптимізації мережі закладів вищої освіти є очевидною і нагальною, але відбувається недемократично і непрозоро, що провокує нездорові настрої у середовищі науково-педагогічної спільноти і підриває авторитет вищої освіти в українському суспільстві; процес оптимізації мережі закладів вищої освіти потребує унормування (розроблення відповідного положення, методичних рекомендацій, чіткого алгоритму) з урахуванням напрацювань українських учених і європейського досвіду.

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**Ключові слова:** *вища освіта, професійна освіта, оптимізація мережі закладів вищої освіти, автономія закладів освіти, академічна свобода.*

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Received: 15 February 2024

Accept: 22 April 2024



# PRINCIPLES OF COUNSELING VOCATIONAL EDUCATION STUDENTS ON YOUTH ENTREPRENEURSHIP

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## Abstract

*The relevance* of the study is determined by the need to justify certain rules common to all entities responsible for organizing and conducting counselling on youth entrepreneurship in vocational (vocational and technical) education institutions, which will help to unite the efforts of the team and achieve the expected results – to create the right conditions for training self-motivated professionals ready to start and run their own business for the post-war recovery of the Ukrainian economy.

*The aim* of the study is to substantiate the basic principles of counselling students of vocational education in youth entrepreneurship and the patterns of organization of counselling activities.

*Methods:* theoretical analysis of scientific sources, comparison and generalization to identify and substantiate the guidelines necessary for the organization of effective counselling of vocational education students in youth entrepreneurship, to determine the patterns that arise in the process of counselling.

*Results:* the guidelines for organizing counselling on youth entrepreneurship are characterized; the significance of the phenomena of "awareness" and "acceptance" of counselling principles as factors in ensuring the effectiveness of counselling activities is substantiated; the regularities that are revealed in the process of implementing counselling activities are determined.

*Conclusions:* it is justified that in the process of organizing counselling on youth entrepreneurship in vocational education institutions, the primary priority is the awareness of organizers and consultants of the importance of adopting common norms, rules, requirements and determining mechanisms for their strict observance; the basic principles of counselling students of vocational education on youth entrepreneurship (humanism, legality, morality, fair use, systematic and consistent, practical orientation, corporate social responsibility) are highlighted; it is shown that the principles of counselling students of vocational education in youth entrepreneurship are also associated with certain regularities concerning the goals, content, technologies, forms, methods and means of counselling, as well as the system of control and evaluation of the results of counselling activities.

**Keywords:** *vocational education, vocational education seekers, youth entrepreneurship consulting, principles of consulting, regularities of consulting organization.*

**Introduction.** Preparing for entrepreneurship in vocational education institutions is a complex process that requires meticulous preparation and coordination not only of direct consultants, but also of the entire pedagogical team: managers, educators, masters of industrial training, and potential employers. Therefore, it is crucial to adopt certain common rules that will help unite the efforts of the team and achieve the expected results – creating proper conditions for effective youth

entrepreneurship consulting. The adoption and adherence to such rules ensure the achievement of synergistic interaction among all consulting participants and its high effectiveness.

In the process of organizing youth entrepreneurship consulting in vocational education institutions, it is essential for organizers and consultants to recognize the importance of adopting uniform norms, rules, requirements, and

mechanisms for their strict compliance. Let us consider the term "principle." This concept signifies a beginning; a fundamental starting point of any scientific system, theory, ideology; a foundation on which a particular process or system of actions is built; a characteristic that underlies the creation or implementation of something; a conviction, norm, or rule that an individual or social group adheres to in life and activity. Symbolically, the term "principle" (from Latin *princeps* – first) was also used to name the heavy infantry warriors of the Ancient Roman army, who held the front line in battle order. Thus, in the context of youth entrepreneurship consulting organization, defining principles is like outlining the front line of the pedagogical front.

Therefore, the principles of youth entrepreneurship consulting are guiding positions that must be laid at the foundation of the organization and implementation of consultative activities in the institution of vocational education with the aim of: upholding the lawful rights of all consulting subjects; fostering pedagogical initiative; developing pedagogical and social responsibility; enhancing the self-reliance of vocational education seekers; increasing the readiness of the youth to start their own business in their field; forming the ability of graduates to successfully and responsibly run their own business even under adverse conditions; strengthening the image of the educational institution and the education system as a whole; contributing to the development of the national economy; supporting the interests of society and the state.

Sources. The principles of consulting future specialists in youth entrepreneurship are based on: the provisions of J.A. Comenius (1940) about the school as a "workshop of wisdom and humanity," capable of forming individuals ready to serve society, J. Locke (2023) on the right to initiative and the expression of creative energy, about "forming a gentleman" as a virtuous, active, physically and emotionally resilient individual, capable of managing their affairs "sensibly and prudently"; J. Dewey (1980) on the formation of a generation of initiative, active, independent, and responsible individuals, capable of planning, making decisions, and bearing responsibility for them. Also considered were the conclusions of Ukrainian educators: I. Pidlasyy (2004, p.41) on the need to ensure the

social orientation of education, S. Honcharenko (1997, p. 170) on the importance of principles of stimulating internal activity of the personality, humanism combined with high demands, democracy; V. Galuzynskyi (1995) and M. Yevtukh (2002) on the humanistic nature of pedagogical action, the necessity of creating a favorable moral-psychological climate in the team, transforming the education seeker from an object of passive perception to a subject of active self-education; L. Bazyl, V. Orlova (2019) on the importance of forming the business activity of future specialists; and others.

**Objective:** The purpose of this text is to substantiate the main principles of consulting young entrepreneurs in vocational education and the patterns of organizing consultative activities.

**Methods:** Theoretical analysis of scientific sources, comparison, and generalization were employed to identify and substantiate guiding principles necessary for organizing effective consulting for young entrepreneurs in vocational education and to determine the patterns that emerge during consultative activities.

**Results and Discussion:** It is evident that establishing certain principles as guiding positions for the effectiveness of consulting in youth entrepreneurship is a very important step, but not the only one. Equally significant and, essentially, decisive is the recognition and acceptance of such guiding positions by each subject of consulting. Every member of the educational team must comprehend the essence of each principle, understand its purpose, and the consequences of its neglect in their activities.

However, mere awareness of principles, although important, is not sufficient to ensure the effectiveness of a particular educational activity. It is necessary for each team member to incorporate the principles defined by the educational collective into their personal beliefs. This will allow the collective principles to become the internal convictions of each participant in the consultative activity. Thus, only the combination of awareness and acceptance of principles by a like-minded team can organize and implement effective consultative activity. This helps overcome the difficulties that inevitably arise in solving educational tasks, achieve coordinated actions, improve mutual understanding

among consulting participants, and promote the synergistic effect so desired in educational activity, where the results exceed the team's expectations.

For each principle to be understood, thorough information must be provided to team members about its essence, features, purpose, etc. This is facilitated by the systematic work of the educational institution in enhancing pedagogical skills and professional qualifications of the educational team, creating conditions for their self-education, conducting seminars, webinars, educational conferences, and other events, all of which are collectively aimed at providing comprehensive information on the importance of principles for organizing consulting in youth entrepreneurship. Thus, simply deciding to organize consultative activity in an educational institution is not enough. For this activity to be effective, the collective needs to be thoroughly prepared. Each future participant in this activity must perceive it as a system of understandable components and logical pedagogical actions.

Accepting principles, just like realization, is an internal process. However, it is not shaped by a teacher's participation in various events but becomes the result of their self-analysis and personal conclusions. Therefore, realization and acceptance are sequential phenomena: accepting a particular principle results from realizing its importance not only for the cause but also personally for the individual. This sequence harbors a certain threat: the effectiveness of training teachers to realize principles, which should guide them during entrepreneurship consulting, will always depend on the teacher's prior life and professional experience. Negative experiences associated with failures, disillusionment with the effectiveness of pedagogical projects, distrust towards management, emotional burnout, and many other factors can completely negate the potential titanic efforts of the management or consulting organizers. In such cases, a teacher may understand the essence of a certain principle, recognize its significance, but fail to accept it, meaning they do not adopt it as a personal belief. To avoid this, it is crucial not only to prepare the team but also to properly form its composition. It is unlikely that a group of unmotivated, burned-out, and disillusioned teachers will become a

cohesive pedagogical team even after extensive well-organized training.

Therefore, to ensure the effectiveness of consulting principles for professional education seekers in youth entrepreneurship, it is necessary to form a team of motivated experienced professionals and develop a system of preparatory events for them.

We propose a characterization of the main principles of consulting professional education seekers in youth entrepreneurship.

*The principle of humanism* – a foundational principle of many sciences, emphasizes the attention on the Human as a value, their dignity, the right to happiness, and the expression of their abilities. It is believed that its application in a particular activity is a criterion for the progressiveness of the corresponding social institution. Therefore, the pedagogical council of a vocational education institution (VEI), deciding to organize consulting on youth entrepreneurship, must organize the work, select consultants, and design the content and forms of consultative activity in such a way that the focus of the goals and tasks is on the personality of the education seeker. The result of applying this principle in consulting on youth entrepreneurship should be the future professional's confidence in their abilities, the realization of the possibility to start their own business successfully, and an overall increase in the graduates' self-sufficiency, particularly in business activities.

*The principle of legality* is a fundamental guiding principle of law that permeates the entire sphere of legal relations. Its essence lies in the strict adherence to and implementation of legal norms by all subjects of legal relations, with the supremacy of the law over other normative legal acts. It entails the principle of clear definition of legal norms. For instance, if the state imposes certain restrictions on people's behavior, it must at least clearly and unambiguously delineate the boundaries of these requirements. In the process of organizing consultation on youth entrepreneurship, this principle entails a clear division of functions among all subjects of consultative activities, the determination of norms and rules for each subject, the provision of a system of incentives and motivations, rewards and sanctions, and so forth.

It is noteworthy that legal norms (awards, rewards, determination of duties, suspension from

activities, etc.) should not depend on the discretion of specific officials. They all must be clearly regulated. However, in modern educational institutions, the implementation of this principle in the process of organizing consultation on youth entrepreneurship encounters many problems of legal uncertainty. A vivid example could be the absence of career centers in vocational education institutions, which, according to their functions, have the best opportunities to prepare young people for entrepreneurship, as a staff structural unit. This implies that practically all such centers operate as extracurricular on a voluntary basis, and the work in them for the teaching staff of educational institutions is just another unpaid workload.

The absence of legal standardized grounds for carrying out consultative activities in career centers forces the leaders of these educational institutions, where they are open, to "reshape" the functions of their staff, find non-budgetary ways to motivate and encourage them to organize the work of the centers, select effective forms of work, and achieve certain positive results. From the standpoint of classical motivation theories, such an approach to the implementation of any project is inefficient. Usually, neglecting this principle in organizing consultation on youth entrepreneurship can lead to uneven distribution of workload among teachers, abuse of responsibility by teachers, their dependence on management, overloading and emotional burnout of many activists, or the institution's descent into imitative activities.

*The Principle of Morality in Consultative Activities.* The justification of this principle should start from the distinction between the concepts of "morals" and "morality." If the former represents a collection of laws, norms, and rules, the latter is the manner of adhering to these in real life and activities. At the heart of this principle lies the golden rule of morality, which urges: "Treat others as you would like to be treated." Moral rules are universally significant, applying equally to all individuals regardless of gender, age, social, or financial status. They regulate the process of communication among people, teaching us to express thoughts or intentions in a way that does not offend the interlocutor and to demonstrate kindness, respect, and a readiness to understand and respect others' interests. This principle underpins diplomacy, which is a crucial

aspect of successful business activity. Thus, in the organization and conduct of consulting educational aspirants on youth entrepreneurship, this principle holds special importance. Firstly, it requires leadership to serve as an example of morality for their subordinates, and consultants as an example for the educational aspirants. Secondly, during the consulting process, this principle should be adopted by the aspirants as a guideline for action. To this end, the educational institution must demonstrate a complete rejection of double standards, especially concerning relationships with potential employers or former graduates who have become entrepreneurs.

*The Principle of Good Faith Use.* This principle in the system of principles for organizing and conducting consultations with aspirants of professional education on youth entrepreneurship is derived from copyright law. In legal practice, good faith use means that copyrighted materials can be utilized without the owner's permission under certain conditions. In the context of consulting on youth entrepreneurship, this should be understood as the application of various pedagogical innovations, diagnostic, psychological, or didactic methodologies, pedagogical systems, concepts, technologies, road maps, etc. The principle of good faith use is not applied automatically or merely by mentioning it. If you are using someone else's copyrighted work, there is no guarantee that the principle of good faith use will apply to your case. It suggests that in state institutions of professional education, during the conduct of various consultative activities, methods, technologies, and publications recommended by the Ministry of Education and Science of Ukraine, academic councils of educational institutions, and scientific establishments of the corresponding profile should be used. This again emphasizes the importance of developing consultation programs concerning the preparation of youth for entrepreneurial activity.

*The principle of systematicity and consistency in advising vocational education seekers* on youth entrepreneurship requires a clear structural organization of information necessary for future professionals to start their own business. It necessitates the rational distribution of this information into individual semantic fragments and their phased mastery. Within the confines of an educational institution, this can be implemented

through the integration of educational and extracurricular activities' objectives and tasks. Systematic advising is ensured by the fact that youth preparation for employment through self-employment must be conducted in classes, career centers, and extracurricular events. For instance, over 85% of vocational education career centers staff include consultants (professional, career, business consultant, and legal advisor). Career counseling is traditionally provided by staff psychologists or social educators. Legal consultations are conducted by staff lawyers or law teachers. Business consulting is mostly carried out by economics teachers, occasionally by representatives of partner organizations or employers (with their consent). Professional counseling often coincides with career counseling. If a career center has a separate professional consultant on staff, these duties are typically assigned to a vocational training master. Therefore, those educational institutions that have career centers possess experience in logically structuring the information necessary for youth to develop entrepreneurial competencies and readiness to start their own business. Psychologists help the future professional explore their personality, identify traits conducive to business activities, and develop characteristics necessary for business success. Legal consultants teach how to properly start and responsibly manage one's business, avoid legal issues, and protect one's interests without infringing on the rights of others. Business consultants familiarize with the nuances of the service market for young entrepreneurs.

The systematic nature of consultative work is strengthened by incorporating entrepreneurship preparation into the work programs of other disciplines studied by education seekers, as well as into the educational plans of the educational institution and individual groups of seekers.

The consistency of preparation for entrepreneurship can be ensured by each consultant defining a list of sequential lessons and tasks for the entire year (or for the period of the seeker's study in a particular specialty). This allows education seekers to not only receive answers to questions regarding the prospects and opportunities of employment in the small business sector during individual consultations but also to gain systematic preparation

for future business activities, where the presentation of information will be logical and match the level of knowledge and previous life experience of the seeker. Thus, it is clear that the implementation of this principle requires meticulous work from a scientifically organized planning and control of all types of consultative activities.

*The principle of practical orientation* in consultancy work involves selecting methods and forms that provide educational seekers with answers to questions related to real steps in starting and managing a business. This is facilitated by the entire pedagogical team's focus on practical training for youth in entrepreneurship. An example of such practical orientation is Japan, a country with a significant share of small businesses in its GDP. Japan is known for innovative educational technologies that foster young people's interest in entrepreneurial activities, high business culture, and social responsibility (Patoka & Baidulin, 2020). This is achieved through collective project activities involving the entire educational institution, from younger students, for whom participation is mandatory, to older students, who may choose to participate. Such projects are incorporated into the educational process, uniting all structural units of the institution, its entire staff, and all learners, immersing them in the real business sphere from idea to profit generation.

*The principle of corporate social responsibility* means a responsible approach by any organization, company, or social institution to its products or services, consumers, employees, and partners. It involves an active social stance by various institutions, characterized by harmonious coexistence, interaction, and ongoing dialogue with society, and participation in solving social issues. An educational institution—a state institution—provides the population with educational services, including consulting youth on starting and managing their businesses. Therefore, the declared educational service must be delivered qualitatively. Imitation in consultancy work or its unprofessional organization and conduct is a deception of public expectations and qualifies as irresponsible.

The term "corporate social responsibility" emerged in the 1950s and was initially related to the business sector. According to American economist H. Bowen, corporate social responsibility should

concern the obligation of businessmen to conduct policies and make decisions that reflect the goals and values of their society. This notion initiated the discussion on business ethics and social responsibility of companies (Kyivstar Business HAB, 2023). This principle equally applies to educational institutions funded by state or local budgets, fulfilling a social mandate to prepare specialists of a certain quality. Given the state of Ukraine's economy, severely undermined by the invasion of the Russian Federation, this responsibility increases manifold.

The domestic market requires not just qualified professionals, but also self-reliant ones capable of securing employment for themselves and providing for their families, without relying on a state weakened by war. Thus, the preparation of education seekers for self-employment should become the cornerstone of the renewal and modernization of educational programs for training specialists in all fields. An educational institution that has not analyzed its programs for alignment with the needs of a wartime and post-war economy is acting contrary to the principles of social responsibility. The corporate nature of this responsibility means that the blame for inadequate preparation of the youth for life and activity in wartime conditions is not only on the management but also on the teaching council that represents the entire staff of the educational institution.

Therefore, the organization of counseling for vocational education seekers on youth entrepreneurship must be legally formalized and standardized, motivated, and supported by a well-prepared staff and content that meets the urgent needs of society and the economy. Any educator agreeing to participate in the organization and conduct of such counseling assumes responsibility for meeting the social expectations regarding the readiness of youth to start their own businesses and their ability to conduct business responsibly. The refusal of the staff to organize such counseling can also be viewed as inaction, distancing from the problem of increasing unemployment among youth, which will lead to delayed but inevitable reputational losses for the educational institution.

The principles of counseling vocational education seekers on youth entrepreneurship are also linked with certain regularities concerning the goals,

content, technologies, forms, methods, and means of counseling, as well as the system for controlling and evaluating the results of counseling activities. Particular attention should be paid to some of these aspects.

There exists a *certain regularity between the quality of legal and regulatory provisions and the intensity of implementing pedagogical innovations*. For instance, the impact of the developed project on the Standard Regulations for the Career Center of a vocational (vocational-technical) education institution (2020) on the frequency of such centers being established in vocational education institutions is well-documented. It is known that 90.4% of career centers were opened immediately following the publication of the Standard Regulations, based on which educational institutions developed their own regulations, incorporating tasks aimed at "promoting the development of entrepreneurial initiative" (Bazyl et al., 2022, pp. 6-18). Clearly, a quality regulatory package optimizes the efforts of educational institution leaders and consulting organizers.

A correlation has also been established between *the financial and resource provisioning of structural units that provide consulting on youth entrepreneurship and the effectiveness of the consulting activity*.

For example, the better the resource provisioning for consulting activities (material-technical, scientific-methodological, informational-communicational, personnel), the more effective its outcomes will be. For instance, in vocational education institutions, slightly more than half of the opened career centers have their own premises. The rest are located in educational and methodical offices, admissions committee premises, libraries, and even hallways. Experience shows that the absence of funding and clear localization of any structural unit complicates the communication among staff members, with educational seekers, and with partnering organizations, decreases the unit's status and prestige, and reflects the administration's regard of it as somewhat marginal. Approximately 20% of the established centers are not equipped with the necessary computer technology and do not have access to high-speed internet, indicating them as merely formal entities (ibid., p. 13). It is evident that such centers are unable to perform their functions

adequately, which, in times of war and uncertainty, requires serious digital provisioning.

It is also worth acknowledging the existence of regular links between the inclusion of consulting on youth entrepreneurship in the educational process, in the overall system of extracurricular educational activities, and the effectiveness of the consultative activity.

For instance, it is known that in many vocational training institutions, the work of career and entrepreneurship competence development centers not only involves conducting their own events but also extends to the entire educational institution's activities—both curricular and extracurricular. In 62% of these institutions, the development of career and entrepreneurship competencies occurs through teaching specific subjects (such as "Fundamentals of Entrepreneurial Activity," "Basics of Industry Economics and Entrepreneurship," "Fundamentals of Entrepreneurship," "Business Economics," etc.), in 29% through the study of specific modules, and in 72% during the resolution of relevant theoretical and practical tasks in classes. Analysis of employment rates of graduates in the small business sector enables us to assert that the best results are shown by those educational institutions where entrepreneurship consulting is a logical component of the overall system of educational and extracurricular activities aimed at preparing youth for entrepreneurial activities. Consequently, there is a clear need for educational and methodological support in the process of developing entrepreneurial competencies in students of vocational training institutions. This can be achieved through the preparation of educational programs, textbooks, and guides tailored to them, considering the industry specifics of educational institutions and the specialties they teach; and the development and dissemination of lesson plans, extracurricular activities, and business projects aimed at developing the entrepreneurial competencies of future specialists.

It must also be recognized that there is *a link between the presence of a motivation program in an educational institution for all subjects of the educational process to participate in consulting and the effectiveness of preparing youth for entrepreneurial activities.*

The establishment of clear mechanisms in the educational institution to stimulate the creativity of youth entrepreneurship consultants is key to the success of this type of activity. Establishing strong connections with various stakeholder groups interested in the development of future specialists' entrepreneurial competencies can be an additional source of moral and material encouragement for educators to participate in preparing youth for entrepreneurship. Without the motivation of the teaching staff, it is impossible to ensure the necessary motivation of education seekers (Yershova, 2020, pp. 154-155). Only a convinced educator can persuade an education seeker, unlock their internal emotional reserves, crucial for acquiring the necessary knowledge, skills, and abilities for entrepreneurial activities. The general style of the teaching staff plays a significant role: the punctuality of the educators, their respect for the students' time, the selection of relevant and rational tasks, the formation of an adequate educational workload, and the development of practice-oriented consulting content.

*The effectiveness of youth entrepreneurship consulting is directly linked to the effectiveness of coordinating the activities of all consulting parties.* This regularity indicates that the lack of clear, coordinated actions by the entire pedagogical team can prevent the achievement of the set goals (Yershova, 2020, p. 155). Therefore, to ensure the effectiveness of consultative activities, it is crucial to establish a certain coordination center (or select a coordinator) and empower it with official authority necessary for prompt and efficient task resolution. It is important to avoid signs of a formal approach to the creation of the coordination center (choice of coordinator): authoritarian imposition of coordination duties on deputies, methodologists, psychologists, and other team members without their consent (forced appointment), creating additional burdens "on a community basis" without changes in employee remuneration; appointing a coordinator who lacks experience in the field and authority within the team; disregarding the opinions of education seekers (student self-government, trade union). Experience in implementing many pedagogical projects shows that this is precisely the stage at which the process of realizing the pedagogical idea is hindered. Many educational

institutions have not yet shed the formal Soviet approach, which essentially entrenched "academic feudalism" incompatible with business thinking, without which it is impossible to develop entrepreneurial competence in the youth. The coordination center (coordinator) must not only incorporate consultative activity into the general work plan for developing entrepreneurial competence but also ensure its systematic execution and reporting.

**Conclusions.** It has been substantiated that in the process of organizing consulting on youth entrepreneurship in professional education institutions, the primary task is for organizers and consultants to recognize the importance of adhering

to unified standards, rules, requirements, and defining mechanisms for their strict compliance. The main principles of consulting professional education seekers on youth entrepreneurship have been identified: humanism, legality, morality, conscientious use, systematicity and consistency, practical orientation, and corporate social responsibility. It is shown that the principles of consulting professional education seekers on youth entrepreneurship are also associated with certain regularities concerning the objectives, content, technologies, forms, methods, and means of consulting, as well as the system of control and assessment of the results of consultative activities.

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# ПРИНЦИПИ КОНСУЛЬТУВАННЯ ЗДОБУВАЧІВ ПРОФЕСІЙНОЇ ОСВІТИ З МОЛОДІЖНОГО ПІДПРИЄМНИЦТВА

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## Реферат:

*Актуальність* дослідження визначається необхідністю обґрунтування певних правил, спільних для всіх суб'єктів, відповідальних за організацію і проведення консультування з молодіжного підприємництва у закладах професійної (професійно-технічної) освіти, що допоможуть об'єднати зусилля колективу й досягти очікуваних результатів – створити належні умови для підготовки самозарадних фахівців, готових до відкриття і ведення власної справи задля повоєнного відновлення економіки України.

*Мета:* обґрунтувати основні принципи консультування здобувачів професійної освіти з молодіжного підприємництва та закономірності організації консультативної діяльності.

*Методи:* теоретичний аналіз наукових джерел, порівняння й узагальнення – для виявлення й обґрунтування керівних положень, необхідних для організації ефективного консультування здобувачів професійної освіти з молодіжного підприємництва, визначення закономірностей, що виникають у процесі консультативної діяльності.

*Результати:* охарактеризовано керівні положення організації консультування з молодіжного підприємництва; обґрунтовано значення феноменів «усвідомлення» і «прийняття» принципів консультування як факторів забезпечення ефективності консультативної діяльності; визначено закономірності, що виявляються у процесі реалізації консультативної діяльності.

*Висновки:* обґрунтовано, що в процесі організації в закладах професійної освіти консультування з молодіжного підприємництва першочерговим є усвідомлення організаторами й консультантами важливості прийняття єдиних для всіх норм, правил, вимог та визначення механізмів їх неухильного дотримання; виокремлено основні принципи консультування здобувачів професійної освіти з молодіжного підприємництва (гуманізму, законності, моральності, добросовісного використання, систематичності і послідовності, практичної орієнтації, корпоративної соціальної відповідальності); показано, що принципи консультування здобувачів професійної освіти з молодіжного підприємництва пов'язані також з певними закономірностями, що стосуються цілей, змісту, технологій, форм, методів і засобів консультування, а також системи контролю й оцінювання результатів консультативної діяльності.

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**Ключові слова:** професійна освіта, здобувачі професійної освіти, консультування з молодіжного підприємництва, принципи консультування, закономірності організації консультування.

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Received: 15 February 2024

Accept: 28 April 2024



# TUTORIAL SUPPORT FOR THE DEVELOPMENT OF ENVIRONMENTAL COMPETENCE OF FUTURE SPECIALISTS IN SHIP NAVIGATION

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## Abstract

*The relevance* of the research is determined by the fact that in modern society, one of the main ways to ensure sustainable development of society in the context of signs of environmental crisis is the formation of environmental competence, the inclusion of environmental safety factors in the context of professional training and formation of future specialists.

*The aim* of the research is to identify and substantiate the most important aspects of tutor support for the formation of environmental competence of future specialists in ship navigation.

*Methods*: theoretical methods of systematic analysis of philosophical, psychological and pedagogical literature to reveal the main provisions of the problem under research; analysis of current dissertation research; generalization and systematization to formulate own views on the problem of forming the environmental competence of future specialists in ship navigation.

*Results*: various aspects of the concept of tutor support for the formation of environmental competence of future specialists in navigation are analyzed. The peculiarity of the research is the identification of innovative productive conditions and means of environmental education in higher education. Based on the idea of the need to organize purposeful environmental and vocational education, based on the use of active, practice-oriented teaching tools and technologies, the tutoring support is characterized, which allows the student to act as an initiative subject performing personally meaningful activities aimed at meaningful solution of ecological problems and improvement of the environment. The principles of the tutor form of interaction between teacher and student, the essence of the tutor's position and tutor support in the process of forming the environmental competence of future specialists in ship navigation are determined. Support, accompaniment, and facilitation are considered as effective forms of tutoring. Explaining the importance of openness of the educational and socio-cultural space within which the formation of environmental competence is carried out, the forms and technologies, as well as key aspects of tutoring support for the formation of environmental competence of future maritime transport specialists are listed.

*Conclusions*: the prospects of using tutoring are due to the possibility of implementing a personal education strategy and the variability of using various resources of the socio-cultural environment based on the student's own potential and the content aspects of the main activity. The current ecological situation determines the need for a reasonable and responsible attitude to the environment. At the same time, the success of environmental protection and nature-transforming activities depends on the level of maturity of ecological thinking of specialists providing all spheres of life. The formation of high levels of environmental competence is the basis for the development of citizenship and patriotism, and therefore requires the search for effective approaches, forms and methods. Tutoring support in the framework of the formation of environmental competence of future maritime professionals allows to create optimal conditions for the actualization and development of a responsible and proactive attitude to the problems of preserving and improving the environment through a special emphasis on the manifestation of activity and initiative during professional activities to solve environmental problems and environmental protection, drawing up and implementing a personal trajectory of professional development of the student, development of the socio-cultural, communicative, leadership, and moral potential of the future specialist, which will allow the student to form his or her own environmental behavior model and effectively carry out professional activities based on the experience of solving environmental problems.

**Introduction.** Today, humanity is experiencing an era of the most intense exacerbation of relations with the environment, a time of increased frequency and scale of adverse natural and technogenic phenomena, when everyone should possess basic knowledge of ecologically rational activities and the ability to forecast impending threats from the environment at least in the near future. The dissemination of such knowledge and the development of skills are envisioned within the framework of environmental education. Environmental education should be viewed as part of the general educational preparation of learners; its goal is to foster an ecological culture. Over the last decade, environmental protection issues have become the most pressing problems requiring resolution by humanity. Special studies conducted by scientists from various countries have shown that reckless use of natural resources and unrestricted waste disposal, particularly into seas and rivers, have created a danger of irreversible processes in the biosphere, thus posing a threat to human life.

The development of oceanic resources, the exploitation of the continental shelf, and the intensive development of shipping and marine product extraction cause significant environmental damage. In the last decade, due to accelerated scientific and technological progress, signs of an anthropogenic ecological crisis characterized by uncontrolled use of natural resources have become increasingly apparent. Pollution of the World Ocean has reached alarming proportions (Kunah & Zhukov, 2021).

Professional ecological training of marine professionals, including future shipmasters, is a multi-faceted process that includes forming a scientific system of knowledge in the interaction of nature and society, in the field of international environmental legislation, cultivating a humanistic world perception, and shaping ecological convictions. This is important as shipmasters have a significant impact on the environment through the operation of vessels and the use of marine resources. Marine professionals from Ukraine carry out professional activities in various countries and continents, which significantly emphasizes the enhancement of their professional ecological training (Simanjuntak, 2023).

During the research of the **results** of scientific research by domestic and foreign scientists on the

issue of forming ecological competence, it was discovered that general issues of the theory and practice of ecological education were addressed by scholars such as G. Galiyeva, O. Gerasimchuk, O. Gurenkova, N. Kurilenko, O. Lytvynova, L. Lukyanova, L. Tytarenko, N. Oliynyk, N. Pustovit, I. Syaska, L. Chopenko, A. Chochman, L. Steg (L. Steg), M. Zint (M. Zint), and others. Various aspects of the ecological competence of future marine specialists were studied by M. Babishena, V. Voloshin, V. Dobrovol'ska, A. Huz, O. Gurenkova, V. Istomin, S. Levkivsky, V. Pozdnyakova, A. Svarichevska, T. Kharchenko, V. Shmakov, A. Yatsyk, M. Simanjuntak, and others.

In the current research, we relied on the conclusion of A. Svarichevska (2018) that "a holistic solution to the task of forming the ecological competence of future shipmasters requires a comprehensive approach. Moreover, for the effective formation of ecological competence in shipmasters, it is necessary to consider factors such as the use of modern methods of teaching and education that promote the development of ecological awareness and motivation for ecologically safe activity, and ensuring the accessibility of educational programs for all shipmasters, regardless of their age, experience, and level of education."

Therefore, issues related to identifying the specifics of professional ecological training in maritime-oriented educational institutions within the context of a competence-based approach, as well as methods and forms of effective ecological training, require further thorough research.

An analysis of the scientific literature and educational practice has shown that creating favorable conditions for the development of ecological competence in future specialists allows for the organization of tutor support (Demyanenko, 2008; Sytnyk, & Dehtyarova, 2020). Researchers such as S. Zhurkina, O. Komar, D. Sytnyk, R. Sharan, G. Bailey, J. Kitchens, Ch. Natson, and E. Hays highlight the prospects of tutorship, which is conditioned by the possibility of implementing a personal educational strategy and the variability of applying different resources of the socio-cultural environment

based on the student's own potential and the substantive aspects of the main activity.

**The goal of the research** is to identify and substantiate the most significant aspects of tutor support in the formation of ecological competence of future ship navigators.

**Methods.** To solve the research tasks, theoretical methods of systemic analysis of philosophical and psycho-pedagogical literature were used—to uncover the main propositions of the problem studied; analysis of current dissertation research, generalization, and systematization were employed—to formulate personal views on the problem of forming ecological competence in future ship navigators.

**Results and discussion.** Among the diverse problems that have arisen before humanity in recent decades, the global ecological crisis has acquired particular significance. A productive approach to solving contemporary society's ecological problems is based on forming a new type of human-nature relationship. The scale and realism of the risks of a global economic crisis underscore the necessity of considering the 'ecologicalness' of all human activities without exception.

Ecological education, aimed at forming value orientations in people that enable them to realize the multifaceted significance of nature and its surroundings, developing an ecological worldview, ecological culture, and thinking based on principles of personal responsibility for the fate of the environment, is one of the main ways to ensure sustainable development of society. The need to change the way of thinking and behavior through quality education in favor of sustainable development for all, regardless of social conditions, thanks to the use of new approaches to learning, development, and education of global citizenship, is a fundamental idea in the documents of the United Nations (UN) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), such as the UNECE Strategy for Education for Sustainable Development.

In our view, the priority for implementing this task is to work on developing ecological competence, incorporating environmental safety factors into the context of professional training, and the development of future specialists. Researchers defining the structure of a specialist's professional training identify the main direction aimed at the comprehensive development of a student's personality,

which seeks growth and further enrichment of their educational potential.

Analyzing the content of traditional training for future officers of the civilian maritime fleet, researchers L. Lukyanova and O. Gurenkova note that there is a certain separation of sailors from the natural environment, which is reflected in the achievement of significant technical innovations without considering their impact on natural systems, both social, economic, and ecological, without aiming to reduce the risks of unwanted interventions in these technical systems (Lukyanova, & Gurenkova, 2008, p. 24). Ecological education is a continuous process of teaching, upbringing, and development of personality, aimed at forming a system of scientific and practical knowledge and skills, as well as value orientations, behaviors, and activities. The system of ecological education includes such principles as humanism, scientific approach, integration, continuity, systematic approach, and interconnection of revealing global, regional, and local aspects of ecology.

Studying ecological aspects will help future navigators understand the impact of their activities and enable them to make decisions aimed at reducing negative environmental impacts. Teaching sustainable maritime practices and methods is another important component of maritime education. Cadets must learn to manage ships ecologically responsibly, minimize emissions, and effectively respond to ecological incidents (Svarychevska, 2018).

Ecological education performs the following pedagogical functions:

- promotes the formation and development of a unified world view in the minds of learners;
- is an essential component of the humanization of all education;
- develops general educational and human skills to predict one's own activities and the activities of others;
- expands the possibilities for moral education during the learning process.

Ecological competence is a personality formation that has purely cultural origins. That is, an ecologically competent person is distinguished by the fact that they know, can, understand, value nature, and care for it because they are bearers of ecological culture, which in turn is built and manifested in a specific worldview and behavioral stereotypes. The ecologization of education means forming a

new understanding of the world and a new approach to activity, based on forming noosphere-humanitarian and ecological values.

The formation of ecological competence in future specialists must be an integral process and include aspects such as consolidating ecological knowledge; developing skills aimed at conserving and protecting the natural world; acquiring specific experience in participating in ecological activities; forming ecologically oriented personal aspects.

An essential condition for the productive formation of ecological competence is the continuity of work in this direction, as an analysis of educational practice reveals certain stages in the development of a conscious and responsible attitude towards the surrounding reality. The specificity of the university stage of ecological education of the individual is characterized by its connection with theoretical and practical aspects of professional training and consistency with the content characteristics of future professional activity (Hurenkova, 2009; Gerasymchuk, 2015).

From the perspective of psychologists, the attitude towards the environment is formed through the interaction of the emotional, intellectual, and volitional spheres of human psyche. Therefore, the implementation of ecological education tasks requires a review not only of the content of education but also of the forms and methods of teaching. It is necessary to prefer methods, forms, and instructional approaches that:

- encourage students to continuously enrich their knowledge about the environment (business or scenario role-playing games, conferences, discussions, student research, and presentations);
- foster the development of creative thinking, the ability to anticipate the consequences of human activities on nature through methods that develop intellectual skills: analysis, synthesis, comparison, establishing cause-effect relationships; and also traditional methods: discussions, observation, experience, laboratory work with a predominance of heuristic cognitive activity of students;
- promote the development of research skills, abilities, teach making ecologically sound decisions, and acquiring new knowledge;
- engage students in practical activities to address local and regional environmental issues (identification of rare and endangered species, protection

of nature from destruction, determining risk factors in residential areas, promoting ecological knowledge).

In our view, the use of a facilitative approach to education (from English, facilitate – to assist) is effective in the process of forming ecological competence, where the teacher does not act as the sole source of knowledge but assumes the role of a guide, advisor; case research method or situational analysis (case method, situational method); discussions, pair and group discussions, as well as methods to stimulate creative activity (brainstorming, decision tree, morphological analysis, dialogic learning, especially in problem-search dialogue). Thus, the key in forming ecological competence should not only be updating the content but also updating the learning technologies.

Expanding on the idea of organizing ecological and professional education based on the use of active and practice-oriented learning tools and technologies, let us turn to the analysis of tutorial support, which allows preparing the student for initiatives related to meaningful problem-solving in ecology and improving the environmental situation. A tutor (from English tutor and Latin tueur), means a coach, educator, group leader, pedagogical mentor, student assistant, advocate, etc. (Balla, 2006, p. 578). Tutoring is a special form of pedagogical and psycho-social activity, which in the context of forming ecological competence of future marine professionals can take such effective forms:

- tutoring as a type of support, primarily aimed at the formation of subjectivity in the learner, development of the ability to be active and take initiative during professional activities regarding solving environmental problems and protecting the environment;
- tutoring as accompaniment in the process of forming ecological competence through the creation and implementation of a personal development trajectory for the student and the joint activity of the teacher and student (educational, ecological, research, project, etc.);
- tutoring as facilitation, that is, facilitating personal and professional growth of the future marine professional, development of his socio-cultural, communicative, leadership, and moral potential (Demyanenko, 2008; Komar, 2013; Sytnyk & Degtyarova, 2020, and others).

In summarizing, it is noted that the harmonious combination of the aforementioned forms of tutoring within the framework of ecological competence development enables the comprehensive organization of assistance and support to future ship navigators not only in the informational-theoretical aspect but also ensures their personal development as active subjects of eco-oriented self-learning, formation, and self-realization. As it is known, the accompaniment in the process of ecological competence development is one of the types of pedagogical activities that involves establishing common and developmental relationships between the subjects of the educational process. At the present stage of ecological education development, tutor support gradually becomes part of the professional training system and is considered as its important resource component.

In a generally accepted sense, "tutoring" refers to the pedagogical stance of a teacher, which includes the support of personally oriented learning of a future specialist and the joint development of a personal development plan and individual educational program. It is important to understand that the tutorial form of interaction between a teacher and a student is built on the principles of partnership, dialogue, and equality (Demyanenko, 2008; Komar, 2013).

An important condition for effective tutor support is the openness of the educational and socio-cultural space, within which ecological competence is developed. The expansion of possibilities and resources of the developmental environment of the education seeker transforms into the full realization of the inner creative potential of their personality during the development and practical implementation of their professional development trajectory (Komar, 2013).

During the formation of ecological competence in future ship navigators, tutor support is implemented in the following forms: individual tutorial consultation, group tutorial consultation, tutorial, training. Among the methods of tutor support, the following are noted: practice-oriented, problem-based learning, project method, psycho-diagnostic, active learning, analysis, and self-analysis, etc. Tutor support is carried out using modern interactive forms and technologies: project work, portfolio

work, group and individual consulting, training, informational, etc.

One of the means of tutor support is the individual educational program. The individual educational program is a mechanism for the individualization of education, which enables the education seeker to implement their intentions, perceptions of the learning outcome, and the means to achieve it, capturing various strategies moving towards the goal. It represents a program of educational and developmental activities aimed at personal and professional development. It is developed and implemented by the tutor (education seeker) based on personal, cognitive, professional interests, needs, and requests. Such a program is composed considering the individual abilities and needs of each specific education seeker. Traditionally, such a program consists of 4 stages:

During the diagnostic-motivational stage, the initial meeting between the tutor and tutee takes place. The tutor endeavors to determine the educational motives and interests of the student, their level of knowledge, skills, and abilities, their motivation, as well as conditions that may facilitate the learning process or, conversely, complicate it. At this stage, the formation of the tutee's portfolio may begin. Alternatively, if the tutee already has a portfolio, the tutor and tutee can analyze the existing portfolio materials. At this stage, the tutor records important information, conducts necessary independent diagnostics, and reflects.

In the design phase, the tutor independently, or together with the tutee, begins to compose an individual educational program. This program may be amended and adjusted during individual consultations and the tutor's independent work. In this program, it is crucial for the tutor and tutee to articulate, primarily, the goals and objectives of ecological education, which will form the basis of the individual educational program for developing ecological competence in future ship navigators. During this stage, it is important for the tutor to support the tutee's autonomy, activity, and aspiration to build their own learning trajectory (Komar, 2013).

During the implementation phase, the direct execution of the actions anticipated by the designed individual educational program occurs. At this stage, the program may also be adjusted according to the interests and needs of the tutee, as well as according

to the learning conditions and various factors that may affect the program's realization.

At the analytical stage, the tutee's reflection (assisted by the tutor) on the journey that has been taken place, as well as the outcomes achieved at this stage, occurs (Komar, 2013). This stage is pivotal as it fosters the development of adequate self-assessment, the ability to analyze the results of one's activities, and understand the significance and relevance of the work done in terms of personal and professional development. This stage also demonstrates the professionalism of the tutor, reveals possible difficulties, and highlights aspects that merit special attention (Demyanenko, 2008). At the end of this stage, it is crucial to determine the prospects for further development of ecological competence, particularly through self-learning, self-development, and self-improvement.

Significant importance in the realization of tutor support in the formation of ecological competence of future ship navigators lies in the pedagogical potential of extracurricular and educational work in the context of forums, discussions, conferences, round tables, games (business, role-playing), consultations (individual, group), trainings, workshops, practicums, seminars (webinars), tutorials, etc.

The key aspects of tutoring support in the development of ecological competence among future ship navigators include the following characteristics of the pedagogical process:

- Systematic and variable, achieved through a wide range of different types of educational and extracurricular activities performed by the student, as well as the use of innovative educational resources;
- The priority of the educational process being in harmony with nature and the ecologization of the studied disciplines;
- A personalized approach, focusing on unlocking students' internal potential, and enabling the practical implementation of their initiative and creativity based on the educational needs, interests, goals, values, personal characteristics, abilities, and taking into account their experience and educational level;
- Ensuring the establishment and maintenance of interpersonally significant partnerships and interactions based on dialogue, cooperation, and co-creation;

- Democratic, manifested in the freedom to choose and the possibility for the tutee to decline tutoring support or change the tutor;

- Focus on creating and implementing an ecologically-oriented personal trajectory for professional development by the future specialist.

In our view, the foundation of tutoring in the context of ecological education is the idea of freedom of choice and independence for students, within which they can select different professional development trajectories that facilitate the fuller realization of their personal potential.

The effectiveness of ecological competence formation under these conditions is determined by the openness of the tutor's support. In other words, the student independently (but not uncontrollably), based on existing needs and abilities, designs their own personal and professional development trajectory; the tutor provides general support and facilitates the joint search for goals and ways to develop ecological competence of the future navigator. Communication is non-directive and partnership-oriented (Sytnyk & Dehtyarova, 2020). It should also be noted that tutoring support should be continuous and dynamic, i.e., implemented at all stages of professional training, taking into account external conditions and circumstances.

Conclusions. The current ecological situation necessitates a sensible and responsible attitude towards the environment. Simultaneously, the success of conservation and nature-transforming activities depends on the maturity of the ecological thinking of specialists responsible for all spheres of life. The development of high levels of ecological competence is fundamental to fostering citizenship and patriotism, thus requiring the search for effective approaches, forms, and methods. Tutoring support in the formation of ecological competence among future ship navigators creates optimal conditions for actualizing and developing a responsible and proactive attitude towards environmental conservation and improvement issues through a special emphasis on demonstrating activity and initiative during professional activities aimed at solving ecological problems and protecting the environment, developing a personal trajectory for professional development, and enhancing the socio-cultural, communicative, leadership, and moral potential of the future special-

ist. All this will enable the student, based on the experience of solving ecological tasks, to form their own ecological behavior model and effectively carry out professional activities.

Further research perspectives are seen in selecting effective forms and methods for developing ecological competence among future ship navigators, as well as in developing appropriate methodological support.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.80-88>

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## ТЬЮТОРСЬКИЙ СУПРОВІД ФОРМУВАННЯ ЕКОЛОГІЧНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ФАХІВЦІВ-СУДНОВОДІВ

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### Реферат:

*Актуальність* дослідження зумовлюється тим, що у сучасному суспільстві одним із основних шляхів забезпечення сталого розвитку суспільства у контексті ознак екологічної кризи пріоритетним виступає формування екологічної компетентності, включення факторів екологічної безпеки до контексту професійної підготовки та становлення майбутніх фахівців.

*Мета:* виявлення й обґрунтування найвагоміших аспектів тьюторського супроводу формування екологічної компетентності майбутніх фахівців-судноводіїв.

*Методи:* теоретичні методи системного аналізу філософської, психолого-педагогічної літератури – з метою розкриття основних положень досліджуваної проблеми; аналіз актуальних дисертаційних досліджень, узагальнення та систематизація – для формулювання власних поглядів на проблему формування екологічної компетентності майбутніх фахівців судноводіїв.

*Результати:* проаналізовано різні аспекти поняття тьюторського супроводу формування екологічної компетентності майбутніх фахівців судноводіїв; визначено інноваційні продуктивні умови та засоби здійснення екологічної освіти у вищій школі; охарактеризовано тьюторський супровід, який дає змогу студенту виступати в ролі ініціативного суб'єкта, що виконує особистісно значущу діяльність, спрямовану на осмислене вирішення екологічних проблем та покращення стану навколишнього середовища; визначено принципи тьюторської форми взаємодії викладача та студента, сутність позиції тьютора та тьюторського супроводу процесу формування екологічної компетентності майбутніх фахівців-судноводіїв; висвітлено ефективні форми тьюторства (підтримка, супровід, фасилітація) та обґрунтовано форми, технології і ключові аспекти тьюторського супроводу формування екологічної компетентності майбутніх фахівців морського транспорту.

*Висновки.* Перспективність використання тьюторства обумовлена можливістю реалізації персональної стратегії освіти та варіативністю застосування різних ресурсів соціокультурного середовища з опорою на власний потенціал студента та змістовні аспекти основної діяльності. Наявна екологічна ситуація визначає необхідність розумного та відповідального ставлення до навколишнього середовища. Від рівня зрілості екологічного мислення фахівців, що забезпечують всі сфери життєдіяльності, залежить успішність природоохоронної та природоперетворюючої активності. Формування високих рівнів екологічної компетентності є основою розвитку громадянськості і патріотизму і потребує пошуку ефективних підходів, форм і методів. Тьюторський супровід у рамках формування екологічної компетентності майбутніх фахівців-судноводіїв дозволяє створити оптимальні умови для актуалізації й розвитку відповідального та ініціативного ставлення до проблем збереження і покращення стану довкілля через особливий акцент на прояві активності та ініціативності під час професійної діяльності щодо вирішення екологічних проблем та охорони навколишнього середовища, складання та реалізації персональної траєкторії професійного розвитку здобувача освіти, розвитку соціокультурного, комунікативного, лідерського, морального потенціалу майбутнього фахівця, що дозволить студенту на основі досвіду вирішення екологічних завдань сформувати власну екологічну модель поведінки та ефективно здійснювати професійну діяльність.

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**Ключові слова:** *персональна траєкторія професійного розвитку, тьютор, тьюторство, фасилітація, майбутні судноводії, екологічна освіта.*

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Received: 23 February 2024

Accept: 22 April 2024



# PROBLEMS AND PROSPECTS FOR THE DEVELOPMENT OF DUAL EDUCATION FOR THE POST-WAR RECOVERY OF UKRAINE

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## Abstract

*The relevance* of the article is determined by the need to identify the most effective mechanisms for using the experience of introducing the dual form of education to improve the professional training of future specialists and accelerate the post-war recovery of Ukraine.

*The aim* is to summarize the experience of the dual form of education in Ukraine, to identify the reasons for its inhibition and promising directions of its development for the post-war recovery of Ukraine.

*Methods*: study of scientific sources, legislative, regulatory and legal documents, empirical data to determine the state of functioning of the dual form of education in Ukraine; theoretical analysis and synthesis, generalization of scientific views on the problem under study in order to identify the causes of inhibition and promising directions for the development of dual education for the post-war recovery of Ukraine.

*Results*: the experience of pilot projects for the introduction of dual education in educational institutions of different levels is analyzed; scientific publications of domestic researchers are summarized; the reasons for inhibition and promising directions for the development of dual education are identified; the importance of dual education and its compliance with the main goals of the Strategy for Sustainable Development of Society and Post-War Reconstruction of Ukraine are substantiated; dual education is characterized as an element of a new worldview paradigm that is being formed under martial law.

*Conclusions*: the main reasons that hindered its development and reduced the effectiveness of dual education (quarantine restrictions related to the COVID-19 pandemic; military operations; increased migration flows caused by the war; reduction in the number of students, workload for teachers and, accordingly, reduction in staff at the departments; destruction, relocation, closure of many enterprises participating in the training of specialists in the dual form of education; low level of awareness of the benefits of dual education among students, teachers and employers; promising areas of its development are outlined (strengthening career guidance and information campaigns on dual education opportunities; reducing the level of bureaucratization of the educational process in educational institutions; providing state support for those educational institutions that will implement full-fledged dual education to retain teaching staff and encourage them to update and modernize educational programs to meet the needs of dual education; improving the training of heads of educational institutions for the development of public-private partnerships, and future teachers - for pedagogical activities in the context of dual education); the dual form of education is presented as an element of a new worldview paradigm, which in times of military aggression continues to transform in three main vectors (the development vector, which focuses domestic scientists and teachers on studying the European experience of implementing dual education; the security vector, which directs the national education and science system to implement this experience to protect Ukraine's national interests; the responsibility vector, which demonstrates the commitment of the post-war educational paradigm to strengthening employers' responsibility for the quality of training and strengthening their influence on the content of educational programs).

**Keywords:** *dual education, prospects for the development of dual education, experience in implementing dual education, employers, post-war recovery.*

**Introduction.** The dual education system in Ukraine is one of the aspects of educational reform on which the Ukrainian society pins high hopes for accelerating the recovery of the war-torn economy. The war against Ukraine has exposed the major problems of the domestic economy, which significantly hinder the country's development and implementation of a sustainable (balanced) development strategy. Primarily, this is linked to the long-standing dominance of raw material export orientation, resource- and energy-intensive industries and technologies, the unbalanced distribution of production (particularly its concentration in industrial regions), and the lag in education relative to technological development and labor market needs. Additionally, attention to the development of dual education is also connected to pressing tasks for Ukraine such as improving education quality, refining educational management, optimizing education costs, strengthening the ties between education and business (Buhaychuk et al., 2023, p. 7), and enhancing efforts to adapt the best European practices of implementing dual education into the national system (Buhaychuk et al., 2022, p. 39). This highlights the need to improve the training of specialists for post-war reconstruction and ensure the further sustainable development of Ukraine. On the other hand, it directs researchers' focus on studying the experience, opportunities, and further prospects of dual education development at various levels in Ukraine. This form has proven its effectiveness in many European Union countries, demonstrating successful training of specialists taking into account global socio-economic trends, national interests of the respective country, and national and regional labor market needs.

**Sources.** The importance of implementing full-fledged dual education is reflected in numerous national documents: Laws of Ukraine "On Education" and "On Higher Education," the Order of the Ministry of Education and Science of Ukraine "On Implementing Elements of the Dual System of Training Qualified Workers" (2015), the Resolution of the Cabinet of Ministers of Ukraine "On Approving the Concept of Training Specialists through Dual Education" (2018), the Medium-Term Priority Action Plan of the Government for the period 2017–2020, the Plan of Measures for the Implementation of the Concept of Training Specialists through Dual Education (2019), the Strategy for the Development of Higher

Education in Ukraine for 2022–2032 (2022), and the Regulations on the Dual Form of Obtaining Professional, Vocational Pre-higher, and Higher Education (2023).

Development in Ukraine of the dual form of education for future qualified workers has been the subject of research by several national scholars. Foreign experience in implementing dual education in EU countries (Savchenko, 2015; Kyrychuk, 2022), Austria (Zelenykh, 2022), and Germany (Dudus, 2022; Zmiyova, 2022) was studied.

In 2019–2022, the first domestic experience of introducing dual education in Ukrainian educational institutions was highlighted. For instance, the development of dual education in higher education institutions such as Zhytomyr National Agroecological University (Skydan & Buhaychuk, 2019); Tavria State Agrotechnological University (Lomeyko, 2019); Hlukhiv Agricultural Technical Institute named after S.A. Kovpak of Sumy NAU (Lytyvnenko, 2019); National University of Water and Environmental Management (Zayets & Oksenyuk, 2020), KhNUMG named after O.M. Becketov (Roslavtsev & Havrylyuk, 2020), Communal Institution "Kharkiv Humanitarian Pedagogical Academy" of Kharkiv Regional Council (Kashuba, 2022), Mykolaiv NAU (Bilichenko, 2022), and the implementation of dual education elements in institutions of professional pre-higher education such as the Ecological College of Lviv NAU (Panyura, Borutska & Rybak, 2019), VSP "Berezovorudsky Professional College PDAA" (Kulkovets, 2020), State Higher Educational Institution "Kyiv Energy College" (Kovalenko, 2020), Verkhniodniprovsk College DDAEU (Zeleny, 2020), VSP "Berdiansky Professional College of Tavria State Agrotechnological University named after Dmitry Motorny" (Shyshkina & Kuz, 2020), VSP "Ladyzhyn Professional College VNAU" (Hudz, 2022), etc.

Significant attention has been paid to studying the methodological foundations for implementing dual education for future skilled workers by researchers at the Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine (Kulalaieva et al., 2019; Kulalaieva, ed., 2023), where textbooks for the implementation of the educational process in dual education have been developed (Haiduk et al., 2020; Haiduk et al., 2021; Gomeniuk et al., 2021).

From 2020 to 2023, the experience of implementing dual education in domestic institutions of professional higher education was summarized (Davlikanova, Ishchenko, & Chaikovska, 2020; Buchynska et al., 2022). Sources on the experience of implementing dual education in Ukraine have been systematically presented on the website of the "Ukrainian Center for Dual Education" (2024).

**The purpose of this article** is to summarize the experience of implementing dual education in Ukraine, identify the reasons for its hindrance, and outline the promising directions for its development for post-war recovery in Ukraine.

**Methods:** studying scientific sources, legislative and normative-legal documents, empirical data – to determine the state of functioning of dual education in Ukraine; theoretical analysis and synthesis, generalization of scientific views on the researched problem to identify the causes of hindrance and promising directions for the development of dual education for the post-war recovery of Ukraine.

**Results and discussion.** Initial initiatives to implement and popularize dual education in Ukraine began in 2013. This allowed us to identify the strong potential of this new form of education. In 2019, the Ministry of Education and Science of Ukraine approved a pilot project that envisaged the introduction of elements of dual education in institutions of professional higher and higher education. Thanks to this project, improvements were made: regulatory and legal support for dual education, including the introduction of practice for signing tripartite agreements (institution, student, employer) and making corresponding changes to the Regulations on the organization of the educational process in institutions of professional higher and higher education; selection of students for the new form of education by business entities; mechanisms for control over the creation and maintenance of safe conditions for education; monitoring the implementation of dual education. The involvement of the State Institution "Scientific-Methodological Center of Higher and Professional Higher Education" enabled proper scientific and methodological support for the implementation of dual education (conducting seminars, master classes, training, etc.).

For the development of dual professional education in Ukraine, experiments of a nationwide level were conducted at VPU №33 Kyiv, the higher professional artistic school of Lviv, VPU of machine-

building in Zaporizhzhia. The Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine conducted regional-level experiments: "Designing the educational-production environment of an institution of professional (vocational-technical) education under dual education conditions" (Zaporizhzhia region, 2019); "Development of training tools for professional training of skilled workers in professions 'Wide profile machine operator', 'Cook', 'Confectioner' under dual education conditions" (Donetsk region, 2020).

The "Dual Education for Ukraine" project, implemented in partnership with the NGO "Ukrainian Association of Marketing" and with the support of USAID's "Economic Support for Ukraine," has enabled the preparation of methodological recommendations for implementing dual education, which significantly strengthened practical assistance to educational institutions, education seekers, and business entities. The methodological recommendations elucidate the prerequisites for implementing dual education in Ukraine, analyze the experience gained in the project, present bi- and tripartite agreements concluded among the participants of dual education, highlight the peculiarities of individual and group learning, introduce certain methodological provisions for the new form of education, and illuminate the contribution of employers to the ongoing and final control of acquired knowledge, skills, and abilities; they also illustrate the specifics of scholarship provision and financial motivation for the entities implementing dual education.

The implemented project has demonstrated that two models of dual education are applied in Ukraine: one integrated with professional activity and the other with integrated practical training. The first model is aimed at those who have already obtained professional or higher education and are employed at a company wanting to continue education in a field demanded by their employer. This model involves a combination of education at higher educational institutions and on-site at the company. The second model pertains to the organization of education for those obtaining their first higher or professional education, both at an educational institution and on-site at a company. It has been shown that educational institutions mostly use the model with integrated practical training. The transition to dual education typically occurs in the 3rd or 4th year of undergraduate studies or – in

the first year of master's programs. Changes in the organization of the educational process at the educational institution and the company are determined by specific schedules and depend on the specialty of the future professional and the needs of the employer-company.

When selecting an educational institution for organizing dual education, business entities primarily consider criteria such as the proximity of the educational institution, the existence of experience in implementing educational processes in a dual form, and the presence of relevant departments. Special attention in the project was given to studying the motivation problems of dual education participants, which can be reflected in the content of tripartite agreements between the educational institution, the learner, and the employer. It has been proven that motivation is significantly enhanced by: paying future professionals wages for performing specific work functions during their studies; awarding the most successful students with motivational scholarships; and covering the cost of education on a contractual basis (Dual Education at Higher and Professional Education Institutions through the Eyes of Employers, 2020).

Special attention was given to improving the mechanisms for selecting education seekers for their further transition to a dual form of education. Typically, in the selection of education seekers, enterprises are guided by the recommendations of the educational institutions where they are studying. In addition, employers participate in the work of qualification commissions and are involved in the defense of coursework and thesis projects. From the first years of their education, education seekers have the opportunity to visit enterprises as bases for their future practice.

It has been found that the greatest motivation for employers to participate in the training of specialists under a dual education system includes: a shortage of qualified personnel in regional labor markets; the need to create a talent reserve for enterprises; the desire of future specialists and employers to shorten the adaptation period of graduates to professional activities; and the willingness of enterprises to participate in shaping not only the variable component of specialist training but also the mandatory component (Dual Education, 2021, p. 5).

Dual education aligns with the guiding principles of the Sustainable Development Strategy. In the

context of the principles of human rights protection and the rule of law, dual education advocates for the protection of the rights of education seekers through the conclusion of tripartite agreements among them, educational institutions, and employers. According to the principles of public participation, business representatives, and social partners in the sustainable development of society, dual education requires well-developed mechanisms of public-private partnership. The principle of integration of policy and management in dual education is implemented through the importance of developing legal and regulatory bases to introduce a comprehensive dual education system in place of using only its elements. The principle of solidarity within and between generations is realized through the unique opportunities of dual education to form mutually respectful relationships among all participants in the educational process. The principles of prevention and payment for pollution are included in the very essence of dual education, which unites the interests of the individual, society, state, and acts as a guarantor of environmental and human health protection during the training stage of a specialist.

Dual education is an important tool for achieving many Sustainable Development Goals. Dual education not only provides quality education but also guarantees employment, which contributes to achieving Goal 1 "Eradication of Poverty." Education obtained through the dual form is more production-oriented, better takes into account the specifics of regional labor markets, is more quickly modernized, and thus, is of higher quality, contributing to the realization of Goal 4 "Quality Education." Dual education allows for the formation of relevant skills, faster adaptation to the profession, better career trajectory building, and professional success, helping to approach the realization of Goal 8 "Decent Work and Economic Growth." The dual form of education, with its high level of employer participation in the training process, financially protects the education seeker and their family, enables talented youth to conveniently build their individual educational trajectory, thus contributing to achieving Goal 10 "Reduced Inequalities." The implementation of a full-fledged dual education system can strengthen each of its participants (educational institutions increase the scientific content, employers guarantee relevant professional skills, education seekers feel bilateral care of their professional growth, civil society gains motivated effective

professionals), overall facilitating the achievement of Goal 16 "Peace, Justice, and Strong Institutions." The relationships among the participants of the educational process, involved in the organization of training through the dual form of education, are characterized by a high level of partner participation and responsibility, which approaches the realization of Goal 17 "Partnership for Sustainable Development."

Following the onset of full-scale war, the dual education system suffered significant losses due to weakened ties between educational institutions and business partners. This was due to the mass relocation of business enterprises and their inability to fulfill their partnership obligations as stakeholders in educational programs for training specialists in dual education. However, the years of the pandemic and full-scale armed conflict forced the education system to adapt to operating under instability, to reestablish partnerships with employers, and to apply innovative approaches to organizing the educational process. Additionally, it should be acknowledged that there is a steady public interest in obtaining a profession through dual education. Evidence of this can be seen in the increase in the number of dual-students who, despite the war, participated in the "Dual Education" project by DTEK Networks (Diya.Business, 2023). Over five years, the project has trained 88 students, providing them with salaries and full social packages. Most of the project's graduates (51) are employed at this company. Despite the war, 19 young energy professionals secured their first job at DTEK Networks (Tereshchuk, 2023).

The dual education form has been revitalized in the western regions of Ukraine, where many educational institutions from temporarily occupied territories have been relocated. It is worth acknowledging that, so far, only elements of dual education are applied in all educational institutions. However, even this form of implementation of dual education has positive results. In particular, the ties between educational institutions and business partners are significantly strengthened, which in turn better integrates into the process of addressing urgent educational problems and become active stakeholders influencing the content of professional training and the modernization of educational infrastructure. For example, the implementation of dual education at the Volyn National University named after Lesya Ukrainka has not

only allowed organizing the study of individual educational components directly at the production with salaries or personal scholarships but also creating joint laboratories – an IT laboratory (a result of cooperation with the company "InternetDevels"), a cybersecurity and information protection laboratory (together with "SOC Prime"), and a "STEAM laboratory" (in cooperation with the Volyn Regional Minor Academy of Sciences) (Tsiost, 2024).

The war has critically changed Ukraine's demography, the staff composition of educational institutions, and the contingent of education seekers. If in the first year of the war virtually all forced Ukrainian migrants continued their studies online at Ukrainian educational institutions, by 2023 their numbers began to decrease due to the significant complexity of studying at multiple institutions (native and foreign). The war ceased to be perceived as a temporary phenomenon, and as a result, many Ukrainians abroad started considering life beyond their homeland, while many sectors within the country experienced a noticeable "staff hunger." Under such conditions, dual education becomes particularly important in terms of preventing the exacerbation of staffing problems, as it is capable of creating a staffing reserve from education seekers who study under tripartite agreements within the framework of dual education.

Consequently, military actions on Ukrainian territory, business relocation, and the forced migration of students abroad have become significant obstacles to the development of dual education. However, they have simultaneously stimulated interest among citizens, educational institutions, and businesses in this form of learning, as it allows for the saving of time and financial resources for students and can positively impact addressing the workforce "hunger" in many sectors of the national economy.

**Conclusions.** The dual education model has been tested in Ukraine at all levels of future specialists' training—professional, specialized secondary, and higher education. Scholars refute the possibility and advisability of implementing mass dual education, yet this form carries high social expectations for accelerating post-war economic recovery, satisfying the increasing demand for highly qualified personnel in strategically important areas of activity (agriculture, construction, energy, environment, machinery manufacturing), digitalization, and Ukraine's integration into the EU.

The study of the experience of dual education in Ukraine has identified the main reasons that hindered its development and reduced its effectiveness: the COVID-19 pandemic and related quarantine restrictions; military actions and increased migration flows; reduction in the number of students and decrease in teaching staff; destruction, closure, and relocation of many enterprises involved in dual education training; poor awareness of students, educators, and employers about the benefits of dual education.

For the development of dual education in Ukraine, promising areas remain: enhancing career guidance for youth, improving the information campaign on the benefits of studying in the dual education system; simplifying the mechanisms for implementing dual learning in educational institutions; enhancing government support for educational institutions ready to implement full dual education, training teaching staff, updating and modernizing educational programs accordingly; developing management competencies of education institution leaders to increase the effectiveness of public-private partnerships; preparing future teachers for pedagogical activity in dual education settings; motivating employers, harmonizing government support and grassroots initiatives (employers and educational institutions).

Post-war recovery in Ukraine will require a revision of priority directions for training specialists

and a list of strategically important professions, creation of corresponding professional and educational standards, more active involvement of employers and civil society representatives, and implementation of more effective models of public-private partnership. Overall, this should enhance the motivation of enterprises and organizations regarding their participation in the training of future specialists and the implementation of full dual education.

The dual form of education represents for the scientific-pedagogical community and other stakeholders at various levels of national education—an element of a new worldview paradigm, which, in the time of military aggression, continues to transform along three main vectors. The development vector directs national scholars and educators to study the European experience of implementing dual education. The security vector directs the national education and science system to implement this experience to protect Ukraine's national interests (e.g., for the development of strategically important directions and professions for Ukraine's recovery). The responsibility vector attests to the post-war educational paradigm's commitment to enhancing employers' responsibility for the quality of training, strengthening their influence on the content of educational programs.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.89-102>

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## ПРОБЛЕМИ І ПЕРСПЕКТИВИ РОЗВИТКУ ДУАЛЬНОЇ ОСВІТИ ДЛЯ ПОВОЄННОГО ВІДНОВЛЕННЯ УКРАЇНИ

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### Реферат:

*Актуальність* статті визначається необхідністю виявлення найбільш ефективних механізмів використання досвіду впровадження дуальної форми здобуття освіти для вдосконалення професійної підготовки майбутніх фахівців і прискорення повоєнного відновлення України.

*Мета:* узагальнити досвід реалізації в Україні дуальної форми здобуття освіти, виявити причини гальмування та перспективні напрями її розвитку для повоєнного відновлення України.

*Методи:* вивчення наукових джерел, законодавчих, нормативно-правових документів, емпіричних даних – для з'ясування стану функціонування в Україні дуальної форми здобуття освіти; теоретичний аналіз і синтез, узагальнення наукових поглядів на досліджувану проблему з метою виявлення причин гальмування та перспективних напрямів розвитку дуальної освіти для повоєнного відновлення України.

*Результати:* проаналізовано досвід пілотних проєктів запровадження дуальної освіти в закладах освіти різних рівнів; узагальнено наукові публікації вітчизняних дослідників; виявлено причини гальмування та перспективні напрями розвитку дуальної освіти; обґрунтовано важливість дуальної освіти та її відповідність основним цілям Стратегії сталого розвитку суспільства та повоєнного відновлення України; охарактеризовано дуальну освіту як елемент нової світоглядної парадигми, що формується в умовах воєнного стану.

*Висновки:* виявлено основні *причини*, що гальмували її розвиток і знижували ефективність дуальної освіти (карантинні обмеження; воєнні дії; зумовлені війною міграційні потоки; зниження контингенту студентів; скорочення педагогів; руйнація, закриття чи релокація багатьох підприємств – стейкхолдерів дуальної форми здобуття освіти; низький рівень обізнаності студентів, педагогів і роботодавців щодо переваг дуальної форми здобуття освіти); окреслено *перспективні напрями* її розвитку (удосконалення профорієнтації, посилення інформаційної кампанії щодо навчання за дуальною формою здобуття освіти; спрощення процедури впровадження елементів дуальної освіти; посилення державної підтримки закладів освіти для впровадження повноцінної дуальної освіти; підготовка й заохочення педагогічних кадрів до оновлення й модернізації освітніх програм з урахуванням потреб дуальної освіти; удосконалення підготовки майбутніх педагогів до педагогічної діяльності в умовах дуальної освіти, розвиток готовності керівників закладів освіти до розвитку державно-приватного партнерства, а); дуальну форму освіти представлено як *елемент нової світоглядної парадигми*, що в час воєнної агресії продовжує трансформуватися у трьох основних векторах (вектор розвитку, що орієнтує вітчизняних науковців і педагогів на вивчення європейського досвіду впровадження дуальної освіти; вектор

безпеки, що спрямовує вітчизняну систему освіти і науки на імplementацію цього досвіду для захисту національних інтересів України; вектор відповідальності, що засвідчує прихильність повоєнної освітньої парадигми до посилення відповідальності роботодавців за якість підготовки фахівців, зміцнення їх впливу на зміст освітніх програм).

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**Ключові слова:** *дуальна форма здобуття освіти, перспективи розвитку дуальної освіти, досвід упровадження дуальної освіти, роботодавці, повоєнне відновлення.*

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Received: 29 February 2024

Accept: 7 May 2024



# USE OF INTELLIGENT FUZZY IMAGE SEGMENTATION SYSTEMS IN THE PROFESSIONAL TRAINING OF FUTURE SPECIALISTS IN ENGINEERING AND PEDAGOGICAL FIELDS

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## Abstract

*Relevance:* The article addresses the critical issue of integrating intelligent image segmentation systems that utilize fuzzy logic into the training processes for future specialists in engineering and pedagogical fields. This integration is a significant aspect of the digitization of higher education.

*Aim:* The goal is to implement intelligent vehicle image segmentation systems using fuzzy logic to train specialists in engineering and pedagogical fields.

*Methods:* The preliminary processing of the images of the studied objects (vehicles) involved digital filtering methods, contour detection, profile analysis, and contrast enhancement. Image segmentation was performed using watershed methods, contour lines, and region growing. After segmentation, the obtained segments were selected based on size. Fuzzy membership functions were then applied to determine the degree of affiliation of the segments to the meaningful parts of the studied objects, ensuring reliable recognition of these parts and stable operation of the intelligent system despite external influences on the acquired images.

*Results:* A computer system has been developed for the segmentation of vehicle images using fuzzy logic, which has been integrated into the training of specialists in engineering and pedagogical fields. The segmentation methods isolate objects within the images, which are then recognized using fuzzy logic. Thanks to the fuzzy membership functions, elements of vehicle images are reliably recognized even when there is some ambiguity in the shapes of the segments. The practical significance of the developed system is demonstrated through the processing of car images.

*Conclusions:* The integration of the developed system into the educational process provides students with both theoretical knowledge and practical skills related to intelligent image processing systems.

**Keywords:** *digitalization of education, higher education institutions, data mining, fuzzy logic, image segmentation, future specialists in engineering and pedagogical fields.*

**Introduction.** The modern world is characterized by rapid development of digital technologies, which drives global changes in all spheres of human activity, including education. The digitalization of the educational process requires higher education institutions to not only implement the latest technologies into the educational process, but also develop innovative approaches to training professionals capable of working effectively in a digital economy. One important direction of

digitalization in higher education is the integration of intelligent systems into the educational process, specifically image segmentation systems using fuzzy logic, which opens new opportunities for improving the quality and effectiveness of education.

The issue of implementing intelligent image segmentation systems in the professional training of future engineering-pedagogical specialists requires a comprehensive approach. This process is not limited to updating curricula and teaching methods

but also involves the development of material and technical bases, the use of appropriate hardware and software, the preparation of qualified teachers, the creation of conditions for scientific research by students in this field, and the development of effective methods for assessing educational achievements. An important aspect is also collaboration with the IT industry and scientific institutions to update the content of education and enhance the competitiveness of educational programs.

**Research sources.** The application of the latest digital technologies in education has become the subject of research by scholars such as S. Balovsyak (Balovsyak et al., 2023; Balovsyak et al., 2024), V. Bykov (Bykov et al., 2020; Bykov & Burov, 2020), V. Kovalchuk (Kovalchuk, 2020; Kovalchuk & Soroka, 2021), A. Kocharian, O. Lavrentieva (Pavlenko et al., 2020), S. Litvinova (Kovalchuk et al., 2022), S. Maslich (Kovalchuk et al., 2022), N. Morze (Morze & Strutynska, 2021; Kuzminska et al., 2020), O. Spirin (Spirin, 2021; Spirin & Pinchuk, 2023), S. Semeryakov (Semerikov, S. O. et al., 2022; Papadakis et al., 2023), V. Soroka (Kovalchuk & Soroka, 2020; Kovalchuk et al., 2022), and others.

The use of computer systems for intelligent image processing (Davies, 2012; Kim & Hwang, 2020; Derevyanchuk, 2024) is an important direction of digitalization in professional education, which is closely related to the future professional activity of engineering-pedagogical specialists and can be used to solve applied tasks. Specifically, intelligent image segmentation systems can be effectively used in projects for the automatic processing of vehicle images (Balovsyak et al., 2024; Tereikovskiy et al., 2022). During the implementation of such projects, future professionals enhance their knowledge of data intelligence analysis. Attention is also focused on digital image processing methods: filtering (Balovsyak & Odaiska, 2018), segmentation (Balovsyak et al., 2024; Tereikovskiy et al., 2022), contour detection (Derevyanchuk et al., 2024), contrast enhancement (Balovsyak et al., 2024), and profile analysis (Balovsyak et al., 2019).

To enhance the outcomes in the field of image processing, experts employ a combined approach that incorporates image recognition methods and fuzzy logic (Fayek, 2020; Balovsyak et al., 2023). This enables systems to analyze and interpret visual data with greater accuracy, as fuzzy

logic facilitates the processing of ambiguity and uncertainty often encountered in images.

**The goal of this article** is to implement intelligent image segmentation systems for vehicles using fuzzy logic for the training of future engineering and pedagogical specialists.

**Research methods** include theoretical (analysis of scientific studies), digital image filtering methods (median filter and Gaussian filter); edge detection methods (Sobel and Canny methods); profile analysis method (comparative analysis of profiles); contrast enhancement method; image segmentation methods (watersheds, contour lines, and region growing).

The software implementation of the fuzzy image segmentation system is performed using Python, incorporating libraries such as scipy, numpy, matplotlib, and scikit-fuzzy.

**Results and discussion.** The research revealed that the application of image segmentation and fuzzy logic can significantly enhance the accuracy of analyzing a large volume of images of the studied objects, such as vehicles (Balovsyak et al., 2024). Image segmentation reliably separates different objects in the image, which is critically important for automated object recognition. Fuzzy logic, in turn, aids in handling the ambiguity and uncertainty in the data, allowing systems to make informed decisions even in the case of incomplete or vague information. Such situations occur, for example, when uneven lighting alters the shape of the segment corresponding to the studied object.

Intelligent image processing systems are of particular importance in the context of professional training for future specialists, as the incorporation of such technologies into the educational process helps learners develop critical thinking skills, analytical abilities, and the capacity to solve complex problems. Additionally, the application of these innovative methods promotes a deep understanding of both fundamental and applied aspects of modern technologies, which is extremely important in the rapidly evolving field of technical disciplines.

The integration of image segmentation and fuzzy logic into educational programs may include STEM projects, laboratory works, interactive simulations, and real research projects (Balovsyak et al., 2024). This approach not only deepens theoretical knowledge but also develops practical

skills, which are key for effective professional activity in the future.

Thus, the introduction of image segmentation and fuzzy logic into the professional training of future specialists in engineering and pedagogical fields not only enhances the educational process but also meets the needs of the modern labor market for highly qualified specialists capable of effectively working with cutting-edge technologies.

In preparing future specialists in engineering-pedagogical specialties, particularly in "Professional Education (Mechanical Engineering)," it is crucial to develop the necessary competencies for designing and using intelligent data analysis systems (Lytvyn et al., 2023; Sun Fayou et al., 2022; Prokipchuk et al., 2023). The application of intelligent data analysis, especially intelligent image analysis (Kim & Hwang, 2020), enables the automation of many tasks in transportation, science, education, industry, and other sectors. For example, intelligent image analysis in transportation systems is used for recognizing vehicles and their parts, for technical diagnostics of objects, controlling their position and speed of movement, and also for educational purposes (Balovsyak et al., 2024). In this context, information about vehicles is obtained through digital images from video cameras.

On images of vehicles, their parts and areas mostly differ in brightness, color, and texture; therefore, segmentation methods are appropriately used to analyze vehicle images (Gonzalez & Woods, 2018). As a result of segmentation, meaningful areas (segments) are identified on vehicle images, such as segments identifying headlights, windows, uniform wall sections, wheels, and license plates.

In experimental images, there is not always a clear correspondence between segments and specific objects; therefore, detecting objects on images based on their segments and establishing correspondence between objects and their segments is suitably performed using fuzzy membership functions of a segment to a particular object (Fayek, 2020).

The separate study of image segmentation methods and fuzzy logic, which are used to construct an intelligent fuzzy segmentation system for vehicle images, does not provide an adequate understanding of the interrelationships between different parts of the system. Therefore, a comprehensive study of image segmentation methods and fuzzy logic significantly improves the efficiency of learning image segmentation systems in training future engineering-pedagogical specialists. The intelligent fuzzy segmentation system for vehicle images is implemented using Python as the "SegmentFuzzyAuto24" program.

Image segmentation is performed using region-growing, watershed, and contour line methods (the latter two methods are effective when the objects under study are bounded by clear contours). In implementing watershed and contour line methods, image contours are highlighted using the Sobel or Canny methods.

Consider an example of processing a test image of cars (image\_0193 from the database: Computational Vision Group. Car dataset) using the developed system ("SegmentFuzzyAuto24" program). The program performs preliminary processing and segmentation of the image, after which, using fuzzy logic, the image of the left rear car light (Rear car lights) is recognized. Recognition involves identifying the image segments that belong to the studied object.

The initial color image  $fRGB$  with dimensions  $M \times N$  pixels (Fig. 1) is read from a graphical file, although it is also possible to read images from video cameras. The initial color image is processed as a three-dimensional array  $fRGB(i, k, c)$ , where  $i = 0, \dots, M-1$ ;  $k = 0, \dots, N-1$ ;  $c = 0, \dots, 2$  – the color channel number (Red, Green, Blue).

In this case, image segmentation is performed using a region growing method, and the preliminary processing of the  $fRGB$  image involves enhancing its contrast.



Fig. 1. Initial fRGB color image

Subsequently, the system determines the average RGB components of the color of the objects being studied (Res\_RGB) based on a fragment of the image resembling the object (Fig. 2). After this, based on the initial image, an image fP (Fig. 3) is calculated with pixel membership values to the studied object, which is determined based on the color similarity of the pixels in the initial image and

the average RGB components of the objects' color Res\_RGB (Fig. 2). To reduce the number of non-informative small segments, the image fP is smoothed using a Gaussian filter (or median filter), resulting in the image fPG (Fig. 4). The degree of smoothing of the fPG image is controlled by analyzing the image contours (as needed).

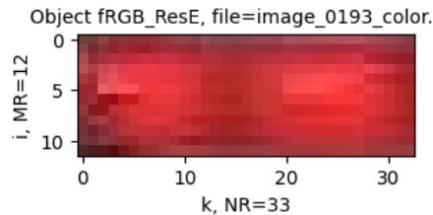


Fig. 2. Image fragment with a characteristic area of the studied object (lantern); average RGB components of the objects' color Res\_RGB =  $[[185.7, 51.3, 57.7]]$

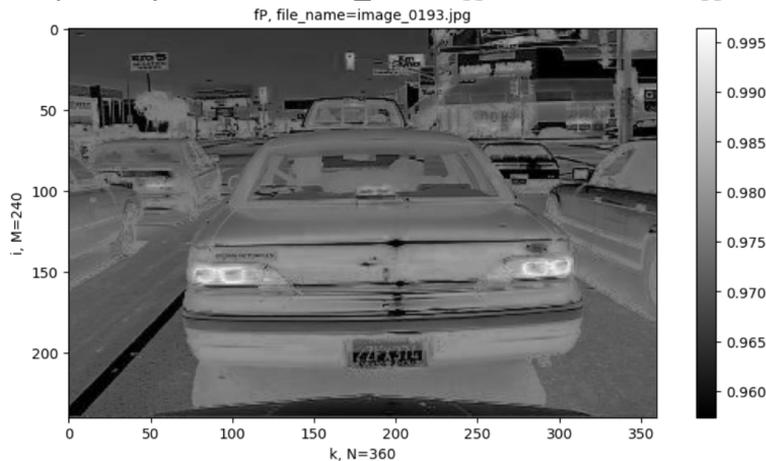


Fig. 3. Image fP with pixel membership values to the studied object (calculated based on the color similarity of the pixels and the average RGB components of the objects' color Res\_RGB (Fig. 2))

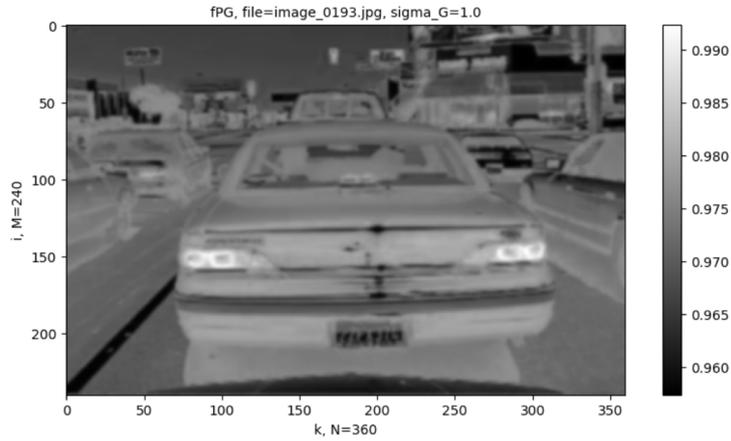


Fig. 4. Image *fPG* with pixel membership values to the studied object (after smoothing with a Gaussian filter with a root mean square deviation /RMS/ of 1.0)

The resulting image *fPG* is binarized with a threshold *Lim\_fPb*, resulting in the binarized image *fPb* (Fig. 5).

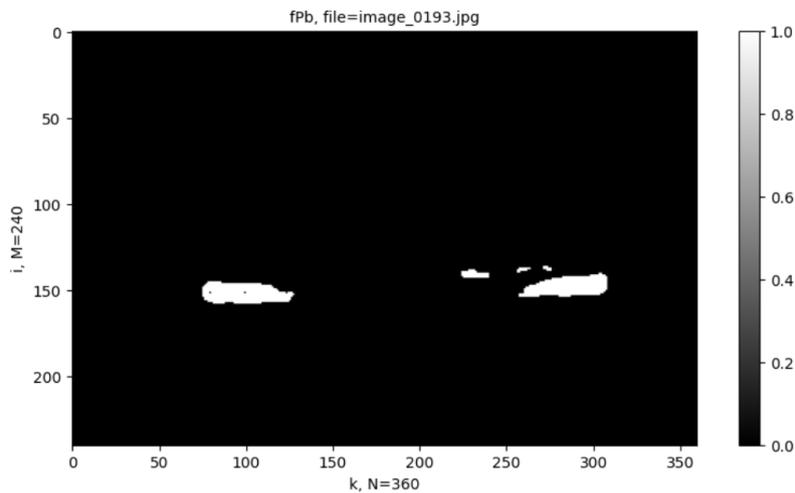


Fig. 5. Image *fPb* with pixel membership values to the studied object (after binarization)

Segmentation is then performed (by the region growing method) on the binarized image *fPb*, resulting in the segmented image *gsL* (Fig. 6). However, the *gsL* image may contain a certain number of small, low-information segments. To

remove such segments, segment selections by size are applied (Fig. 7): only segments whose dimensions exceed the minimum acceptable values *siw\_min* and *skw\_min* in height and width, respectively, are retained.

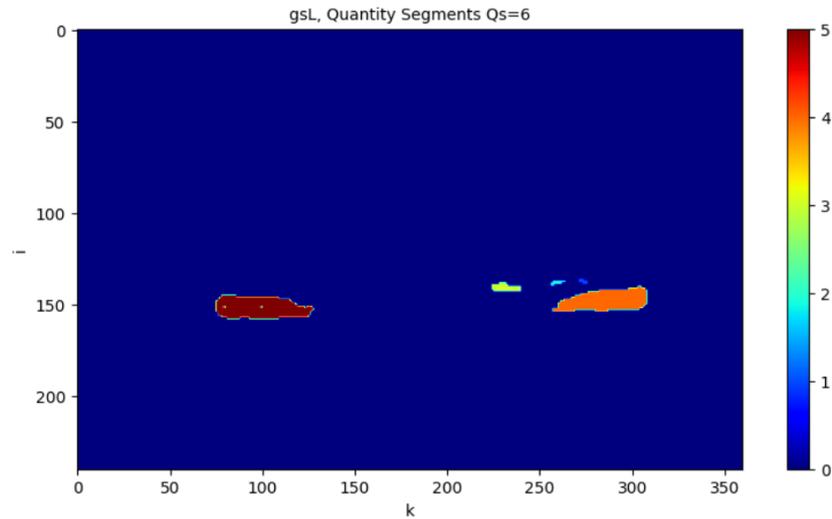


Fig. 6. Initial image of segments  $gsL$ ; number of segments  $Qs = 6$ ; segmentation performed based on the binarized image  $fPb$  (Fig. 5); on the color map (strip to the right of the image) segment numbers are indicated

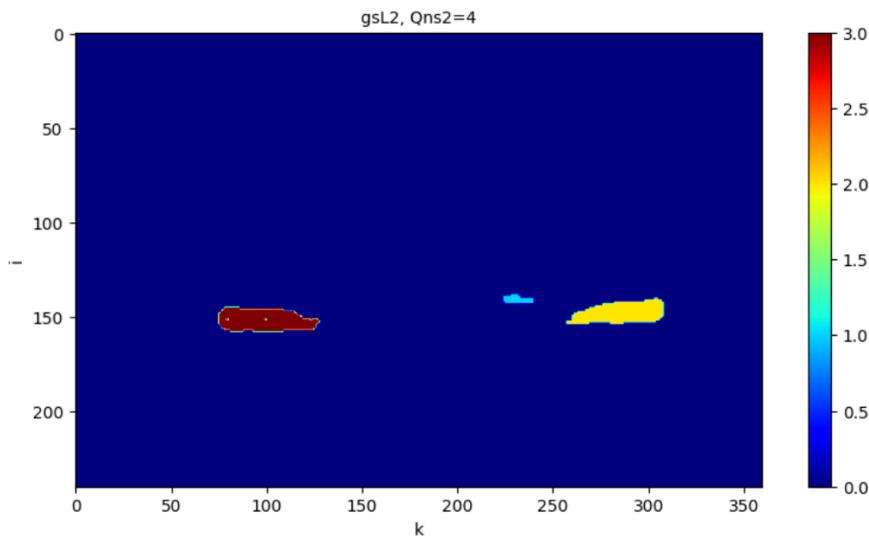


Fig. 7. Image of segments  $gsL2$  after their selection by size; number of segments  $Qns2 = 4$ ; segments retained whose dimensions in height and width exceed 3 pixels

Fuzzy membership functions for all segments of the image  $gsL2$  (Fig. 7) are calculated with respect to the object of study (left rear automotive light):

- Functions  $\mu_h(siw)$  (Fig. 8) describe the membership of a segment to the object of study considering the normalized height of the segment  $siw$  (for an image height  $M = 1000$  pixels), for other values of  $M$  – the height of the segment  $siw$  changes proportionally;
- Functions  $\mu_w(skw)$  (Fig. 9) describe the membership of a segment to the object of study considering the normalized width of the segment  $skw$  (for an image width  $N = 1000$  pixels), for other

values of  $N$  – the width of the segment  $skw$  changes proportionally;

- Functions  $\mu_c(sic)$  (Fig. 10) describe the membership of a segment to the object of study considering the normalized center coordinate of the segment in height  $sic$  (for an image height  $M = 1000$  pixels), for other values of  $M$  – the center coordinate of the segment in height  $sic$  changes proportionally;
- Functions  $\mu_c(skc)$  (Fig. 11) describe the membership of a segment to the object of study considering the normalized center coordinate of the segment in width  $skc$  (for an image width  $N = 1000$  pixels), for other values of  $N$  – the center coordinate of the segment in width  $skc$  changes proportionally.

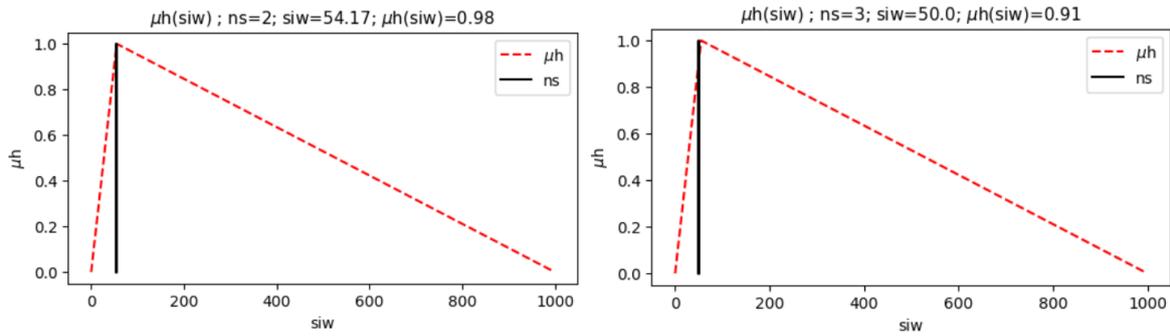


Fig. 8. Values of fuzzy membership functions  $\mu_h(\text{siw})$  of a segment to the object of study (left rear light of a car) considering its height for segments with numbers  $ns=2$ ,  $ns=3$ ;  $siw$  – normalized height of the segment

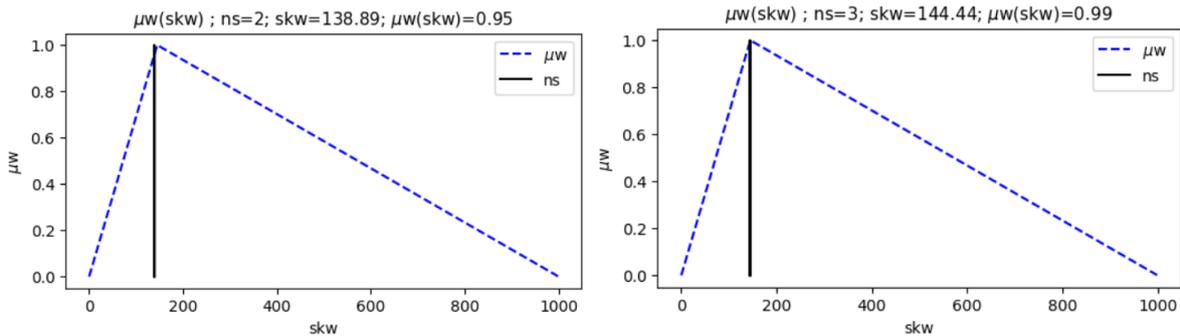


Fig. 9. Values of membership functions  $\mu_w(\text{skw})$  of a segment to the object of study (left light of a car) considering its width for segments with numbers  $ns=2$ ,  $ns=3$ ;  $skw$  – normalized width of the segment

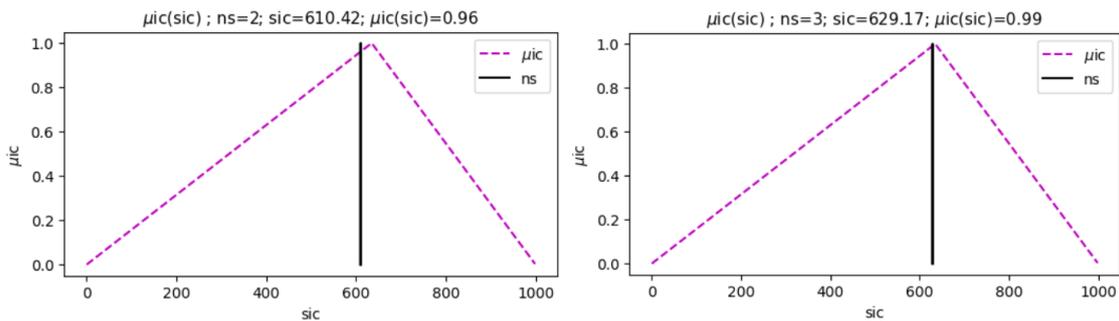


Fig. 10. Values of membership functions  $\mu_c(\text{sic})$  of a segment to the object of study (left light of a car) considering its center coordinate in height for segments with numbers  $ns=2$ ,  $ns=3$ ;  $sic$  – normalized center coordinate of the segment in height

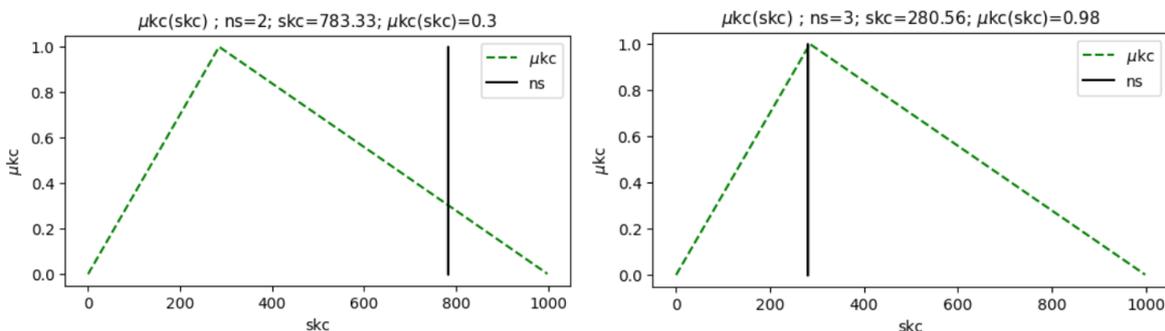


Fig. 11. Values of membership functions  $\mu_{kc}(\text{skc})$  of a segment to the object of study (left light of a car) considering its center coordinate in width for segments with numbers  $ns=2$ ,  $ns=3$ ;  $skc$  – normalized center coordinate of the segment in width

Based on the analysis of the parameters of segments corresponding to the objects under study,

parameters of fuzzy triangular membership functions have been determined. The values of the

resulting membership functions  $\mu_s(ns)$  (Fig. 12) for the segment with number  $ns$  to the objects under study, taking into account all the segment

parameters (height, width, center coordinates by height and width), are determined as the product of the values of the respective membership functions:

$$\mu_s(ns) = \mu_h(siw) \cdot \mu_w(skw) \cdot \mu_{ic}(sic) \cdot \mu_{kc}(skc) \quad (1)$$

By the maximum of the membership function  $\mu_s(ns)$ , the segment number  $ns1\_ws$ , which

most fully belongs to the studied object (Fig. 13), is calculated.

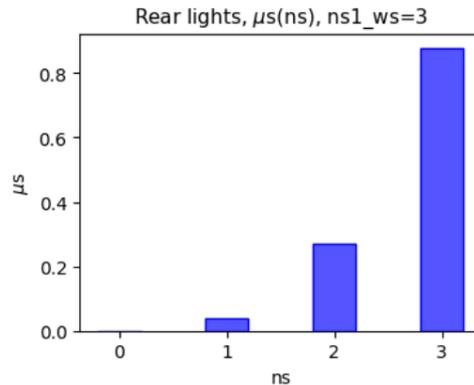


Fig. 12. Resulting values of the membership functions  $\mu_s$  of the segment to the studied object (left car headlight) for segments with numbers  $ns$



Fig. 13. Image with the identified segment belonging to the studied object (left car taillight); the segment is highlighted with a rectangle

Thus, the segment labeled  $ns1\_ws$  is correctly identified as the research object (left car taillight). Other objects in the image are recognized similarly.

**Conclusions.** The developed computer system for segmenting images of vehicles using fuzzy logic can be integrated into the professional

training of future specialists in engineering and pedagogical fields. The system employs comprehensive methods of image preprocessing, segmentation, and fuzzy logic, providing students with theoretical knowledge and practical skills related to intelligent image processing systems. Segmentation methods are used to isolate objects in

the images, which are then recognized using fuzzy logic. Thanks to fuzzy membership functions, elements of vehicle images are reliably recognized, as they simultaneously take into account the sizes

and positions of the segments. The example of fuzzy segmentation of images demonstrated a correct result in recognizing objects in car images.

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## ВИКОРИСТАННЯ ІНТЕЛЕКТУАЛЬНИХ СИСТЕМ НЕЧІТКОЇ СЕГМЕНТАЦІЇ ЗОБРАЖЕНЬ У ПРОФЕСІЙНІЙ ПІДГОТОВЦІ МАЙБУТНІХ ФАХІВЦІВ ІНЖЕНЕРНО-ПЕДАГОГІЧНИХ СПЕЦІАЛЬНОСТЕЙ

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### Реферат:

*Актуальність:* у статті розглядається актуальне питання інтеграції інтелектуальних систем сегментації зображень, що використовують нечітку логіку, в процесі професійної підготовки майбутніх фахівців інженерно-педагогічних спеціальностей, що є важливою компонентою цифровізації вищої освіти.

*Мета:* реалізація інтелектуальних систем сегментації зображень транспортних засобів із використанням нечіткої логіки для навчання майбутніх фахівців інженерно-педагогічних спеціальностей.

*Методи:* попередню обробку зображень досліджуваних об'єктів (транспортних засобів) виконано методами цифрової фільтрації, виділення контурів, аналізу профілів і підвищення контрасту; сегментацію зображень виконано методами водорозділів, контурних ліній та нарощування областей, після чого проведено селекцію отриманих сегментів за розмірами; нечіткі функції належності застосовано для визначення ступеня належності сегментів до змістовних частин досліджуваних об'єктів, що забезпечує надійне розпізнавання таких частин об'єктів та стабільну роботу інтелектуальної системи в умовах впливу зовнішніх факторів на отримані зображення об'єктів.

*Результати:* розроблено комп'ютерну систему для сегментації зображень транспортних засобів із використанням нечіткої логіки, яку інтегровано у професійну підготовку майбутніх фахівців інженерно-педагогічних спеціальностей; методами сегментації виконується виділення об'єктів на зображенні, що в подальшому використовується для їх розпізнавання з використанням нечіткої логіки; завдяки нечітким функціям належності надійно розпізнаються елементи зображень транспортних засобів навіть при певній неоднозначності форми сегментів; розроблена система має прикладне значення, що продемонстровано на прикладі обробки зображення автомобіля.

*Висновки:* інтеграція розробленої системи в освітній процес надає здобувачам освіти теоретичні знання та сприяє формуванню навичок, пов'язаних з інтелектуальними системами обробки зображень.

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**Ключові слова:** *цифровізація освіти; заклади вищої освіти; інтелектуальний аналіз даних; нечітка логіка; сегментація зображень; майбутні фахівці інженерно-педагогічних спеціальностей.*

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Received: 1 March 2024

Accept: 8 May 2024



# THE SETAS AND S-SYSTEM SKILLS DEVELOPMENT IN SOUTH AFRICA AND BRAZIL: A TRANSFORMATIVE SOCIAL POLICY PERSPECTIVE

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## Abstract

**Relevance.** The African Union declared 2024 the Year of Education, Educating an African Fit for the 21<sup>st</sup> Century and the Agenda 2063 aspiration seeks to catalyse an education and skills revolution for Africa's industrialisation. This places Technical and Vocational Education and Training at the centre in skills development on the continent. As part of their endogenous initiatives at improving skills, knowledge and abilities desired for work and enhance industrial competitiveness South Africa and Brazil instituted the SETAs system and the S-System, respectively aimed at skills formation and human capital development.

**Aim.** The two BRICS countries of South Africa and Brazil, through Acts of Parliament, institutionalised skills development programs which had seen them emerge as leading economies on their respective continents. What key lessons can be drawn for other African countries in their quest for industrialisation in the AU Year of the Year of Education to foster the relevant and competitive skills needed for the 21st century.

**Methods.** The case studies of the S-system of Brazil and the SETAs system of South Africa are presented using a case study approach. Examining the SETAs and S-systems using a Transformative Social Policy framework, the paper adopts a case study approach seeks to answer the following questions: (1) what kind of institutional linkages and coordination between industry/business and skills/education training institutions need to be in place for adequate and appropriate human capital formation in Africa? (2) what are the appropriate funding mechanisms for human capital development suitable for African countries to adopt? (3) What coordination and facilitating role should be adopted by states in African countries to facilitate industry/training institutional linkages?

**Results and conclusions.** Key finding indicates that while the SETAs in South Africa are widely recognised by employers and give holders a big advantage in securing employment, TVET-market coordination, regional coordination for area-specific industrialisation and appropriate skills funding mechanism are key for competitive skills development and provide practical and policy lessons for African governments.

**Keywords:** *transformative social policy, skills development, SETAs, S-System, South Africa, Brazil.*

**Introduction.** The high growth rates and substantial poverty reduction experienced in Africa in the past two decades (Beegle, Christiaensen, Dabalen & Gaddis, 2016) are unlikely to be sustainable in the longer term since they have not been based on industrialisation, which barely had taken root in many African countries (Asche, & Grimm, 2017, p. 1). Besides South Africa, the most industrialised African country, and barely a few others, large-scale industrial manufacturing is in a process

of de-industrialisation from an already low baseline (Arbache, *et al.*, 2008) or practically non-existent in many countries. Thus, for Africa to grow to the next level, it is critical to examine the reasons why the continent does not seem able to gather momentum for rapid and widespread industrialisation with many economies remaining at a subsistence level and not moving beyond. Many reasons have been proffered such as perceived lack of political stability in Africa,

the need for proper basic infrastructure- power, water, logistics and connectivity, over-reliance on natural resources and unfavourable terms of trade (Arbache, *et al.*, 2008). While these are important, the paper, learning from East Asian experiences, places at the centre the absence of adequate and appropriate stock of human capital critical for successful and sustained industrialisation and economic growth (Yulianti, & Fitriansyah, 2024).

Although a large pool of labour is readily available in Africa, successful, sustained and competitive industrialisation in the 21<sup>st</sup> century requires a relatively educated and skilled workforce (Yulianti, & Fitriansyah, 2024, p. 42). Unlike in the past, modern factories require highly automated and skilled workers to operate and maintain the machines, while the production operations may be non-stop. Coupled with relatively low level of digitalisation and limited digital maturity and sophistication of much of the population in Africa, technology adoption is comparatively lower relative to other regions. As a result, the ability of the local workforce to understand the various complex processes to manipulate and operate digital software running the machines, will have to be constantly enhanced through training and development. In recognition of the above, one of the aspiration of the African Union Agenda 2063 is to “catalyse an education and skills revolution and actively promote science, technology, research and innovation, with the ultimate aim of building knowledge, human resources, capabilities and skills for Africa’s future” (AU Agenda 2063, p. 102). To operationalise this aspiration two important continental policy documents are of particular importance. The first is the *Continental Strategy for Technical and Vocational Education and Training (TVET) to Foster Youth Employment* and the *African Union Plan of Action for the African Decade for Technical, Professional, Entrepreneurial Training and Youth Employment (2019-2028)*.

**Goal.** The two BRICS countries of South Africa and Brazil, through Acts of Parliament, institutionalised skills development programs which had seen them emerge as leading economies on their respective continents. What key lessons can be drawn for other African countries in their quest for industrialisation in the AU Year of the Year of Education to foster the relevant and competitive skills needed for the 21<sup>st</sup> century.

**Sources and Materials.** In this twenty-first century, the availability of sufficient quality human resources is a major pre-requisite for social and economic transformation and competitiveness. For SSA, its current state of under-development and the struggle to pursue economic transformation is not only due to lack of capital but more importantly, lack of adequate knowledge and skills to enhance productivity and promote innovative-driven growth relative to other regions of the world (Baah-Boateng, 2016). Amartya Sen (1999) argues that ‘well-being’ involves more than just increasing contentment or reducing suffering but involves increasing the capacity of human beings to do the things they would want to do (p. 18). In the same vein, modern growth economics suggest that a society’s ability to produce the goods and services it needs and want is dependent on the exercise of the ‘human capabilities’ of its people. In contrast to ‘accumulationist’ models which conceptualise accumulation of capital as the drivers of growth and proxies for capabilities as dependent variables, modern growth economics argue that human improvements in education, health, training and so on, must precede growth if the latter is to be sustained (Evans, 2014, p. 35). East Asian Tigers effectively harnessed their social policies for human capital formation, technological innovation and industrial competitiveness and provide invaluable lessons for Africa.

Human capital is defined by Baptiste (2001) as the knowledge, attitudes and skills that are developed and valued primarily for their economically productive potential- the productive capacities of human beings as income generating agents in an economy. Abramovitz (1995) use the term ‘social capability’ to capture the attributes and qualities of people and institutions that condition a society’s capability selectively to adopt, adapt and improve technologies. Such capabilities are embodied in people not machines (Hujo, 2014). Formation of good human capital and institutions for generating, absorbing and adapting innovative technologies is perhaps the most crucial area of transformative social policy as it is the basic institutional condition for enhancing human capacities and contributing to successful industrialization (Chung, 2014, p. 116; Mkandawire, 2014, p. 26).

During German’s industrialisation from the mid-1960’s its government began to build a vocation

education and training system which today account for its superior industrial performance (Chung, 2014, p. 116). These institutional arrangements are responsible for collective provision of a pool of high portable skills that all employers can share. Technical Vocational Education and Training (TVET) are learning pathways which aim to equip people with knowledge, know-how, and/or competencies required in different occupations or labour markets (Hujo, 2014). As such TVETs are a powerful means of empowering people develop their full capabilities and increase productivity. While these ideas are presented as somehow new, it should be stressed that the most redistributive regimes of Northern Europe have tended to be the most conscious of the productive role of social policy. This is evidenced by literature on the welfare production regimes (WPR) Estevez-Abe, Iversen & Soskice, 2001, p. 146) or Hall and Soskice (2001) varieties of capitalism.

In the case of East Asian tigers, strong government control over institutions responsible for education and training account for the superior performance of their economies relative to other developing regions (see also Yulianti & Fitriansyah, 2024). Although the private sector played a part, the approach of these countries was not a *laissez-faire* one. The state through direct provision of education facilities and regulation, played a significant leading role in the entire process (Mkandawire & Yi, 2014, pp. 27-28). Key questions for African governments and policy makers relate to the kind of mechanisms and market co-ordination necessary for effective delivery of capability expanding services, the kind of state(s) needed for effective and appropriate delivery of capability expansion services necessary for industrial development and competitiveness and the kind of linkages between social and economic policies needed to turn this into a reality.

Two parallel developments in the systematic analysis of advanced capitalist economies, on the one hand, Esping-Andersen (1990) political economies of welfare states and Hall & Soskice (2001) varieties of capitalism have advanced understanding of production regimes together with their institutional configurations and linkages (Lee, 2014, p. 93). Production regimes highlights the synergies among various policies and the institutional complementarity of rules and regulations that govern the internal functioning and mutual coordination of activities of

various actors within national policy framework (Hall & Soskice, 2001). Coming out prominently in the varieties of capitalism literature is the notion of 'skills formation and training regimes' defined as the ensemble of institutions and specialised actors engaged in the organization and provision of education and training. This indicate that skills formation and training regimes are often embedded in much larger welfare (social) policy concerns with ramifications beyond the economic but also social and political transformation (Mkandawire, 2007, p. 15).

Two 'production regimes' are identifiable in the varieties of capitalism literature. First is the liberal market economies characteristic of 6 countries namely: USA, UK, Australia, Canada, New Zealand and Ireland. Second, are co-ordinated market economies characteristic of 10 countries namely: Germany, Japan, Switzerland, Netherlands, Belgium, Sweden, Denmark, Norway, Finland and Austria (Halls & Soskice, 2000, p. 20). The former is characterised by less institutional support, low skill production with education and training, including vocational training provided by companies (in-house training). Education programmes from secondary to university level, even in business and engineering stress 'certification' in general rather than acquisition of more specialised competencies (Estevez-Abe et al., 2001). On the other hand, are co-ordinated market economies exemplified by many northern Europe nations including Japan and South Korea in which co-ordination is depends on business associations and trade unions organized primarily along sectoral lines, giving rise to vocational training schemes that cultivate industry-specific skills (Lee, 2014, p. 93). Many firms in co-ordinated market economies employ production strategies that rely on highly skilled labour force. This extensive use of labour with high industrial-specific or firm-specific skills, make them depend on education and training systems capable of providing workers with such skills through public subsidized and private financed vocational training systems. In these economies, business work closely with public officials to determine where firm competencies can be improved and orchestrating public subsidized programmes to do so (Halls & Soskice, 2001, pp. 25-26). These countries represent the group of countries most conscious of the productive role of social policy unlike those characterised by liberal market economies.

Evident in this literature is that economic policies, commonly referred as “growth policies”, and the kind of capability-enhancing efforts that have been traditionally called ‘social policy’ or ‘welfare policy’ are two-sides of the same coin (Evans, 2014, p. 37; Lee, 2014, p. 95). The literature emphasizes the productive aspects of social policy, such as investment in human capital. Paradoxically, the importance of social policy as an integral element of the historical development of advanced countries has often been neglected and had featured far less prominently in the development strategies recommended to Africa. Recommended are palliative forms of social policy programmes (family cash transfers and public works programmes) as remedial action against the adverse effects of economic policies, or market-led growth (Yi, 2015, p. 2). In the context of developing countries from which this paper seeks to draw lessons to accelerate industrialisation for job creation and poverty reduction, Brazil and South Africa have attempted two distinct but similar skills formation programmes as part of their efforts at improving skills, knowledge and abilities desired for work and enhance their industrial competitiveness as described in the proceeding sections.

**The Methods.** The case studies of the S-system of Brazil and the SETAs system of South Africa are presented using a case study approach. The S-system of Brazil. Brazil is ranked in the top five world automobile manufacturers and boasts of the third largest commercial airplanes factory in the world suggesting that something must have been done right to prepare the country for its industrial revolution (De Moura Castro, undated). The period saw the establishment of the S-System currently amongst the top 3 institutions in the World Skills Competition (De Moura Castro, undated). The S-System, part of the broader Technical Vocational Education and Training (TVET) landscape in Brazil, is a collection of nine separate initiatives created progressively over the years aiming to prepare workers through supplying them with the skills needed in the industry as well as other sectors of the economy (Barria & Klasen, 2014, p. 8). The Brazilian S-System of vocational training is a private non-profit making organization, managed and led by industrial associations and has been historically considered the leading institution providing professional skills contributing to school-work transition in Brazil

(UNESCO, 2022, p. 154). Scarcity of skilled workers in Brazil had generated the necessity of implementing a vocational training system as there was lack of programmes to train skilled workers in the country. Modelled in line with the Germany and Swiss vocational and apprenticeship training models, the government of Brazil created the first institution of the S-System- the SENAI (National Service for Industrial Training) in 1992 and subsequently seven others viz. SENAL (National Commercial Apprenticeship Service), SENAC (National Service for Commercial Training), SESC (National Service for Business Training), SESI (Social Service for Industry), SENAR (National Service for Rural Training), SENAT (National Service for the Transport Sector), SEBRAE (Brazilian Service for Assistance to Micro and Small Companies) and SESCOOP (National Service for Co-operative Learning) (Bulunga, 2017; Wilson, 2006).

The institutions comprising the S-System are private organisations that work in collaboration with government, labour and the business sector to ensure that both national industrial development goals and business training needs are met. The financing mechanism proved to be a balance of market-driven component, through government regulation stipulating an industrial tax of one percent on all payrolls serving as the basis of the contribution to the social security system exempt from federal taxes, with the stable public funding (UNESCO, 2022, 154). The private industrial levy is collected by the National Institute of Social Security with the levies and incomes going directly to training corporations (Barria & Klasen, 2014, p. 12). As such the various training service organisations receive payroll contributions which vary according to the specific industries. The institutions are mandated to allocate two-thirds of their revenue from the levies to provision of education and training (Bulunga, 2017). In terms of its structure, the S-System is administered at national and federal state levels covering the whole country in terms of geographical distribution with industry and institutions partnering at local level to ensure relevance of regional training programmes. As such it is present in the 27 federal states of the country (Barria & Klasen, 2014, p. 36).

The SETAs System of South Africa. To survive in a highly competitive global market, policy

experts in South Africa agreed that the country required little short of a skills revolution which led to the promulgation the Skills Development Act of 1998 (Lundall, 2003, p. 2). The Act led to the formation of Sector Education and Training Authority (SETA) system, a vocational skills training system in South Africa with a mandate of developing sector skills plans, promoting learnership, internship, unit-based skills programmes, apprenticeship and distribution of the skills development levy paid by employers (OECD, 2017, p. 32). Just as the Brazilian S-System, the SETA system in South Africa is made up of 21 SETAs each with its own clearly defined sector and sub-sectors made up of a variety of economic activities that are related and closely linked. Each SETA is responsible for both the private and public sectors of the economy within their own sector.

Covering every industry and occupation in South Africa, the SETAs include: MerSETA (Manufacturing Engineering and Related Services SETA); Chieta SETA (Chemical Industries SETA); FP&M SETA (Fibre Processing and Manufacturing SETA); AgriSETA (Agricultural SETA); BANK SETA (Banking SETA); Ceta SETA (Construction SETA); Csth SETA (Culture Arts, Tourism, Hospitality and Sports SETA); ESETA (Energy SETA); Etdp SETA (Education Training and Development Practices SETA); (Fasset SETA (Financial, Accounting, Consulting and other Financial Services SETA); FOOD BEV SETA (Food and Beverage Manufacturing Industry SETA); Hseta (Health and Welfare SETA); InSETA (Insurance SETA); LGSETA (Local Government SETA); MictSETA (Media, Advertising, Information and Communication Technology SETA); Mqa SETA (Mining Qualifications SETA); PSETA (Public Service SETA); SasSETA (Safety and Security SETA); Services SETA (Services SETA); Teta SETA (Transport SETA) and the W&R SETA (Wholesale and Retail SETA) ([www.economic.gov.za](http://www.economic.gov.za)).

Similar to the industrial levy in the Brazilian S-System, the Skills Levies Act (1999) promulgated a year later after the Skills Development Act of 1998 made provision for the collection of one percent payroll levy for training from all firms in South Africa with an annual wage bill of at least ZAR 500 000 paid to the National Revenue Fund - the counterpart of the National Institute of Social Security in the

Brazilian S-system. The Skills Development Act stipulates that of all the collected skills levies revenue 20% is allocated to the National Skills Fund (NSF) and 80% goes to SETAs. The National Skills Fund provide funding for national skills priorities as defined by the National Skills Development Strategy (NSDS) and the Human Resources Development Strategy (HRDS) and used for education and training, skills infrastructure development and development research. NSF has a focus on disadvantaged groups (such as individuals from rural areas) with an objective to develop skills in priority occupations to address skills imbalances by funding learners in universities, TVET and workplaces.

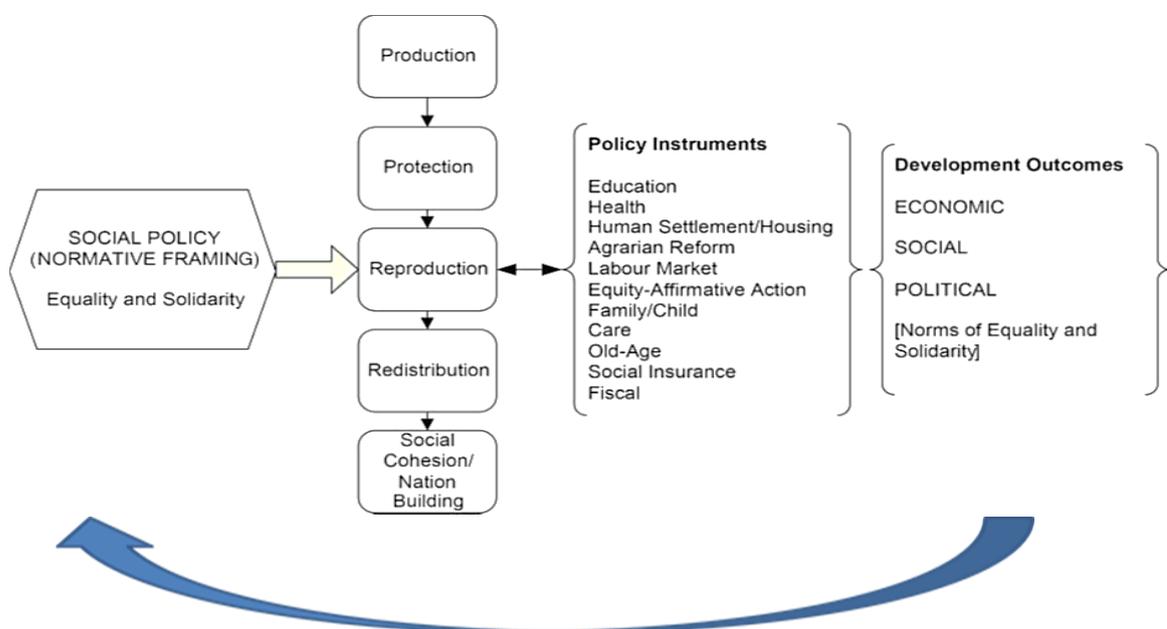
SETAs would distribute the levies to employers in the form of mandatory and discretionary grants keeping 10 percent of the levies for administrative costs. The former is paid to all employers that paid the levy and submitted their Workplace Skills Plans (WSP) and Annual Training Reports (ATR) while the latter are given to employers for specific training requests with only firms eligible for mandatory grants able to request discretionary grants. Since 2012 the share of mandatory grants was reduced from 50% of the levies which employers have paid to 20% with a 0.5% of the levies allocated to the Quality Council for Trades and Occupations (QCTO). The remaining 49.5% of the levies are allocated to discretionary funding with 80% earmarked for PIVOTAL grants- professional, vocational, technical and academic programmes that address scarce and critical skill needs which are identified by SETAs in their Sector Skills Plans using information from employers' WSP and ATR (OECD 2017:48-49). What key lessons can be drawn from these two skills development programmes to accelerate industrialisation, job creation and poverty reduction in Africa?

**Conceptual and Theoretical Framework: The Transformative Social Policy.** UNRISD research offers argument for rescuing social policy from the residual role it was assigned during much of the 1980's and 1990's to a multi-tasking of social policy involving over-arching concerns with redistribution, production, reproduction and protection (see Figure 1). In this framework, social policies are embedded in economic policy where the former has intended welfare consequences reflecting implicit or explicit socio-economic priorities, such

as human capital skills for development not only for global competitiveness and industrialization but also for reducing politically unacceptable levels of poverty and unemployment (UNRISD, 2006, p. 1).

As new growth theories places emphasis on ideas and human capital, in the twenty-first century, any state that want to be developmental should focus more intensely on ‘people’ and their ‘skills’ and less on ‘machines’ and their ‘owners’. The expansion of human capabilities highlights the vital importance of appropriate and adequate stock of human capital necessary for economic development (Evans, 2014, p. 34). The transformative social policy approach provides a framework through which social policies

can be harnessed for systematic development of human capital critical for industrialisation in Africa exemplified by the East Asian human capital-led development. This is present both an opportunity and a challenge for African governments in this era of neoliberalism when the kind of social policies are averse to the ‘collective good’ element of capability expansion necessary for human capital formation. The prevailing social policy environment makes it harder to construct productive alliances with private capital as the latter may be hostile to devoting state resources to capability expansion (Evans, 2014, p. 39). This begs the question, what kind of state(s) are needed in Africa for transformative social policy.



**Figure 1.** The Transformative Social Policy Framework  
(Source: Adesina, 2011, p. 463)

**Discussion of Results.** The design and implementation of the two skills development programmes, though they share some similarities in some respects account for their contrasting programme-specific as well as nation level socio-economic outcomes. The following criteria shall guide the comparative analysis of the S-system of Brazil and the SETAs system of South Africa and their different impact on socio-economic inequalities viz. market coordination and relevancy of skills training, promoting regional industrialization and competitiveness, financing structure and allocation modalities and the role of the state.

1. Market coordination for skills relevancy training. Despite the S-system and the SETAs system both being skills development programmes, a distinction can be made in terms of their market orientation which has a knock-on effect on relevancy of skills training and mismatch as employer ownership of skills development can be a key differentiator and competitive advantage for a country’s skills base (Mehrotra, 2017). Employer-ownership and demand driven skills supply is a distinguishing marker of the S-system in Brazil not comparable to its South African SETAs system. Modelled along the Germany and Swiss apprenticeship model (Wilson,

2006) the private sector in the S-system take the lead in managing skills development which ensures better alignment of supply and demand of skills. In one of the institutions of the S-system- the SENAI determines the training programmes to be offered and the number of students to be admitted strictly based on the industry demand (Bulunga, 2017). Such employer-ownership and level of engagement is missing in the SETAs system of South Africa to ensure relevancy of skills training for the labour market.

These differences are reflected in the labour market outcomes in the two countries. Whilst SETAs are widely recognised by employers and give holders a big advantage in securing employment in South Africa, stark labour market inequalities not only by age but also by race and regions remains a persistent challenge. In South Africa due to lack of skills among the youth (15-24 years) the unemployment rate was 51.3% with a gender bias higher among females 55.3% than males 48.0% in 2014. Another indicator for the effectiveness of skills training programmes on unemployment relate to the share of young people neither in employment nor education or training (NEET) which provides an additional picture of people's idleness and social exclusion in South Africa. The share of NEET among persons aged 15-29 was around 36% in 2015 and shoots to 50.0% when focussing on 22-24-year olds. This indicate that the SETA system had not made significant impact when it comes to reduction of unemployment and poverty along with their associated racial and age disparities. This had a negative knock-on effect on industrialization prospects and national competitiveness in the global economy. The situation above contrast markedly with the Brazilian one in which the market orientation and relevancy of training skills provided substantial labour market outcomes to participants which have been related to more general trends in the Brazilian industrial labour market. The S-system had contributed to the Brazilian economy's ability to reduce general and youth unemployment from 12.4% and 25.3% in 2003 to 5.4% and 13.7% in 2012 respectively (Barria and Klasen 2014:36) in contrast to South Africa where the national unemployment rate has fluctuated around 25% for the past 25 years and currently stands at 26.2% in the 4<sup>th</sup> quarter of 2016 (OECD, 2017, p. 16).

The lack of TVET-labour market coordination for skills training of the South African SETAs system goes hand in hand with the existence of qualifications mismatch- when employers hire workers who do not have the right qualifications for the job resulting in workers working in occupations for which they do not have the correct qualifications- which stood at 52.3% in 2015 (OECD, 2017, p. 24). Emanating from lack of skills the incidence of underqualification- a situation where workers have a qualification level that is below the most commonly observed level in that occupation- stand at 27.6% in South Africa compared to a much lower level of underqualification at 7.9% in Brazil (ibid). This can be attributed to market coordination failures leading to mismatch between skills training and industry demands. Market coordination ensures that business and industry are not by-standers but active contributors, shapers and designers of skills policies and helping to deliver them (Mehrotra, 2017).

If any lessons can be drawn from the European vocational training education, in countries where vocational education (technical and technological) is provided, vocational graduates spent less time and face less difficulties searching for suitable jobs than those who completed secondary education only (Muller, Gangl & Raffae, 2013; Mizen, 2004). Empirical evidence from the S-system of Brazil indicate that the market orientation of skills training, relevancy of the programmes and the active engagement by employers' results in 80% of the graduates finding employment within 6-months after graduation (Bulunga, 2017). Whereas unemployment reflects an age profile in South Africa, it less unfavourable for young people in countries with well-developed and demand-driven vocational technical education and training (Barria & Klasen, 2014, 9).

2. Regional coordination for area-specific industrialisation. Apart from differences in terms of market coordination of the S-system and the SETAs system, a distinction can also be observed in terms of their level of decentralisation and governance structures. Unlike the SETAs system not linked to skills training institutions, the S-system is organised at the national and state level as a non-profit making organisation financed (private and public), managed and led by industry (Wilson 1996). In terms of geographical distribution, the federal organization of the S-system makes it present in all the 28 states of the

country as reflected in the geographical distribution of training in which opportunities for training are offered to those living in less populated areas or less advanced federal states and differences in participation mirrors the observed differences in population by federal states (Barria & Kasen 2014, p. 3). Most importantly, within the federal states, the partnership between industry and training institutions allows the design of relevant regional training programmes tailored to specific regional skills demand- an important lesson for South Africa, and other Africa countries with specific economically distinct regions.

This identifying attribute of the S-system has had positive impact on regional industrialization promoting a reduction in the speed of urbanisation and the formation of overpopulated cities surrounded by violence and low standards of living. This characteristic of the S-system is particularly important for South Africa in terms of reducing regional inequalities. In South Africa, as in most African countries, not only do labour market outcomes differ strongly by age as highlighted above, but also by regions. In South Africa, unemployment rates vary considerably with regions- in the 4<sup>th</sup> quarter of 2016 it ranged from 19.3% in Limpopo to 37.7% in the Free State. The differences in terms of discouraged workers- persons who wanted work but could not try to find work or start a business because they had believed that there were no jobs available in their area or were unable to find jobs requiring their skills or have lost hope of finding any kind of work- were more significant with the share limited to 1.5% in the Western Cape but reaching 21.1% in Kwa-Zulu Natal province (OECD, 2017, p. 18). This has been exacerbated by lack of skill needs information at regional levels as the SETAs skill needs assessments only provide information at the sector level with not regional assessments. This suggest that there are no coordinated efforts to adapt national industrialisation policies to maximise on regional competitive advantages.

As such a decentralised skills development structure may play a fundamental role in South Africa given the substantial economic and labour market differences between the country's provinces a product of Apartheid legacy and the existence of multiple and competing ethnic and racial groupings within the country (OECD, 2017, p. 61; Barria &

Klasen, 2014, p. 3). A skill needs assessment at regional level could be invaluable in South Africa if social policies can be effective in promoting regional industrialisation to eliminating the regional inequalities reflected in both labour market outcomes and income inequalities. African governments are well advised to target selected industries and regions that have the potential to create employment and/or innovation and technological learning, with positive spill over effects to national development (Asche & Grimm, 2017, p. 2).

3. Financing human capital formation. A commendable effort by the governments of the two countries in supporting human capital formation for accelerated industrialisation is the institutionalisation of a skills development levy through Acts of Parliaments. In the South African context, a year after the ratification of the Skills Development Act in 1998, the Skills Development Levies Act mandated SETAs to collect skills levies from employers within each sector making the money available for education and training (Lundall, 2003, p. 2; [www.vocational.co.za](http://www.vocational.co.za)). The Act stipulates a one percent payroll levy payable by all firms with an annual wage bill of at least ZAR 500 000 to the National Revenue Fund (OECD 2017:49). This is up from 0.5% that existed when the process was instituted in 2000 (Lundall, 2003, p. 1). In the Brazilian context, since the 1940's the various service organisations of the S-system receive payroll contributions of one percent on all payrolls, with no threshold unlike in the SETAs system. The payment exempt from federal taxes, is collected by the National Institute of Social Security (Barria & Klasen, 2014, p. 12; Bulunga, 2017). The two skills levy collections agencies, the National Revenue Fund and the National Institute of Social Security would then disburse the levies to the SETAs and S-systems in South Africa and Brazil respectively.

A distinguishing mark of the S-system is that the compulsory contribution as a percentage of payroll is used to fund directly the technical vocational education and training (TVET) system as the National Institute of Social Security pays the levies incomes directly to training corporations (Barria & Klasen, 2014, p. 12). This had facilitated funding access to the system by poor students facilitating entry and re-entry of people into the labour market as they adjust to the labour market demand which may call

for continuous training and re-training. This funding is complemented by increasing government spending on vocational training via establishment of adequate infrastructure, development of teachers, tools and methodologies for training highlighting the collaboration of government, labour and business in skills training with the government balancing the social equity goals for national development and business focusing on enhancing productivity by ensuring that training needs are met (Bulunga, 2017; Mehrotra, 2017). Such collaboration had enabled training systems responsiveness to labour market demands strengthening the skills system thus contributing to employment and low skills mismatch in Brazil with concomitant rapid industrialisation and consequent reduction in inequalities, overall improvement in incomes and well-being despite the country having high inequality levels at the start of the century (OECD, 2017, pp. 22, 24).

Public and private sector financial investment in skills development had not produced the same results in South Africa as in Brazil with the nation failing to bridge the chasm between the 'two nations' characterising it- part 'the global knowledge and consumerist 'First World' and part the poor and marginalised 'Third World' (Mbeki, 2004a). The challenge lies in the policies, institutions and skills delivery mechanisms which had failed to build an inclusive and high-quality skills development system for competitive industrialisation (Akoojee, Gewer & McGrath, 2005). Rather than the skills development levy used directly to support skills training institutions (TVET) as in the S-system, it was designed to incentivize employers to provide training opportunities at their workplaces (OECD, 2017, p. 48) with little benefit to those out of employment. In 2014/15 period, ZAR 14 032 million was collected through the skills development levies (National Treasury, 2015). A meagre 20% of the collected skills levy is allocated to the National Skills Fund (NSF) which support skills training in universities, TVET colleges including employer workplace training. In the 2015/16 period, University training accounted for (56%), TVET (16%), Workplace (27%), Skills research and development (2%) and the remainder spent on construction of three TVET colleges of the NSF. In the period in question, workplace training accounted for a higher percent-

age 27% compared to 16% allocated to TVET suggesting a focus on those in employment to the exclusion of those out of employment.

The remaining 80% of the collected skills training revenue went to SETAs (OECD, 2017, p. 48). Prior to the 2012 SETA grants regulations, employers could claim 50% of their paid levy back through the mandatory grants- grants paid to all employers that paid the levy and submitted their Workplace Skills Plans (WSPs) and Annual Training Reports (ATRs). Employers could claim an additional 20% of their levies through discretionary funds-grants given to employers for specific training requests. While the goal of the skills development levy is to increase training opportunities, the money collected through the skills levy only benefit a small number of firms as only a small share of employers submits WSPs and ATRs leading many employers to view the levy as an additional tax as they could not claim the mandatory and discretionary grants (Lundall, 2003, p. 2; OECD, 2017, p. 50). This distribution of the skills levy had led some to conclude that many of the training programmes in South Africa target people already in employment as much of the money returns to employers. This represent a missed opportunity for a broadened human capital formation which could be generalized to rest of the population considering lack of skills and the numbers of people out of employment. The higher returns from education and training would be registered at the level of the enterprise as the focus is more on retraining existing labour force (Lundall, 2003, p. 2).

Just like any other African countries, in South Africa despite the huge investment for human capital development, the country is burdened with a large pool of low-skilled unemployed people, suggesting over-supply of low skilled workers and a huge skills training need. In the International Manpower Development World Talent Ranking, South Africa ranks among the bottom five countries for the availability of skilled labour, the implementation of apprenticeship and the ability of the education and training system to meet the needs of a competitive economy (OECD, 2017, p. 23). Such indicators reveal a failing skills training regime with negative knock-on effect on prospects for industrialization. This is reflected not only in terms of existence of shortages of skilled workers often cited as the main

contributor to South Africa's limited growth prospects but also in the state of the South Africa labour market with significant differences in outcomes by race.

The main challenge facing policy makers in South Africa lies in reversing these economic trends and the ever-widening socio-economic chasms to build a democratic inclusive society characterized by better standards of living generalizable to the rest of the population. Despite providing workable models for financing human capital formation, the South African case highlight a typical government coordination failure in holding in tandem social and economic policies. This calls for strong government control over institutions responsible for skills training, education and funding for effective human capital formation and industrial competitiveness. This represent the transformative role of social policies in which the state takes the lead holding social objectives in tandem with economic objectives to enhance the productive capacities of individuals for improved national industrial productivity and competitiveness.

#### **Conclusion and Policy Recommendation.**

Generally, the relative competitive performance of the Brazilian economy relative to South Africa is partly explained by the level of organisation of the S-system for human capita development compared to the S-system in South Africa. However, there are key lessons to be drawn from the South African SETAs and Brazilian S-systems in terms of human capital formation to accelerate industrialization in Africa. First, is the establishment of industry specific sectors and sub-sectors, including their holistic coverage ensuring that every industry and occupation are included for the purposes of identifying and attending to training needs within each sector is highly commendable. Besides, each specific sector is made responsible for both the private and public sectors of the economy. This is critical as it is a first step towards adequate and appropriate human capital formation necessary for successful and competitive industrialization. Second is the establishment of an industrial levy system and the establishment of revenue collection entities- the National Revenue Fund (SA) and National Institute of Social Security (Brazil)- through Acts of Parliament to avail financial resources critical for sustainable human capital formation is some feature other African countries

can emulate. These are important lessons for other African countries in their quest to industrialize, create jobs and reduce poverty and unemployment. Notwithstanding these possible strengths and the efforts by the South African government and private stakeholders in capability expansion, some challenges remain. The following recommendations can enhance the effectiveness of the SETAs system in terms of skills development and its overall on the economy and socio-economic inequalities. First, is the identification of precise market coordination failures that hold up industrialisation. In the case of South Africa there is need for strengthening the role of SETAs to serve as intermediaries between employers and training providers. The main drive for establishment of industry specific training institutions should be towards industry/employer-led approaches to sectoral skills development. What it means for the South African context would be transformation of SETAs from mere development of sector skills plan and distributing skills development levy into vocational training institutions for the different sectors of the economy to resemble the institutions of the S-system which are training programmes financed by levies from employers. Since SETAs are custodians of sector skill plans it makes easier for them to know which skills are in short supply and how much training is needed. This will not only enhance the effectiveness of the skills development levy but also address skills mismatch in the country where, currently, 52.3% of the South African workers are employed in occupations for which they did not have the correct qualification. In that state SETAs model will be a classic example for other African countries to emulate in their human capital formation strategies to enhance industrial competitiveness. Secondly, the need to identify government coordination failures between stakeholders in skills training and development. The Brazilian S-system is not only characterized by collaboration between government, labour, business and training institutions but also coordination between the Ministry of Education working together with the Ministry of Labour to define vocational training policy which is then extended and executed by technical and agro-technical schools including the S-system. Such kind of collaboration and coordination is absent in the South African context. Firstly, there is lack of collaboration between government, labour, business

and training institutions as employers in South Africa always complain about lack of involvement in policy development. The government need to facilitate coordination between all stakeholders involved in skills development with SETAs acting as intermediaries linking policy makers and employers. SETAs have not done sufficiently in this role yet their sector skill plans should assist identify gaps, skill imbalances and training requirements- a good first step towards coordination between demand and supply side of skill formation and development. This would transform the current technical skill development which is largely theory-based examination focused programmes to the exclusion of practical work-based application. Secondly, there is need to improve cooperation across government departments, particularly the DHET and the Department of Labour. It has been observed that South African depart-

ments work in silos, with little cooperation or coordination between them. A lack of coordination and cooperation between government departments, training institutions and employers, hinders the development and delivery of effective human capital formation for successful industrialization. Third, relates to the decentralisation, adaption and promotion of regional industrialization targeting selected industries that have the potential to create employment and/or innovation and technological learning, with positive spill over effects to the national industrialization objectives. Thus, developing countries in Africa are well-advised not to follow well-trodden paths but to swiftly adapt to changing industrial patterns. Unless the African governments adopt a transformative approach to social policy to facilitate human capital formation, the quest for industrialization, job creation, reduction in unemployment and poverty will remain elusive.

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# РОЗВИТОК НАВИЧОК У ПІВДЕННІЙ АФРИЦІ ТА БРАЗИЛІЇ В РАМКАХ СИСТЕМИ SETAS ТА S-SYSTEM У ПІВДЕННІЙ АФРИЦІ ТА БРАЗИЛІЇ: ТРАНСФОРМАЦІЙНА ПЕРСПЕКТИВА СОЦІАЛЬНОЇ ПОЛІТИКИ

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## Реферат:

*Актуальність.* Африканський Союз оголосив 2024 рік Роком освіти, виховання африканця, готового до XXI століття, а «Порядок денний 2063» має на меті каталізувати революцію в освіті та навичках для індустріалізації Африки. Це ставить професійно-технічну освіту і навчання в центр розвитку навичок на континенті. У рамках своїх ендогенних ініціатив, спрямованих на вдосконалення знань, умінь і навичок, необхідних для роботи та підвищення промислової конкурентоспроможності, Південна Африка та Бразилія запровадили систему SETAs та S-System, що, відповідно, спрямовані на формування навичок та розвиток людського капіталу.

*Мета.* Дві країни БРІКС – Південна Африка та Бразилія – за допомогою парламентських актів інституціоналізували програми розвитку навичок, завдяки яким вони стали провідними економіками на своїх континентах. Мета полягає в тому, щоб з'ясувати, які ключові уроки можна винести для інших африканських країн у їхньому прагненні до індустріалізації в Рік освіти Африканського Союзу, щоб сприяти розвитку актуальних і конкурентоспроможних навичок, необхідних у XXI столітті.

*Методи.* На прикладі S-системи Бразилії та системи SETAs Південної Африки представлено тематичні дослідження з використанням методу кейсів. Розглядаючи SETA та S-системи з використанням концепції трансформаційної соціальної політики, в роботі застосовано підхід, заснований на аналізі конкретних прикладів, що має на меті відповісти на такі запитання: 1) які інституційні зв'язки та координація між промисловістю/бізнесом та закладами освіти, що займаються розвитком навичок, мають бути встановлені для адекватного та належного формування людського капіталу в Африці? 2) які механізми фінансування розвитку людського капіталу можуть бути прийнятні для африканських країн? 3) яку координуючу та сприяючу роль повинні взяти на себе держави в африканських країнах, щоб сприяти налагодженню зв'язків між промисловістю та закладами освіти?

*Результати і висновки:* хоча SETA в Південній Африці широко визнаються роботодавцями і надають їхнім власникам значні переваги у працевлаштуванні, координація ринку ПТО, регіональна координація індустріалізації конкретних територій та відповідний механізм фінансування процесу розвитку навичок є ключовими питаннями для досягнення конкурентоспроможності навичок і слугують практичними й політичними настановами для урядів африканських країн.

**Ключові слова:** трансформаційна соціальна політика, розвиток навичок, SETA, S-System, Південна Африка, Бразилія.

Received: 03 May 2024

Accept: 31 May 2024



# FORMATION OF ENVIRONMENTAL COMPETENCE OF THE FUTURE BACHELOR OF NAVIGATION: THEORETICAL ASPECT

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## Abstract

*The relevance* is driven by the fact that the ecological crisis both globally and in Ukraine particularly, is characterized by a trend of increase. The war with the Russian Federation, which severely destroys the country's ecosystems, has become a challenge for domestic ecology. We now face significant losses of hundreds of species of animals and plants. This requires replenishment of organizations and institutions, including maritime and water transport, with specialists who have a thorough professional-ecological training. Meanwhile, maritime higher education institutions are still insufficiently focused on activating ecological education for students, on fostering ecologically aware seafarers with developed ecological thinking. The problem of targeted formation of ecological knowledge, skills, and consciousness among future navigation specialists is further actualized by the fact that pedagogical science has not yet substantiated detailed methodological approaches, effective principles, specific conditions, and rules for productive ecological training of future specialists in maritime and inland water transport, nor has it developed effective technologies and methodologies for systemic acquisition of professionally oriented ecological knowledge, skills, and abilities by marine education seekers.

*Objective:* To substantiate the pedagogical system of targeted formation of ecological competence in future navigation bachelors and to develop its conceptual model.

*Methods:* To achieve the objective, the study utilized theoretical methods (theoretical analysis of scientific works, study of the requirements of environmental legal documents to clarify the level of problem development and identify directions of scientific exploration; comparison to study scientific approaches to solving the problem; analysis and synthesis to clarify the features of ecological-professional training of navigation bachelors, substantiating the content of their ecological competence formation; modeling to develop the structural-content model of the pedagogical system) and empirical methods (pedagogical observation, discussions, surveys to identify directions, stages, forms, technologies of forming ecological competence in future navigation bachelors).

*Results:* Based on the analysis of pedagogical theory and educational practice, the peculiarities of professional-ecological training of future navigation bachelors in higher education institutions were clarified; it was determined that ecological competence of future navigation bachelors is a complex scientific object and requires a systemic approach in its research, and the process of its targeted formation should be considered as a pedagogical system; a conceptual model of the system has been developed that combines the conceptual positions of the studied process into a single ideal construct, illustrating the sequence of "movement" from the goal to the expected result.

*Conclusions:* The substantiated model is a theoretical construct that reflects the conceptual foundations of the systemic formation of ecological competence in future navigation bachelors; the positions embedded in this ideal object regarding the formation of this integrative property of the personality combine the possibilities of intradisciplinary and interdisciplinary directions of ecological education for students with the acquisition of experience by future seafarers in environmental protection, research, ecological-enlightenment, and other activities; the implementation of the developed pedagogical system in a higher education institution will significantly enhance the level of formation of ecological knowledge, ecological thinking, ecological consciousness, and eco-safe behavior among future navigation bachelors.

**Keywords:** *ecological education, ecological competence, future navigation bachelors, ecological knowledge, ecological worldview, maritime transport, pedagogical system.*

**Introduction.** We must acknowledge that the environmental crisis in the world is escalating, and in Ukraine, its dynamics are further intensified by military actions on land, as well as in marine and river waters. The war destroys domestic ecosystems, damages rare flora and fauna. More than 80 species of animals are on the verge of extinction: over 10 million individuals have already died due to shelling of zoos and shelters. The negative impact of naval vessels' hydrolocation systems causes the stranding of cetaceans. Significant leaks of fuel and lubricants and the entry of toxic compounds from ammunition and military equipment from sunken ships substantially worsen the ecology of the Azov and Black Seas, estuaries, and wetlands.

It is worth noting that, ultimately, water transport itself is a significant source of environmental and biosphere pollution. Primarily, this refers to pollution from waste generated during the operation of vessels and marine pollution through the discharge of oil, petroleum products, chemicals (ammonium nitrate, superphosphate, bauxite, etc.) during accidents involving barges, tankers, and other cargo ships. Specifically, marine environmental pollution occurs due to: the operation of diesel engines using high-sulfur fuel oil that pollutes the atmosphere with nitrogen oxides, carbon, and other carcinogens; toxic waste from commercial vessels (cruise industry) from burning garbage, including plastic; wastewater from medical facilities, general use areas that may contain harmful viruses, intestinal parasites, etc.; solid waste (glass, paper, ash, plastic, metal drink cans, etc.) that can become marine litter and pose a threat to all life; the discharge of insufficiently treated bilge water; collisions of marine mammals (e.g., whales) with vessels leading to their death and injuries; noise created by ships, disrupting the orientation, communication, and feeding of some marine species, etc. It is not difficult to see that a significant (and possibly decisive) role in marine environment pollution is played by human factors.

Thus, we must recognize that the ecologically safe operation of vessels directly depends on the professional-environmental training of maritime and water transport professionals future officers of the deck command. However, an analysis of the training practices of seafarers in higher education institutions, especially future bachelors of navigation, indicates that the problem of forming ecologically conscious, responsible, active defenders of nature is still insufficiently addressed in maritime universities and

academies. Typically, acquiring ecological knowledge and skills by future bachelors of navigation involves studying in the second or third semester (Bairamova, 2020); National University "Odessa Maritime Academy"; Prospects of training and employment for seafarers) the discipline "Ecology and Environmental Protection," culminating in an examination (from 2 to 6 credits). Unfortunately, in some maritime higher education institutions, such an educational discipline is not included in the educational-professional programs for training bachelors of navigation at all.

Therefore, it can be concluded that in the educational environment of maritime higher education institutions, the development of ecological competence in future bachelors of ship navigation still receives insufficient attention. The problem of targeted formation of ecological knowledge, ecological skills, and ecological consciousness among future maritime professionals is further emphasized by the fact that pedagogical science has not yet substantiated detailed methodological approaches, effective principles, specific conditions, and rules for productive ecological training of future specialists in maritime and inland water transport, nor has it developed effective technologies and methods for systematic acquisition of professionally oriented ecological knowledge, skills, and abilities by maritime education seekers.

**Sources.** Regulations on the regulation of relations in the field of protection and conservation of natural resources, ensuring ecological safety, principles of environmental protection, use of plant and animal life are specified in the Laws of Ukraine "On Environmental Protection" (1991 with amendments 1993–2022), "On the Natural Reserve Fund of Ukraine" (1992 with amendments 1993–2022), "On Air Protection" (1992 with amendments 1995–2022), "On Radioactive Waste Management" (1995 with amendments 2000–2022), "On Waste" (1998 with amendments 2002–2022), "On Plant World" (1999 with amendments 2009–2022), "On Animal World" (2002 with amendments 2009–2022), "On Environmental Impact Assessment" (2017 with amendments 2019–2022), among other normative legal documents. The content of virtually every analyzed official document includes the issues of the necessity to develop environmental culture among the population, formation of views, beliefs, and knowledge of people regarding the priority of ecological safety requirements, strict adherence to ecological standards, limits on the use of natural

resources in industrial activities. At the same time, it emphasizes the importance of forming ecological competence in students of higher education institutions, preparing them to implement strategies for ecological safety and environmental protection. For example, Article 7 of the Law of Ukraine "On Environmental Protection" (1991) states: "Enhancing the environmental culture of society and professional training of specialists is ensured by general mandatory comprehensive education and training in environmental protection."

It is worth adding that, unfortunately, the bill "Strategy for Sustainable Development of Ukraine until 2030" (2018), which aims to "promote the transition of Ukraine to the principles of sustainable development, legislative and institutional provision of the public management system for sustainable development, improving the quality of life of the population and achieving economic, social, and ecological balance of development of Ukraine," has not yet been adopted. At the same time, the strategy and main directions for the development of Ukraine as a maritime state are declared in the Maritime Doctrine of Ukraine for the period until 2035, which defines: "Among the priority national interests at sea are meeting the needs of society, economy, and state in the use of sea resources, strengthening the position of Ukraine among the leading maritime states, as well as ensuring security by: preventing pollution of the marine environment, conducting effective ecological monitoring; achieving the condition of the marine environment in the territorial waters and the exclusive economic zone of Ukraine, which corresponds to the concept of 'good environmental condition' in the sense of the EU Framework Directive on Marine Strategy, and maintaining such a state in the long term" (Postanova Kabinetu Ministriv Ukrainy, 2009).

The theoretical and methodological basis for addressing the issue of purposeful formation of ecological competence in future bachelor mariners has been defined by the works of scholars such as M. Bilyanska, V. Boholyubov, O. Vernik, S. Deryabo, I. Koreneva, V. Karamushka, L. Kurnyak, L. Lukyanova, O. Mateyuk, O. Palamarchuk, V. Panov, N. Pustovit, S. Rudyshyn, T. Saienko, Y. Shvalb, L. Rudenko, H. Filichuk, S. Shmaliy and others; the theoretical and methodological aspects of professional and ecological training of maritime and inland water transport specialists are highlighted in the works of L. Bazyl, O. Bayramova, O. Hurenkova, L. Herganova, O. Danylenko, V. Dobrovolska, Y. Yezhokina, V. Zhurian, M. Musorina, T. Rulevska, K. Tkachenko, and others. The scientific aspects of personality trait development, substantiated by these

scholars, served as the basis for the justification and development of the system for purposeful formation of ecological competence in future bachelor mariners.

**The aim of the research:** to substantiate the pedagogical system for the purposeful formation of ecological competence in future bachelor mariners and to develop its conceptual model.

**Methods:** To achieve the aim of the study, theoretical (theoretical analysis of scientific works, studying the requirements of normative legal documents of ecological nature to determine the level of problem development and identify directions for scientific exploration; comparison – to study scientific approaches to solving the problem; analysis and synthesis – to clarify the features of ecological-professional training of bachelor mariners, substantiating the content of their ecological competence formation; modeling – for developing the structural and content model of the pedagogical system) and empirical (pedagogical observation, conversations, surveys – to determine the directions, stages, forms, technologies of forming ecological competence of future bachelor mariners) methods were used.

**Results and discussion.** Given that Ukraine is a leader in supplying maritime industry specialists to the global fleet (in 2018, 69,000 jobs (Bayramova, 2020), in 2023 – about 100,000), and a member of the International Maritime Organization (IMO), it is critical for solving the problem of professional and ecological training of bachelor mariners that students know and are able to apply the main norms and rules of international maritime safety and environmental protection. These provisions are highlighted in a number of Conventions adopted by the IMO, including: the International Convention for the Safety of Life at Sea (SOLAS-74/83); the International Maritime Dangerous Goods Code (IMDG-Code); the International Convention for the Prevention of Pollution from Ships (1973).

In turn, the standard of higher education (first (bachelor's) level of higher education; field of knowledge – "27 Transport", specialty – "271 River and Sea Transport"; implemented by the order of the Ministry of Education and Science of Ukraine dated 13.11.2018 No. 1239) (Ministry of Education and Science of Ukraine, 2010) defines that future bachelors of navigation must master the general professional competence "Ability to supervise and control the compliance with national and international legislation in the field of navigation and measures to ensure the protection of human life at sea, protection and conservation of the marine

environment." For bachelors of the specialty "271 Maritime and Inland Water Transport", with the specialization "271.01 Navigation and management of sea vessels (Navigation)", the standard establishes that graduates must demonstrate learning outcomes directly related to the subject of our research, in particular:

- *RN22. Knowledge of methods, measures, and equipment for combating pollution from ships, as well as precautionary measures necessary to prevent pollution of the marine environment and fulfilling the obligations according to the International Convention for the Prevention of Pollution from Ships, as amended;*

- *RN23. Knowledge of international and domestic legal acts regarding the safety of human life at sea and the protection of the marine environment and ensuring their compliance.*

Thus, it is worth defining the essence of the concept of *"ecological competence of a future bachelor of navigation"*. We note that as a result, and at the same time as an indicator of the quality of ecological education, Dzham (2016, p. 105) considers ecological competence, positioning this component of life competence of a person with her ability to make decisions and act in the interests of sustainability and environmental conservation. The scholar is convinced, and we support her position, that "The formation of ecological competence of citizens is one of the most important tasks of education for sustainable development. Ecological competence enables a modern individual to responsibly resolve life situations, subordinating the satisfaction of their needs to the principles of sustainable development. Therefore, ecological education requires special attention. Since balance is the result of harmonizing economic and social development of society and environmental conservation, one of the important trends in the ecological component is the formation in a citizen the ability to make decisions and act in the interests of sustainability and conservation of the environment." As the ability of an individual to actualize the acquired ecological knowledge and experience in real-life environmental situations for making environmentally appropriate decisions is considered ecological competence by Naidonova & Furdui (2018, p. 124). We value the well-founded approaches of these scholars in research, which include: 1) creating conditions for understanding the essence of norms and rules of environmentally appropriate behavior and mastering them; 2) fostering the formation of ecological convictions; 3) developing appropriate emotions related to nature

and its ecological state; 4) developing the ability to make responsible decisions in specific ecological life situations; 5) self-education of the student's personality.

Lobodynska & Mahazynshchykova (2018, p. 168) demonstrate that ecological competence must be acquired by every specialist with higher education; in the conditions of a planetary crisis, this key competence is necessary for every modern person. It is worth agreeing with the scholars' interpretation of ecological competence as the ability of a specialist to interact harmonically with the environment and society "... in all spheres of their life activity." The above statement convinces that future bachelors of navigation must thoroughly master ecological competence, which, following Zhurian (2022), we understand as a complex, integrative personality trait that reflects the motives of ecological activity, possession of ecological knowledge, and naturally-purposeful types of activity, volitional qualities, and values of the personality with an active stance in the field of environmental protection, rational use, and reproduction of natural resources, and provides the ability to perform environmental professional activities in the field of maritime and inland water transport.

The acquisition of knowledge about environmental problems and ways to solve them, the purposeful formation of needs, motives, and habits of environmental activity, the development of ecological thinking, and ecological awareness of future mariners are carried out in the process of ecological education. In this regard, as Bayramova (2020) points out, two approaches to professional-ecological training of future bachelors of navigation are implemented in educational practice: multidisciplinary (using the ecological potential of each discipline in the curriculum, giving an ecological orientation to each component of the educational-professional program) and intradisciplinary (a separate educational component of the curriculum provides for a discipline of ecological content). Here, it is worth listening to Saienko's (2008) suggestion to focus on a combined model of ecological training of specialists in higher education, which combines students' study of the subject "Ecology and environmental protection" with the ecologization of professional-practical disciplines and all types of practice. Our position aligns with the definition of ecological education by Lukianova (2006), who is convinced that this is a new sense and purpose of the modern educational process, a unique means of preserving and developing the environment and continuing human civilization, a process that is in

constant development and, what is extremely important, is the result of reorientation and coordination of various disciplines. Moreover, it is important to consider that the effectiveness of ecological-professional training of seafarers significantly depends on the quality of students' study of environmentally-oriented disciplines ("Occupational Safety," "Life Safety," "Labor Protection in the Industry" etc.).

Ecological education of future bachelors in navigation is a leading direction in acquiring classical ecological knowledge by students, and the greening of the rest of the educational program components enables productive formation of students' perceptions of the "nature-human-society" system. In this case, we do not distinguish ecological education of students (ecological holidays, ecological excursions, debates on ecological topics, ecological trails, etc.) as a separate direction, considering the close integration of processes of education, upbringing, and personal development.

At the same time, it is equally important to involve students in practical activities related to environmental protection, develop robust skills and habits of environmentally friendly behavior, teach future mariners to anticipate the consequences of their actions on nature, and develop personal responsibility for the environmental condition. Rulyevska (2021) voices consonant thoughts in this regard, stating that students' participation in ecological activities (clearing and maintenance of the territory around drinking water sources, landscaping educational institution territories, cleaning water bodies from waste, etc.) ensures the effective combination of ecological knowledge and practical skills, fostering habits of safe ecological behavior. In turn, Bayramova (2020) argues that the formation of ecological awareness, development of ecological ethics, and skills of eco-safe behavior in future mariners should be carried out not only through nature conservation activities but also through experimental, ecological-educational activities, and so forth. This includes students' participation in ecological clubs, groups, ecological agitprop brigades, ecological expeditions, volunteer eco-events, and execution of ecological projects by future mariners.

Along with the formal component of ecological education of mariners, this informal component is also aimed at achieving the primary goal to ensure high levels of professional-ecological training for future bachelors of navigation, capable

of systematically analyzing and competently resolving various ecological situations, and qualified to carry out measures to prevent and eliminate pollution of the environment and the biosphere during vessel operation.

Therefore, we conclude that the ecological competence of future bachelors in navigation is a complex scientific object and requires a systemic approach in its study, and the process of targeted formation of this integrative characteristic of the personality should be considered as a pedagogical system. Recall that the pedagogical system must possess certain characteristics (Luzan, & Pasichnyk, 2023, p. 399-400): the presence of components, parts; diversity each system component has certain unique properties that distinguish it from other components; the presence of structure certain elements, connections, and relationships among them; the presence of integrative, general properties, qualities that no single component possesses; identifiability any component can be conditionally or actually distinguished from the construct; hierarchy; the presence of functional characteristics of the system as a whole and its individual components; the purposiveness of the system; every system is created to achieve a specific goal, so the functions of its components must correspond to the purpose and functions of the whole system; and the inherent communicative properties, which are manifested in two forms in interaction with the external environment and in interaction of this system with systems of a lower or higher order, and others.

Using the recently outlined features and characteristics of the system, the study justifies a hierarchical structure of dialectically interconnected elements (goal, main determinants, tasks, principles, stages, content, methods, forms, tools, diagnostics, expected result). In light of the principle of conceptual minimalism combined with the maximum informativeness of the subject of modeling (Lodatko, 2022), we have developed a conceptual model of the system for forming the ecological competence of future bachelor mariners, the visualization of which is presented in Table 1. As evident from the ideal construct shown in the table, the main determinants (formative and non-formative components of ecological education for future mariners) are directed towards achieving the primary goal of the studied process systematic, purpose-driven formation of ecological competence of future bachelor mariners.

**Conceptual Model of the System for Developing Ecological Competence in Future Bachelor's of Ship Navigation**

<b>Purpose</b>	<b>Systematic, targeted development of ecological competence in future bachelor's of ship navigation</b>	
<b>Determinants (Directions)</b>	Formal component of ecological education for seafarers	Informal Component of Maritime Environmental Education
<b>Main Tasks</b>	To form classical ecological knowledge and skills in students, develop ecological awareness of seafarers regarding the resolution of ecological situations during the operation of ships	Future seafarers' mastery of environmental conservation, eco-educational activities, and others, development of ecological thinking, worldview, and students' ecological ethics.
<b>Methodological Approaches</b>	Systemic, culturological, competence-based, technological	Activity-based, person-oriented, humanistic
<b>Fundamental Principles</b>	Systematicity, integrativity, scientific basis, interdisciplinarity	Nature correspondence, continuity, ecological responsibility, goodness
<b>Content</b>	Content of the course "Ecology and Environmental Protection" and environmentally oriented disciplines, ecologization of the content of other educational components of the program	Practical environmental conservation actions, research on ecological problems related to water pollution, eco-educational activities, ecological design, and so forth.
<b>Methods</b>	Explanatory-illustrative, reproductive, problem-informational, heuristic, research, gaming, simulation, simulation-gaming, etc.	Practical demonstration, execution of actions, operations, persuasion, suggestion, example, exercises, training, observation, experiments, design, research methods, and others.
<b>Forms</b>	Lectures, seminars, practical classes, design, forms of Internet self-education, participation in olympiads, conferences, ecological contests, etc.	Ecological clubs, teams, "eco-trails," ecological expeditions, volunteer eco-events, ecological events (cleaning of water bodies, ), ecological festivals, ecological internet excursions, and so on.
<b>Means</b>	Natural objects, subject-spatial representations of objects: machines, mechanisms, ship systems, ship models, demonstration stands, etc.; educational, methodological, ecological literature, scientific-reference publications; electronic educational resources	
<b>Diagnostics</b>	Criteria, indicators, and levels of ecological competence formation in future bachelor's of ship navigation	
<b>Expected Outcome</b>	Sufficient levels of ecological competence formation in future bachelor's of ship navigation	

The aim of implementing a system for developing ecological competence in future mariners is specified by interconnected tasks of both structurants of ecological education, in particular: (1) to form classical ecological knowledge and skills of students, to develop ecological awareness of mariners regarding the resolution of ecological situations during vessel operation; (2) for future mariners to master the experience of performing environmental protection, ecological education, and other activities, development of ecological thinking, ecological worldview, and ecological ethics of students. For the execution of the forecasted tasks, the conceptual model identifies methodological approaches, main principles, content, methods, forms, and means of forming ecological competence of future mariners.

**Conclusion.** The justified model is a theoretical construct that reflects the conceptual foundations of systemic formation of ecological competence in future bachelor's degree holders in ship navigation. The provisions laid down in this ideal object regarding the formation of the studied integrative characteristic of personality combine the possibilities of intra-disciplinary and interdisciplinary directions of ecological education for students with the acquisition of experience in environmental protection, ecological education, and other activities by future mariners. The implementation of the developed educational system in a higher education institution will significantly enhance the level of ecological knowledge, ecological thinking, ecological consciousness, and ecologically safe behavior of future bachelors in ship navigation.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.131-140>

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## ФОРМУВАННЯ ЕКОЛОГІЧНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ БАКАЛАВРІВ СУДНОВОДІННЯ: ТЕОРЕТИЧНИЙ АСПЕКТ

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### Реферат:

*Актуальність* зумовлюється тим, що екологічна криза у світі та в Україні зокрема, характеризується тенденцією до зростання. Викликами для вітчизняної екології стала війна з РФ, що жорстко нищить екосистеми країни. Нині маємо суттєві втрати сотень видів тварин і рослин. Це потребує поповнення організацій і установ, зокрема морського і водного транспорту, фахівцями з ґрунтовою професійно-екологічною підготовкою. Натомість морські заклади вищої освіти поки-що недостатньо зорієнтовані на активізацію екологічної освіти студентів, на виховання екологічно свідомих, з розвинутим екологічним мисленням моряків. Проблему цілеспрямованого формування екологічних знань, екологічних умінь, екологічної свідомості майбутніх фахівців-судноводіїв актуалізує й те, що педагогічною наукою дотепер не обґрунтовано докладних методологічних підходів, дієвих принципів, конкретних умов і правил продуктивної екологічної підготовки майбутніх фахівців морського і внутрішнього водного транспорту, не розроблено результативних технологій і методик системного опанування здобувачами морської освіти професійно орієнтованими екологічними знаннями, вміннями, навичками.

*Мета:* обґрунтувати педагогічну систему цілеспрямованого формування екологічної компетентності майбутніх бакалаврів судноводіння та розробити її концептуальну модель.

*Методи:* для досягнення мети дослідження використано теоретичні (теоретичний аналіз наукових праць, вивчення вимог нормативно-правових документів екологічного характеру – задля з'ясування рівня розробленості проблеми дослідження та визначення напрямів наукових розвідок; порівняння – з метою вивчення наукових підходів щодо розв'язання проблеми; аналіз і синтез – задля з'ясування особливостей еколого-професійної підготовки бакалаврів судноводіння, обґрунтування змісту формування їх екологічної компетентності; моделювання – для розроблення структурно-змістової моделі педагогічної системи) і емпіричні (педагогічне спостереження, бесіди, опитування – для визначення напрямів, етапів, форм, технологій формування екологічної компетентності майбутніх бакалаврів судноводіння).

*Результати:* на основі аналізу педагогічної теорії і освітньої практики з'ясовано особливості професійно-екологічної підготовки майбутніх бакалаврів судноводіння у закладах вищої освіти; визначено, що екологічна компетентність майбутніх бакалаврів судноводіння є складним науковим об'єктом і потребує системного підходу у його дослідженні, а сам процес цілеспрямованого формування цієї інтегративної властивості особистості вартує розглядати як педагогічну систему; доведено, що основними напрямками формування досліджуваного феномену є формальний і неформальний складники екологічної освіти, які в інтеграції форм, методів, засобів забезпечують системне, цілеспрямоване формування екологічної

компетентності майбутніх бакалаврів судноводіння; розроблена концептуальна модель системи поєднує концептуальні положення досліджуваного процесу в єдиний ідеальний конструкт, унаочнює послідовність «руху» від мети до очікуваного результату.

*Висновки:* обґрунтована модель є теоретичним конструктом, що відображає концептуальні основи системного формування екологічної компетентності майбутніх бакалаврів судноводіння; закладені у цьому ідеальному об'єкті положення щодо формування досліджуваної інтегративної властивості особистості поєднують можливості внутрішньо дисциплінарного і міждисциплінарного напрямів екологічної освіти студентів з набуттям майбутніми моряками досвіду виконання природоохоронної, науково-дослідницької, еколого-просвітницької та ін. діяльностей; реалізація розробленої педагогічної системи у закладі вищої освіти дозволить суттєво підвищити рівень сформованості екологічних знань, екологічного мислення, екологічної свідомості та екологобезпечної поведінки майбутніх бакалаврів судноводіння.

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**Ключові слова:** *екологічна освіта, екологічна компетентність, майбутні бакалаври судноводіння, екологічні знання, екологічний світогляд, морський транспорт, педагогічна система.*

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Received: 13 March 2024

Accept: 30 May 2024



# SPEECH COMPETENCE AS A COMPONENT OF PROFESSIONAL TRAINING FOR FUTURE VOCATIONAL EDUCATION TEACHERS

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## Abstract

**Relevance:** The prioritization of developing speech competence in future teachers of vocational education is necessitated by the need to equip learners with competencies for lifelong learning, aligning with the qualification requirements of higher education graduates amidst the reforms in the national higher education system and its integration into the European space.

**Objective:** To substantiate the importance of speech competence as a component of professional training for future teachers of vocational education in higher education institutions.

**Methods:** Analysis, synthesis, and generalization of scientific works and legislative and regulatory documents were used for the theoretical analysis of key concepts of the study, defining the term "speech competence as a component of professional training for future vocational education teachers"; comparison was employed to identify approaches to solving the researched problem; generalization and systematization were used to formulate conclusions and prospects for further research.

**Results:** Analysis of scientific works revealed that the speech competence of future vocational education teachers develops through the integration of the main tenets of linguistic sciences, psychology, and pedagogy. It is hierarchically subordinated to the principles of implementing a competence-based approach in the education system and integrates into the system of key (general) competencies as a distinct component. Speech competence, as defined in the Standard of Higher Education at the Bachelor's level, field of study 01 – "Education / Pedagogy", specialty 015 – "Professional Education (by specializations)" and in educational-professional programs, is determined by specific learning outcomes, mastery of which provides the ability to obtain an educational qualification. The level of speech competence within the system of general competencies for lifelong learning is a guarantee for the systemic further personal and professional development of a vocational education teacher according to the standards and socio-cultural trends.

**Conclusions:** Innovative and European integration development of educational systems, current scientific research in pedagogy and psychology, technological changes, and the digitalization of society require a systemic update of educational content components to effectively develop the speech competence of future vocational education teachers and to ensure their ability to organize and conduct pedagogical activities effectively.

**Keywords:** *speech competence, communicative competence, future vocational education teacher, higher education institution, professional training, standard, educational-professional program.*

**Introduction.** Modern transformations of the national higher education system are aimed at improving traditional approaches to professional training, updating educational content according to labor market needs, and developing and implementing innovative teaching technologies focused on developing competencies for lifelong learning in students. Among the current factors that necessitate the modernization of educational processes in higher education institutions (hereafter – HEIs), the significance of European integration processes in the country and the compliance of the national higher education system with the paradigm of the European Higher Education Area are gaining importance. The leading characteristics of this paradigm include the development of professional and key (universal) competencies in students, which ensure the individual's competitiveness in the labor market and readiness to model effective interaction patterns in professional and social environments.

According to the requirements of the European Union's Framework Programme on updated key competencies for lifelong learning, among the eight main key competencies identified are: communication in mother tongue and communication in foreign languages. The importance of these competencies is confirmed by the opinion of international experts (80% for the mother tongue, 72% for foreign languages). In the context of understanding the content of these competencies, the focus is also on the fact that more attention should be paid to literacy and personal language development during their formation, considering specialized or academic language, features of digital communication, and professional environment specifics (European Commission, 2018).

The future professional activity of vocational education teachers is directly related to communication and subject-subject interaction among participants of the educational process, and the level of formation of linguistic competence determines the effectiveness and quality of achieving the main goal of the professional activity of vocational education teachers regarding "organization and implementation of pedagogical activities, including professional-practical training of students, in institutions of vocational (vocational-

technical), advanced professional, higher education and other subjects of educational activity" (Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine, 2022). It is not only about the significance of linguistic tools and possession of the appropriate communicative toolkit, but also the development of extralinguistic abilities to analyze communicative situations, consider standards and behavior models of communication participants, and cultural and ideological tendencies of the social environment.

The development of speech competence in future teachers of vocational training integrates with the development of general and professional competencies, including communicative competence. This encompasses linguistic, extralinguistic, and operational components that ensure an individual's ability to use the language system in conditions of active communicative activity.

**The purpose** of this article is to substantiate the significance of speech competence as a component of the professional training of future teachers of vocational training in higher education institutions.

**Methods.** Analysis, synthesis, and generalization of scientific works, legislative and normative documents are used to conduct a theoretical analysis of key concepts of the research and to define the definition of "speech competence as a component of the professional training of future teachers of vocational training"; comparison is used to determine approaches to solving the researched problem; generalization and systematization are employed to formulate conclusions and perspectives for further research.

**Sources.** Research on the development of speech competence of future teachers of vocational training is based on the analysis of scientific works on the importance of the competence approach in the professional training of higher education seekers (V. Andrushchenko, S. Kalashnikov, V. Kremen, V. Lugovyi, T. Sulyma, O. Slyusarenko, Z. Talanova, S. Khotkina, et al.). The introduction of the competence approach in higher education programs is considered by scientists as a way to enhance the quality of educational services and to strengthen their professional-applied orientation, which leads

to the transformation of the content of education, aimed at the final result of the educational process – the acquisition of relevant competencies (Andrushchenko & Lugovyi, 2011). Taking into account the principles of structuring key (general) competencies, which are their "canonicity (essential uniqueness), irreplaceability, and fundamental necessity" (Rashkevich, 2014, p. 62), we agree with V. Lugovyi's opinion (2009, p. 11) regarding the types of human activity in the system of subject-object (subjective) relations of competence, which can be grouped into five types: intellectual-knowledge, creative-innovative, value-orientation, dialogical (consensual)-communication, and artistic-creative. The speech competence of the future teacher of vocational training in the context of pedagogical activity as an independent ability belongs to the dialogical (consensual)-communication type, yet in the system of comprehensive professional training it integrates into all groups of competencies and is defined in pedagogical theory and practice as a component of communicative competence. As noted by O. Korniyaka (2011), communicative competence is a defining component of the professional competence of a teacher, mediates the implementation of relevant professional functions, and encompasses a number of hierarchically subordinate competencies: informational, speech (language culture, correctness, expressiveness, and aesthetic quality of speech), competence in social interaction, competence in perception and understanding of another person. Investigating professional-pedagogical communication of future teachers, N. Volkova (2007) believes that to achieve mutual understanding and subject-subject relations in the educational process, they must master communicative-speech, informational-instrumental, organizational-technological, non-verbal, informational-search communicative skills.

Several scholars' works (Bosa, 2017; Honcharuk, 2012; Lukatska, 2018; Orap, 2010; Ostrovska & Beganska, 2009; Skybun, 2016; Sokolina, 2018; Khotkina, & Sulyma, 2019) focus on exploring the nature and characteristics of language and speech competence development among individuals at various educational levels, which is characterized by a diversity of scientific approaches, attributes of the target audience,

specifics of the educational process, and nuances of professional training. We align with M. Orap's (2010) position that language competence is a prerequisite for the development of speech competence, which is a broader concept and reflects the level of knowledge about the regularities of forming coherent statements from a given language system to articulate thoughts. As Y. Lukatska (2018) notes, speech competence is a system of skills and abilities used in communication to convey information. In our view, the essence of the concept of "speech competence" integrates principles from linguistic sciences (speech experience, language mastery, the ability to apply speech skills and abilities, etc.), psychology and pedagogy (the ability for interpersonal interaction in professional environments and life activities; the ability to establish effective communication and apply pedagogical communication techniques; understanding and accepting one's own communicative potential and the capabilities of the interlocutor, etc.), and sociology (the ability to adapt and socialize). In the context of researching speech competence in educational process participants, the fundamental positions of the relevant sciences are subordinated to the principles of implementing a competence-based approach in the education system, particularly in the process of professional training of future vocational education teachers in higher education institutions. An analysis of scientific works on the development of speech competence in higher education students allows us to assert that there is a lack of research in the scientific theory and pedagogical practice dedicated to the development of speech competence among future vocational education teachers.

**Results and Discussion.** The personality of the future professional education teacher develops and is revealed through individual characteristics thanks to language, its lexical-conceptual apparatus, communicative potential, and techniques used in both educational and future pedagogical activities. The potential of speech competence ensures the development of the future teacher of professional education as a highly qualified specialist. Hence, the task of higher education institutions in the process of professional training is to form not only professional competencies in higher education students but also to develop skills for the appropriate use of language

tools in practice, thereby ensuring excellence in their own linguistic culture and the ability to organize effective communicative interaction in any pedagogical situation.

Considering the speech competence of future teachers of professional education as a result of professional training, we understand that the procedure for forming the outcomes of learning and competencies is based on adherence to the principles of the competency-based approach. This includes considering the content of descriptors of the national qualifications framework at the corresponding qualification levels and European criteria, requirements of the professional standard, higher education standard, content of educational-professional programs, and curricula of mandatory and elective disciplines. The implementation of a competency-based approach leads to a reorientation of the dominant educational paradigm from knowledge transmission and skill formation to creating conditions for mastering a complex of competencies that define the graduate's ability to sustain life activities in a modern multifactorial environment. Thus, in the context of mastering speech competence as a component of professional training, the functional features of the competency-based approach become relevant (methodologically-regulative, conceptually-theoretical, project-technological, modeling-predictive, criterion-assessment, qualitative, orientation, practice-oriented, adaptive, standardization-normative, coordination-harmonic).

According to the Resolution of the Cabinet of Ministers of Ukraine "On Approval of the National Qualifications Framework," a descriptor of qualification levels is "communication" as one of the results of the corresponding professional competence, which together with knowledge, skills / abilities, responsibility, and autonomy ensures "interaction of individuals for the purpose of transmitting information, coordinating actions, and joint activity" (Cabinet of Ministers of Ukraine, 2011). Future teachers of professional education, who obtain a 6th level qualification of the National Qualifications Framework (educational qualification – bachelor's degree), must possess knowledge, skills/abilities, be responsible and autonomous, and according to the generalized result by the descriptor "communication" – must ensure:

conveying to specialists and non-specialists information, ideas, problems, solutions, personal experience, and arguments; collecting, interpreting, and applying data; communicating on professional topics, including in a foreign language, orally and in writing (Cabinet of Ministers of Ukraine, 2011).

The convergence trends of the National Qualifications Framework with European criteria involve the implementation of updated key competencies for lifelong learning in the vocational training process of educational seekers, among which language competence is defined as "the ability to use various languages effectively for communication" (European Commission, 2018). This competence includes understanding, expressing, interpreting concepts, facts, opinions, and feelings both orally and in writing; it encompasses the ability to listen, speak, read, and write within relevant social and cultural contexts.

The main knowledge, skills, abilities, and attitudes associated with language competence include: the use of vocabulary, knowledge of the functional grammar of various languages, and awareness of the main types of verbal interaction and language registers; knowledge of social customs, cultural aspects, and language dialects; the ability to understand conversational messages, initiate, maintain, and conclude conversations, read, understand, and compose texts in various languages according to personal needs; the ability to learn languages in a system of formal, non-formal, and informal education throughout life; valuing cultural diversity, showing interest in different languages and intercultural communication; respecting individual linguistic features of each person, including those belonging to minorities and/or migrants.

Thus, the national and European contexts for qualification level requirements of future professionals determine linguistic competence as a mandatory component for acquiring, attributing, or confirming a qualification, and its recognition on the domestic and international labor market.

According to the Professional Standard for Vocational Education Teachers (2022), communicative competence is listed among the general competencies as "the ability to communicate within professional activities," and speech competence is defined as "the ability to

communicate on professional topics in both the state and foreign languages (orally and in writing)" (Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine, 2022). Based on the Methodological Recommendations for the Development of Professional Standards (National Qualifications Agency, 2023), general competencies that reflect the content descriptors "communication," "responsibility and autonomy" in contemporary professional standards must be formulated as categories of learning outcomes in the context of professional competencies, involving their development, assessment, and acquisition both in educational institutions and by authorized Qualification Centers. Consequently, it can be asserted that even the Higher Education Standard for the first (Bachelor's) level in the field of knowledge 01 – "Education / Pedagogy," specialty 015 – "Professional Education (by specializations)" (Ministry of Education and Science of Ukraine, 2019), requires updates to broaden the range of professional competencies a modern vocational education teacher should possess, and to enhance the importance of speech competence in the implementation of pedagogical functions in accordance with the demands of the modern educational services market.

Directly in higher educational institutions, the professional preparation of future teachers of vocational education is conducted according to educational-professional programs (hereinafter referred to as EPPs). The system for developing competencies is aimed at ensuring appropriate learning outcomes, recorded in the EPPs, directed towards achieving the integral competence ("Ability to solve complex specialized problems and practical issues in vocational education, which involves the application of certain theories and methods of pedagogical science and other sciences relevant to the specialization 015.39 'Digital Technologies' and characterized by complexity and uncertainty of conditions") (Ministry of Education and Science of Ukraine & Kryvyi Rih National University, 2022, p. 7). Thus, the general competencies in the EPP "Professional Education (Digital Technologies)" for the specialty 015 "Professional Education (by specializations)" (specialization 015.39 "Digital Technologies") (Ministry of Education and Science

of Ukraine & Kryvyi Rih National University, 2022) are defined as follows: "ZK 2. Ability to preserve and enhance moral, cultural, scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society, and in the development of society, technology, and technologies, using various types and forms of physical activity for active rest and leading a healthy lifestyle"; "ZK 3. Ability to communicate in the state language both orally and in writing"; "ZK 4. Ability to communicate and find ways to solve professional problems in a foreign language"; "ZK 7. Ability to learn and master modern knowledge"; "ZK 9. Valuing and respecting diversity and multiculturalism".

These competencies ensure the formation of the following learning outcomes: "RN 4. Master skills of communication, interaction, and cooperation in international cultural and professional contexts"; "RN 5. Possess the culture of speech, choose the optimal communication strategy in communication with groups and individuals"; "RN 6. Clearly and unambiguously convey professional knowledge, reasoning, and conclusions to specialists and the general public in the state and/or foreign languages"; "RN 13. Possess skills in fostering cognitive interest, motivation for learning, professional self-determination, and self-development of education seekers."

The development of competencies and learning outcomes is carried out during the implementation of the mandatory components of the Educational and Professional Program (EPP) (MC 2 "Ukrainian Language (for professional orientation)", MC 3 "Foreign Language"; MC 8 "Psychology", MC 10 "Methodology of Professional Education", MC 12 "Professional Pedagogy") and during the mastery of elective disciplines (ED 1.2 "Business Foreign Language (for professional orientation)", ED 3.3 "Foreign Language for Specific Purposes", ED 4.1 "Conflictology in Professional Activity").

In the process of teaching disciplines, especially those that belong to the mandatory component of the EPP, the language competence of higher education students is developed primarily through subject-subject activity, which is

subordinate to ensuring active communication under traditional learning conditions or using distance technologies, but with mandatory consideration of individual psychological features and cognitive abilities of the learning subjects.

The organization of pedagogical communication between the teacher and the students precedes the design of a specific lesson: determining the goal and task, selecting educational tools, methods, and forms of education. During the design phase, the teacher already begins a "cognitive dialogue" with the target audience, anticipating the expected result of the joint communicative activity under the existing conditions of subject-subject interaction. Thus, we determine that the basis for the development of language competence of future teachers of professional education is laid by the teacher of the discipline, demonstrating and implementing pedagogical functions in terms of their structural, functional, and reflective components. If the structural component is largely determined by normative requirements, methodological and professional skills of the teacher, then the functional and reflective parts are provided thanks to the communicative function, which includes the possession of language competence by participants in the joint educational process.

The development of language competence of future teachers of professional education takes place according to the content of the educational programs of the general and professional cycles of training. Thus, functional support includes: knowledge about professional language, knowledge about accuracy, appropriateness, and correctness in the use of linguistic means (verbal and non-verbal); industry terminology; lexical units, speech etiquette, the structure of a speech act; the atmosphere of communication; social roles of the communicator; features of the activities of the subjects of the pedagogical process; the essence and peculiarities of professional-pedagogical activity; designing the content of educational material; developing didactic technologies; organizing the educational activities of students of professional (vocational-technical) education in mastering theoretical knowledge and forming practical skills; the educational activity of students based on collaboration; creating a favorable

psychological climate; striving for creative self-improvement, and more.

In this process, we perceive a dual result of the prospective use of higher education students' acquired linguistic knowledge and skills. The first is achieving learning outcomes in accordance with educational program requirements and mastering professional speech, speech techniques, logic, intonation, persuasive and influential means, and methods of building effective communication models in a professional environment, including in the digital space. The second result involves developing a comprehensively advanced personality through the emotional and aesthetic influence on the learners in the process of developing speech skills necessary for life activities in various social spheres. It concerns understanding the significance and appropriateness of using speech constructions (for example, phraseological units, dialectisms, slang, and a system of foreign phrasal units in the context of communicative interaction). Such speech skills enhance communication processes and are effective during the study of disciplines in the professional cycle, particularly in psychological and pedagogical fields, where speech competence is honed and polished in solving pedagogical situations.

Since the work with future professional education teachers is integrated, encompassing both general and specialized training, developing speech competence should address controversial aspects during the study of humanities disciplines in the training cycle (gaining particular importance during remote learning in wartime conditions). With such an approach, speech becomes substantive and well-argued.

The ability to adapt speech knowledge and skills to the specifics of the professional or sociocultural environment and the characteristics of the interlocutor, the skill to analyze speech and communicative processes, and to manage and correct one's own communicative potential are the most significant traits of a personality that characterize a high level of speech competence formation and practical application. In the discussed context, the speech competence of future professional education teachers is both a result of training in higher education institutions and a primary means of future pedagogical activity in educational institutions of various levels.

**Conclusions.** Thus, the speech competence of a future teacher of professional education is an indicator of the expression of his general linguistic culture and, in a professional environment, ensures the quality performance of labor functions regarding the organization and implementation of pedagogical activities in institutions of professional (vocational-technical), specialized secondary, higher education, and other educational entities.

The development of speech competence during the professional training of future teachers of professional education in higher education institutions must be ensured with an orientation towards national and European qualification requirements, among which the components of communicative activity, particularly linguistic (speech) competence, are the system-forming component of a professional's competence. As a result of training, speech competence integrates into the content of professional competence, providing the dynamics of its formation for the performance of future pedagogical activity, and in the context of general competencies for lifelong learning – it is a guarantee of systematic further personal and

professional development of a teacher of professional education.

Modern requirements for the level of professional qualification of a teacher of professional education imply primarily the renewal of the Higher Education Standard of the first (Bachelor's) level, field of knowledge 01 – "Education / Pedagogy", specialty 015 – "Professional Education (by specializations)." At the current stage of updating the content of normative disciplines, we see the expansion of sectoral specificity according to the reform and innovative development of education, current scientific pedagogical and psychological research, European integration processes, technical-technological progress, and the digitalization of society.

**Perspectives for further scientific research** within the studied problem are seen in justifying the forms, methods, and innovative pedagogical technologies for developing the speech competence of future teachers of professional education in higher education institutions based on the study of disciplines of the profile cycle of training the normative and elective component of the educational program.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.141-151>

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## МОВЛЕННЄВА КОМПЕТЕНТНІСТЬ ЯК СКЛАДОВА ПРОФЕСІЙНОЇ ПІДГОТОВКИ МАЙБУТНІХ ПЕДАГОГІВ ПРОФЕСІЙНОГО НАВЧАННЯ

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## **Реферат:**

*Актуальність:* пріоритетність розвитку мовленнєвої компетентності майбутніх педагогів професійного навчання зумовлюється необхідністю формування у здобувачів освіти компетентностей для навчання упродовж життя, що співвідноситься із вимогами до рівня кваліфікації випускників закладів вищої освіти в контексті реформування національної системи вищої освіти та її входження до Європейського простору.

*Мета:* обґрунтувати значення мовленнєвої компетентності як складової професійної підготовки майбутніх педагогів професійного навчання у закладах вищої освіти.

*Методи:* аналіз, синтез, узагальнення наукових праць, законодавчих і нормативних документів – для здійснення теоретичного аналізу ключових понять дослідження, визначення дефініції «мовленнєва компетентність як складова професійної підготовки майбутніх педагогів професійного навчання»; порівняння – з метою визначення підходів до розв’язання досліджуваної проблеми; узагальнення й систематизація – для формулювання висновків і перспектив подальших досліджень.

*Результати.* На основі аналізу наукових праць з’ясовано, що мовленнєва компетентність майбутнього педагога професійного навчання розвивається на основі поєднання основних положень лінгвістичних наук, психології та педагогіки, ієрархічно підпорядковується принципам реалізації компетентнісного підходу в системі освіти та інтегрується до компетентності окремою складовою системи ключових (загальних) компетентностей, зокрема комунікативної. Мовленнєва компетентність у змісті Стандарту вищої освіти першого (бакалаврського) рівня, галузі знань 01 – «Освіта / Педагогіка», спеціальність 015 – «Професійна освіта (за спеціалізаціями)» та в освітньо-професійних програмах визначається відповідними результатами навчання, опанування якими забезпечує можливість присвоєння освітньої кваліфікації. Рівень сформованості мовленнєвої компетентності у системі загальних компетентностей для навчання упродовж життя є запорукою системного подальшого особистісного та професійного розвитку педагога професійного навчання відповідно до вимог стандарту та соціокультурних тенденцій.

*Висновки:* інноваційний та євроінтеграційний розвиток освітніх систем, актуальні наукові дослідження у сфері педагогіки та психології, техніко-технологічні зміни та цифровізація суспільства вимагають системного оновлення змісту освітніх компонентів задля якісного розвитку мовленнєвої компетентності майбутніх педагогів професійного навчання та забезпечення здатності до ефективної організації і здійснення педагогічної діяльності.

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**Ключові слова:** мовленнєва компетентність, комунікативна компетентність, майбутній педагог професійного навчання, заклад вищої освіти, професійна підготовка, стандарт, освітньо-професійна програма.

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Received: 03 April, 2024

Accept: 31 May 2024



# ECOLOGICAL COMPETENCE OF SHIP OPERATORS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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## Abstract

*Relevance:* Under current conditions, the problem of ship navigation gains particular relevance – the formation of ecological competence of ship operators in the context of sustainable development, the study of important aspects of the interaction of vessels and the surrounding environment, particularly their impact on water resources, water pollution, emissions of harmful substances, and other ecological aspects.

*Objective:* To determine the role of ecological competence of ship operators in the context of sustainable development.

*Methods:* Theoretical methods: analysis, synthesis, generalization of scientific works on the issue of ecological competence of future professionals in the field of ship navigation and official documents – to define the theoretical and methodological bases of the phenomenon; study and generalization of the existing problem status with the aim of choosing pedagogical tools – for the development of ecological competence of ship operators; comparison – to identify various approaches to solving the researched problem; modeling – to justify the structural elements of the model for the development of ecological competence of ship operators.

*Results:* Key characteristics of ecological competence and its components have been identified; ecological competence of ship operators is considered as a complex integrative characteristic of the personality, reflecting motives of ecological activity, possession of ecological knowledge and natural science bases, practical skills and abilities regarding environmental protection; the necessity of forming ecological competence in ship operators during their professional training has been substantiated, as it directly affects the conservation of the marine water state, protecting them from pollution. It is noted that under current conditions, when sustainable development has become one of the priority directions of global policy, the ecological competence of ship operators is a key factor in ensuring safe navigation, and ecological education in the maritime sector is an important tool for forming this competence in ship operators.

*Conclusions:* Education acts as a catalyst for the development of sustainable thinking and practices in the maritime sector, promoting ecological safety and sustainable development in this strategically important industry; as the maritime sector continues to develop, the results of the conducted research emphasize the important role of education in preparing future ship operators to navigate the ecological complexities of the global maritime industry and to contribute to sustainable development and effective communication.

**Keywords:** *sustainable development, ecological competence, ship operators, future professionals, educational institutions, ecology.*

**Introduction.** Ecological competence of ship navigators is a critical component of modern maritime management, particularly in the context of sustainable development. Key aspects of this competence include understanding the ecological

impacts of shipping, compliance with natural resource conservation requirements, and efficient energy use, as well as participation in ecological safety measures. One of the crucial qualities of future navigators is the development of ecological

competence, which enables professionals to solve production-related problems associated with ecological and occupational safety without harming the environment.

Since the mid-1980s, ecological education has become part of the educational curriculum, yet studies indicate no positive effect (Safranov et al., 2017). The main reason is that while learners accumulate ecological information and knowledge, ecological culture does not develop. The educational process in Ukraine at the time required significant improvement to enhance effectiveness and integration. Such improvement is only possible through a deep philosophical and psycho-pedagogical understanding of the issue, considering the socio-cultural functions of ecology in society, the comprehensive structure of ecological knowledge, the current level of ecological science, traditions, customs, and history, the experience of the Ukrainian people in this field, and the specifics of the ecological-economic situation in the country. Therefore, the formation of ecological competence in future navigators under current conditions in Ukraine is an important quality, especially in the context of modern challenges related to environmental conservation and sustainable development, focusing on acquiring sustainable development skills and preparing for effective communication and ecological competence development.

**Sources.** The issue of developing ecological competence in future professionals of various specializations has been the subject of research by G. Galiyev, A. Glazachov, O. Gurenkova, L. Lukyanova, O. Litvinov, N. Oliynyk, L. Popenko, N. Pustovit, M. Tytarenko, T. Marchenko, and others. As T. Kharchenko notes, "a holistic solution to the problem of forming the ecological competence of a future navigator requires a comprehensive approach. Additionally, for effective formation of navigators' ecological competence, it is essential to consider factors such as the use of modern teaching and upbringing methods that foster the development of ecological awareness and motivation for environmentally safe activities and ensuring the accessibility of educational programs for all navigators, regardless of their age, experience, and education level" (Kharchenko et al., 2020).

**The aim** of this article: to identify the role of ecological competence of ship navigators in the context of sustainable development.

**Methods:** theoretical: analysis, synthesis, generalization of scientific works on the problem of ecological competence of future professionals in the maritime field and official documents - to define the theoretical and methodological foundations of the phenomenon; study and generalization of the existing state of the problem for the selection of pedagogical tools - for the development of navigators' ecological competence; comparison - to identify various approaches to solving the studied problem; modeling - to substantiate the structural elements of the model for the development of navigators' ecological competence.

**Results and Discussion.** In contemporary conditions, where sustainable development has become a prioritized direction of global policy, the ecological competence of mariners is a key factor in ensuring environmentally safe navigation, and ecological education in the maritime industry is an important tool for developing the ecological competence of mariners. It contributes to the development of their ecological awareness, understanding of ecological issues related to maritime transport, and knowledge about the principles of rational use of natural resources and environmentally safe operation of vessels. Training citizens with a high level of ecological knowledge, awareness, and culture based on new criteria for evaluating the relationship between society and nature should become one of the main levers in solving the extremely acute ecological and socio-economic problems of modern Ukraine (Tolochko et al., 2017).

According to the Concept of Ecological Education in Ukraine, all its achievements are aimed at acquiring fundamental ecological knowledge and methodology, as well as professional ecological training, greening of specialized disciplines, and ecological upbringing. This will ensure the formation of integrated ecological knowledge and thinking necessary for making substantiated management decisions at the level of enterprises, industries, regions, and the country as a whole (Concept, 2001).

Analyzing the state educational programs in ecology, an orientation towards the formation of rational use of natural resources among cadets of maritime institutions was identified, the quantity and

quality of which are diminishing each year. In July 2019, the Cabinet of Ministers of Ukraine adopted a new Regulation on the interaction between the Administration of Marine Ports of Ukraine (AMPU) and the State Environmental Inspection of Ukraine (SEIU) in case of pollution of the marine waters of Ukraine from vessels within marine ports. This will facilitate the fight against large-scale corrupt schemes in the system of ecological control in Ukrainian marine ports, which lead to significant expenses for ship owners and damage the international reputation of Ukraine as a maritime state.

Our study found that safe and high-quality maritime transportation has always been a priority of the European Union, alongside environmental protection and fair competition in the market (Tunysia et al., 2015). The list of legislative initiatives in this area is quite long and frequently updated. Specifically, the ISM Code is considered as one of the three "pillars" of the infrastructure created to eradicate substandard shipping. The other two are the activities of the flag states and the control by the port states (Padgett, 2016). The International Convention for the Prevention of Pollution from Ships (MARPOL) is the principal one covering the prevention of pollution of the marine environment from ships due to operation or accidents.

It should be noted that the impact of the maritime sector on the environment has prompted international and regional organizations to introduce strict rules and guidelines aimed at mitigating this impact. For example, the MARPOL Convention was adopted on November 2, 1973. The 1978 Protocol was adopted in response to a wave of tanker accidents in 1976-1977. The convention addresses pollution by oil from ships, harmful liquid substances carried in bulk, packaged form, sewage, garbage, and air pollution prevention from ships. The European Union supports all voluntary initiatives of its members, especially shipping companies, aimed at improving safety and quality. Many companies within the Community have also implemented ISO 9002 quality standards. Specifically, Occupational Safety and Environmental Certification (SEP) has been offered to the maritime sector since 1990. To date, more than fifty companies have voluntarily implemented SEP (Absalyamova et al., 2017).

Maritime instructors must demonstrate their readiness for effective interdisciplinary cooperation with instructors and lecturers of relevant disciplines. Additionally, they can involve maritime experts

(graduates of MET institutions, maritime officers) in the educational process itself.

Another important aspect to consider is the need for adequate educational resources to incorporate "green" skills into maritime education, which includes ecological competence. These could be cases for analysis, professionally-oriented projects for cadets, and authentic documentation. The primary task is the selection and adaptation of educational resources and the use of the opportunity to study disciplines. The accompanying tasks must be carefully developed; they serve as an effective tool for awakening interest and motivating future ship operators to participate in discussions. Future ship operators recognize the potential danger that shipping poses to the marine environment, hence the crew requires "green" skills, which are actually used on a daily basis to ensure proper ship operation.

Recognizing the need to implement "green" skills content in the educational process, researchers in environmental issues focus attention on various aspects of ecological issues that concern the role of instructors in this process (Kudryavtseva, etc., 2022). "Green" skills are understood as skills related to reducing the impact on the environment and supporting economic restructuring to achieve a cleaner, climate-resilient, and efficient economy that maintains ecological stability and provides decent working conditions. It is believed that their structure consists of three dimensions: knowledge, skills, and attitudes. "Green" skills support sustainable development of the economy, society, and the environment through activities in education and the economy.

Given the information provided, it is clear that the formation of ecological competence is important for the development of modern professionals, as it contributes to the creation of a sustainable and environmentally responsible society. By conducting an analytical review and summarizing the essential characteristics of the above definitions, it can be concluded that ecological competence is defined by the following key characteristics:

- knowledge about environmental problems: future marine professionals should understand the basic principles of ecosystem functioning, the processes of human impact on the natural environment, and the causes of environmental problems;

- ability to use environmentally friendly technologies: mariners must be able to apply modern technologies and methods aimed at reducing the

negative impact of human activity on the environment;

- conscious consumption. It is important to educate future marine professionals in a conscious attitude towards natural resources, understanding the principles of sustainable consumption, and responsible use of resources;

- ability to make decisions in ecological situations. Future marine professionals should be able to consider ecological aspects in professional problem solving and make decisions aimed at preserving nature;

- cooperation in a global context. In a world where environmental problems have a global character, it is important for professionals to be able to cooperate internationally, adhering to ecological standards and agreements;

- active participation in ecological initiatives. Future mariners should be prepared to participate in projects and initiatives aimed at improving the environmental condition and preserving biodiversity.

- As noted, under current conditions, where sustainable development has become one of the priority directions of global policy, and the ecological competence of mariners is a key factor in ensuring environmentally safe navigation.

- Let's define what the concept of "ecological competence" includes. It is a complex of knowledge, skills, and abilities necessary for the performance of professional duties with consideration for environmental protection requirements. Analyzing numerous scientific studies on this issue, it can be stated that it includes the following components:

- ecological knowledge, defined as understanding the ecological problems associated with maritime transport, as well as knowledge of the principles of rational use of natural resources and environmentally safe operation of ships;

- ecological skills, which can be defined as the ability to apply ecological knowledge in practice, particularly in areas such as: ship management considering environmental protection requirements; prevention of environmental pollution during ship operation; response to ecological emergencies;

- ecological skills: the ability to make ecologically reasoned decisions in various situations.

Thus, it can be concluded that the formation of ecological competence in mariners is a task facing all participants in the maritime industry. It is carried out within the framework of training mariners in educational institutions, as well as through the

enhancement of qualifications and retraining in courses and seminars.

Maritime education traditionally focuses on providing cadets with the technical and operational skills necessary for navigation and ship management. These skills include navigation, ship management, cargo handling, and emergency response. Although this traditional approach remains crucial, there is an increasing realization of the need to integrate environmental education into maritime training programs. Researchers advocate for a comprehensive educational approach in maritime education, which includes aspects of sustainable development, because maritime education is of great importance for the formation of ecological competence, awareness, and management among future mariners, in particular:

- Future mariners encounter various environmental problems, such as marine pollution, emissions of harmful substances, and the impact of climate change on the marine environment. Training on these issues helps prepare cadets for effective management of such challenges;

- Understanding environmental aspects is crucial for the safety of navigation. For example, training about the impact of weather conditions on marine events and knowledge of ecological systems allows future mariners to be prepared for various situations at sea;

- International standards and duties require maritime professionals to comply with environmental norms and procedures. Environmental awareness is important for fulfilling these duties and adhering to standards;

- Given the growing attention to sustainable development, future mariners must understand the principles and practices that contribute to the conservation of marine resources and the reduction of human impact on the marine environment;

- Cadets should learn to effectively respond to environmental disasters and take necessary measures to prevent further pollution and restore the natural environment (Hurenkova, 2009).

Ensuring a high level of ecological awareness and management in maritime education helps form responsible and competent professionals capable of working effectively in the conditions of the contemporary marine environment.

**Conclusions.** It has been established that the maritime sector in the modern world faces various challenges related to environmental aspects and the need for sustainable development. One of the key strategies for addressing these problems is the

integration of environmental education into the training of future mariners, aimed at highlighting the importance of the role of education in promoting sustainable practices in the maritime sector. It has been determined that the integration of environmental education into the training of future mariners is important for forming ecologically competent and sustainability-oriented professionals. Education thus serves as a catalyst for the

development of sustainable thinking and practices in the maritime sector, contributing to ensuring ecological safety and sustainable development in this strategically important industry. The integration of environmental education becomes a key element in preparing future generations of mariners for effective resolution of environmental challenges in the maritime sector.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.152-158>

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## ЕКОЛОГІЧНА КОМПЕТЕНТНІСТЬ СУДНОВОДІВ В УМОВАХ СТАЛОГО РОЗВИТКУ

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### Реферат:

*Актуальність:* за сучасних умов особливої актуальності набуває проблема в сфері судноплавства – сформованості екологічної компетентності судноводіїв у контексті сталого розвитку, дослідження важливих аспектів взаємодії суден та навколишнього середовища, зокрема їх вплив на водні ресурси, забруднення водойм, викиди шкідливих речовин та інші екологічні аспекти.

*Мета:* визначити роль екологічної компетентності судноводіїв в умовах сталого розвитку.

*Методи:* *теоретичні:* аналіз, синтез, узагальнення наукових праць з проблеми екологічної компетентності майбутніх фахівців у сфері судноплавства й офіційних документів – для визначення теоретико-методологічних основ феномену; *вивчення та узагальнення* існуючого стану проблеми з метою вибору педагогічного інструментарію – для розвитку екологічної компетентності судноводіїв; *порівняння* – з метою визначення різноманітних підходів до розв'язання досліджуваної проблеми; *моделювання* – з метою обґрунтування структурних елементів моделі розвитку екологічної компетентності судноводіїв.

*Результати:* визначено ключові характеристики екологічної компетентності та її складові; розглянуто екологічну компетентність судноводіїв як складну інтегративну характеристику особистості, яка відображає мотиви екологічної діяльності, володіння екологічними знаннями і природно-науковими основами, практичні вміння та навички щодо охорони навколишнього середовища; обґрунтовано необхідність формування екологічної компетентності судноводіїв у процесі їхньої професійної підготовки, оскільки від цього безпосередньо залежить збереження стану морських вод, захист їх від забруднення. Зазначено, що у сучасних умовах, коли сталий розвиток став одним з пріоритетних напрямів світової політики, екологічна компетентність

судноводіїв є ключовим фактором забезпечення безпечного мореплавання, а екологічна освіта в морській галузі є важливим інструментом для формування цієї компетентності судноводіїв.

*Висновки:* освіта виступає каталізатором для розвитку сталого мислення та практик у морському секторі, сприяючи забезпеченню екологічної безпеки та сталого розвитку в цій стратегічно важливій галузі; оскільки морський сектор продовжує розвиватися, результати проведеного дослідження підкреслюють важливу роль освіти у підготовці майбутніх судноводіїв, щоб вони могли орієнтуватися в екологічних складнощах глобальної морської індустрії, а також сприяти сталому розвитку та ефективній комунікації.

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**Ключові слова:** *сталий розвиток, екологічна компетентність, судноводії, майбутні фахівці, заклади освіти, екологія.*

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Received: 28 February 2024

Accept: 31 May 2024



# PUBLIC-PRIVATE PARTNERSHIP MODELS IN THE PROFESSIONAL TRAINING OF SPECIALISTS FOR THE CONTEMPORARY LABOR MARKET NEEDS

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## Abstract

*The relevance* of the article is determined by the need to substantiate the characteristics of the application of public-private partnership models in the vocational training of specialists in institutions of vocational (vocational-technical) education, taking into account the contemporary needs of the labor market, capable of working effectively in high-tech manufacturing environments.

*Objective:* To identify and substantiate the characteristics of the application of public-private partnership models in the vocational training of specialists for the contemporary needs of the labor market.

*Methods:* Analysis of normative and scientific literature regarding the development of public-private partnerships in the field of vocational (vocational-technical) education and the summarization of its results – to identify the state of the problem's development and to clarify the characteristics of the application of public-private partnership models in the vocational training of specialists for the contemporary needs of the labor market.

*Results:* The characteristics of public-private partnership models in conducting the vocational training of specialists for the contemporary needs of the labor market have been determined and substantiated. The participation of private companies in co-financing programs for the vocational training of specialists, the modernization of the material and technical base of vocational (vocational-technical) education institutions, and the creation of conditions for internships for students and teaching staff of vocational (vocational-technical) education institutions at high-tech workplaces have been analyzed.

*Conclusions:* It has been found that the effectiveness of public-private partnerships in the vocational training of specialists is ensured through the implementation of models: joint financing of vocational (vocational-technical) education programs; internships for students of vocational (vocational-technical) education at partner enterprises; organization of dual form of vocational education; training of specialists on the order of enterprises. Among the characteristics of the application of public-private partnership models are: ensuring the quality of vocational training of specialists, reducing expenses from the state budget on the implementation of vocational (vocational-technical) education programs, increasing the level of employment in the profession of graduates, and strengthening the links between vocational (vocational-technical) education and private business. Recommendations have been formulated for activating public-private partnerships in the vocational training of specialists through organizing informational and educational work, improving the regulatory framework, ensuring funding for educational projects, coordinating efforts on the part of all interested partners, and enhancing transparency and accountability of their activities, in order to minimize the risks of corruption in the implementation of public-private partnership projects.

**Keywords:** public-private partnership, models, vocational (vocational-technical) education, labor market, specialists, private business.

**Introduction.** The globalization of economic processes and the dynamic development of modern technologies necessitate significant changes in the structure of the national economy and the labor

market. In particular, the automation and robotization of production processes, the widespread use in professional activity of technologies such as artificial intelligence, 3D printing, the Internet of Things, and

"big data," create a demand for specialists with new knowledge and skills in programming and technical maintenance of automated systems, big data analysis, and logistics. This is a crucial factor for the successful development of state enterprises and private companies. Under these conditions, public-private partnership (hereafter – PPP) is one of the key mechanisms for modernizing the system of vocational (vocational-technical) education (hereafter – V(TE)E) and ensuring that professional qualifications meet labor market needs through the combined efforts of state and private partners for financial and expert support in implementing innovations. Ultimately, ensuring the professional training of specialists, taking into account the current demands of the labor market, contributes not only to their individual professional development but also to the economic growth of the state as a whole.

Despite numerous advantages of PPP in professional training, there are certain challenges: insufficient awareness of V(TE)E institutions and private companies about the opportunities they can gain from implementing PPP projects, as well as experience in participating in such projects; the absence of a clear legal framework regulating PPP in the field of V(TE)E; insufficient funding for the implementation of PPP projects, coordination of efforts by all partnership participants, transparency, and accountability in the activities of PPP entities to minimize corruption risks, among others.

**Sources.** The legal foundations of contractual relations between interested parties in PPP are the Laws of Ukraine "On Public-Private Partnership" (2010), "On Education" (2017), as well as the provisions of the National Economic Strategy for the period up to 2030 (2021), Goals of Sustainable Development of Ukraine for the period up to 2030 (2019), Concept of the State Target Social Program for the Development of Vocational (Vocational-Technical) Education for 2022-2027 (2022), among others. Specifically, according to the Law of Ukraine "On Education" (2017), the state is tasked with developing educational standards based on competencies, introducing dual education, and licensing and accrediting V(TE)E institutions and certifying educational staff, among other responsibilities.

Based on the research results on PPP issues in the field of Vocational Education and Training

(hereafter – VET), domestic researchers have identified its main directions: strengthening cooperation between the parties of PPP, including state institutions, VET institutions, the private sector, and the public to improve the quality of professional training of specialists (Radkevych, 2022); creation of joint programs that facilitate the development of VET in conditions of war and post-war times (Radkevych, 2023); implementation of systemic monitoring of VET and evaluation of its results (Kravets, 2022); ensuring accessibility of VET for all population categories, regardless of residence and social status or the consequences of the state of war (Popova, 2022). Furthermore, PPP in the field of VET is viewed by scholars as a system of long-term, mutually beneficial contractual economic and organizational relations between public and private entities aimed at attracting additional investments in the development of vocational education, increasing the level of joint responsibility for decision-making that represents public interest, and achieving pedagogical, social, and economic effects (Radkevych, 2022).

An innovative form of PPP in professional training, as highlighted by O. Strilets, is dual training, the implementation of which positively affects the quality of VET and the employment rate of graduates (2019). According to foreign researchers (Frank et al., 2016), the effectiveness of the dual education system lies in combining education in vocational institutions with practice in enterprises. This model enables students to acquire the necessary practical skills, enhancing their competitiveness in the job market. Research results have concluded that implementing dual education requires maintaining close cooperation between educational institutions and enterprises to match educational programs with the real needs of production. This approach has already been implemented in Germany and other European countries, where it has proven its effectiveness.

Scientific interest is represented by the research of Hodge & Greve (2017) regarding the development of public-private partnerships in the field of professional training in European countries. They believe that the main purpose of such partnerships is to ensure the adaptation of professionals to the demands of the modern labor market and the effective use of resources in professional activities. Meanwhile, the analysis of the European labor market's needs for professionals

indicates an increase in demand, as in Ukraine, for IT specialists, automated production line operators, construction installers and technicians, masters of industrial equipment maintenance, etc. This demand for professions is driven by rapid technology development and the necessity of implementing innovative educational solutions in the production process (Schwab, 2015).

**The purpose of the article:** to identify and justify the peculiarities of applying models of public-private partnerships in the professional training of specialists for the current needs of the labor market.

**Methods:** analysis of regulatory and scientific literature on the development of public-private partnerships in the field of professional (vocational-technical) education and the generalization of its results – to determine the state of problem development and understand the peculiarities of applying models of public-private partnerships in the professional training of specialists for the current needs of the labor market.

**Results and discussion.** The system of vocational (technical) education plays an important role in the professional training of specialists who meet the current needs of the labor market. It concerns not only the possession of technical knowledge but also a set of soft skills that enable professionals to effectively perform their duties, work in a team, learn quickly, adapt to changing conditions in the production processes, and communicate effectively. Additionally, important skills related to work safety, environmental responsibility, and the need to work in stressful conditions are crucial. To ensure the professional training of specialists meets the needs of the modern labor market, it is essential to form skills of critical thinking (the ability to analyze situations, make decisions, and solve problems); flexibility and adaptability (readiness to learn new technologies and methods of work, the ability to quickly adapt to changes) (Autor, 2019). For this, it is vital that educational programs are adapted to the current demands of employers and take into account the latest technological achievements. Moreover, it is very important to ensure close cooperation between vocational (technical) institutions and private companies to develop educational programs that reflect the current needs of the labor market. In this context, the role of PPP in professional training of specialists, based on the

principles of: mutual benefit, where all participants of PPP gain certain benefits from cooperation; voluntariness, according to which participation in PPP is voluntary; equality, so that all participants of PPP have equal rights and obligations; transparency, according to which information about the activities of PPP should be open and accessible to all interested parties; responsibility, according to which all participants of PPP are responsible for fulfilling their commitments.

The peculiarities of PPP in the professional training of specialists are characterized by the application of organizational models, which vary in forms of cooperation, resource allocation, and partnership responsibilities, namely: joint financing of VET programs; internships for VET candidates at partner enterprises; organization of dual forms of professional education; and training of specialists on the orders of enterprises. Specifically, the characteristics of the model of joint financing of VET programs include the pooling of resources from private companies and public institutions to finance educational programs and curricula for the professional training of qualified specialists, which enhances the quality and provides modern technical equipment for VET institutions. This approach reduces the burden on the public budget and attracts additional resources for the modernization of VET (Lewis et al., 2021). Additionally, PPP stimulates the introduction of innovations into educational programs. The private sector often serves as a source of cutting-edge technologies and methods that can be integrated into the educational process. This enables VET institutions to be at the forefront of scientific and technical progress and to train specialists who possess up-to-date knowledge and skills. Furthermore, collaboration with private business also promotes the development of entrepreneurial competence in future specialists, which is essential for the modern knowledge economy, where innovation and entrepreneurship become key factors in an individual's professional success.

In the context of the mentioned model, the activities of representatives of government bodies and private companies are conducted as follows: first, the needs of the labor market for qualified specialists are jointly identified; second, a working group is formed, comprising representatives of public institutions, private companies, and VET institutions;

third, the working group develops educational programs and curricula that meet the identified needs; fourth, the educational programs and curricula are tested and approved by the relevant authorities; fifth, VET institutions implement the educational programs developed with the participation of employers; sixth, the implementation of educational programs and curricula is monitored and evaluated. The advantages of the joint financing model of VET programs include: improving the quality of professional training of specialists, as the educational programs and curricula developed with the participation of employers better meet the needs of the labor market; reducing the costs of VET from the public budget through investments from private companies in the development of educational infrastructure and innovative educational programs; increasing the employment rate of graduates who have obtained VET through partnership programs, and more.

The specific model of PPP that ensures the organization of internships for VET (Vocational Education and Training) students at partner enterprises considers the provisions of PPP principles. According to these principles, all internship participants have different rights and duties and gain certain benefits from the collaboration; participation in the internship is voluntary, and information about the internship results must be open and accessible to all interested PPP parties; all participants are responsible for fulfilling their obligations. The internship mechanism can vary and ultimately includes acquiring practical work experience in their field for VET students, which significantly enhances their competitiveness in the job market. Furthermore, internships facilitate collaboration between VET institutions and employers, making the vocational training system more adaptable to the current labor market needs.

In Ukraine, internships are regulated by the "Law on Employment of the Population" (2013). To organize internships at partner enterprises, the following steps must be observed: a) signing an internship agreement between the VET institution and the enterprise, which defines the rights and obligations of the parties; b) developing an internship program that sets the goals, tasks, duration, and content of the internship; c) selecting VET students to participate in the internship; d) undergoing the

internship with specific tasks under the supervision of enterprise professionals; e) concluding the internship, receiving assessments and feedback from internship supervisors, etc. At the same time, there are certain challenges in organizing internships. For this purpose, it is advisable to clearly define the internship goals and select qualified mentors who can effectively teach and provide valuable professional advice. Moreover, it is important to consider that internships might be paid and not accessible for a significant number of VET students. Overall, internships are a valuable component of vocational training, helping future professionals gain practical experience, improve their employment prospects, and strengthen ties between VET institutions and private business.

Regarding the model of dual vocational education, it combines theoretical training in Vocational Education and Training (VET) institutions with practical training at partner enterprises. The features of implementing this model include: the presence of a contract for dual education and a curriculum that defines the theoretical and practical content components; the assessment of the educational outcomes of VET students by both the institution's teachers and the specialists from partner enterprises (mentors); and the attainment of a VET diploma, as well as a certificate of professional qualifications. Globally, there are many successful examples of implementing dual vocational education. Among the most well-known is the German "Duales System der Berufsausbildung" (DSBA), which has been in operation since 1969. Within the DSBA, students spend two to three years studying both at an educational institution and at an enterprise. This model is highly effective, with the employment rate of DSBA graduates being approximately 90% (Karriere bibel, 2022).

In Ukraine, the dual form of professional education is regulated by the Law of Ukraine "On Education" (2017). According to Article 9 of this law, this form involves combining the education of individuals in educational institutions (and other educational entities) with workplace training at enterprises, institutions, and organizations to acquire a specific qualification, typically based on a contract (Verkhovna Rada of Ukraine, 2017). According to the provisions of the Concept of Training Specialists through the Dual Form of Education (2018), an

equitable partnership is established between educational institutions to enable VET students to gain practical experience in applying competencies and adapting them in a professional context. The organization of the educational process is based on educational programs/standards for VET in specific professions/qualifications and working curricula, which are developed jointly with business entities and approved in the legally established order upon agreement with the business entity (Ministry of Education and Science of Ukraine, 2019).

In the Regulation on the Dual Form of Professional Post-Secondary and Higher Education, one of the main objectives identified is: enhancing the quality of training specialists according to the current labor market demands and the needs of employers by: modernizing the content and methods of implementing the practical component of the educational process; increasing the motivation of students to learn, and enhancing the role of employers in the training system at all stages from participating in the development of educational programs to assessing the outcomes of education (Ministry of Education and Science of Ukraine, 2023).

Advantages of the dual system of vocational education include the practical orientation of educational programs and curricula; employment in the profession; involvement of future specialists in the training process through mentorship from partnering enterprise workers; and funding of educational programs by employers.

The PPP model "training specialists on enterprise orders" is characterized by private companies commissioning vocational education institutions to train specialists with the necessary professional knowledge and skills. To achieve this, private companies identify their needs for specialists with specific qualifications and professional

competencies, develop a professional training program that reflects the requirements of the private company, and implement it using their methods and resources. Upon successful completion of their professional training, specialists receive a diploma from the vocational education institution or a certificate confirming their professional qualifications (full or partial). In Ukraine, the training of specialists on private company orders is gaining popularity. Many Ukrainian vocational education institutions have partnership agreements with private companies that order professional training of specialists for their own business needs.

**Conclusions.** Public-private partnerships in professional training open up new opportunities for improving the quality of VET (Vocational Education and Training) and its alignment with the contemporary needs of the labor market. One of the promising mechanisms of PPP involves implementing various models of partnership in professional training, such as: co-financing of VET programs; internships for VET participants at partner enterprises; organizing dual education forms; and training specialists on enterprise orders. The features of applying PPP models include: ensuring the quality of professional training, reducing state budget expenses on implementing professional (vocational-technical) education programs, enhancing the employment rate of graduates in their fields, and strengthening the links between professional (vocational-technical) education and private business. To activate PPP in professional training, it necessitates organizing informational and educational work, improving the legal framework, ensuring financing for educational programs, coordinating efforts from all stakeholders, and enhancing transparency and accountability in their activities to minimize corruption risks in PPP projects.

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# МОДЕЛІ ДЕРЖАВНО-ПРИВАТНОГО ПАРТНЕРСТВА У ПРОФЕСІЙНІЙ ПІДГОТОВЦІ ФАХІВЦІВ ДЛЯ СУЧАСНИХ ПОТРЕБ РИНКУ ПРАЦІ

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## Реферат:

*Актуальність* статті зумовлюється необхідністю обґрунтування особливостей застосування моделей державно-приватного партнерства у професійній підготовці фахівців у закладах професійної (професійно-технічної) освіти з урахуванням сучасних потреб ринку праці, здатних ефективно працювати в умовах високотехнологічного виробництва.

*Мета:* визначити та обґрунтувати особливості застосування моделей державно-приватного партнерства у професійній підготовці фахівців для сучасних потреб ринку праці.

*Методи:* аналіз нормативної й наукової літератури щодо розвитку державно-приватного партнерства у сфері професійної (професійно-технічної) освіти та узагальнення його результатів – для виявлення стану розробленості проблеми й з'ясування особливостей застосування моделей державно-приватного партнерства у професійній підготовці фахівців для сучасних потреб ринку праці.

*Результати:* визначено та обґрунтовано особливості моделей державно-приватного партнерства у здійсненні професійної підготовки фахівців для сучасних потреб ринку праці, проаналізовано участь приватних компаній у співфінансуванні програм професійної підготовки фахівців, модернізації матеріально-технічної бази закладів професійної (професійно-технічної) освіти, створенні умов для стажування здобувачів освіти і педагогічних працівників закладів професійної (професійно-технічної) освіти на високотехнологічних робочих місцях.

*Висновки.* З'ясовано, що ефективність державно-приватного партнерства у професійній підготовці фахівців забезпечується шляхом реалізації моделей: спільного фінансування програм професійної (професійно-технічної) освіти; стажування здобувачів професійної (професійно-технічної) освіти на підприємствах партнерів; організації дуальної форми професійної освіти; навчання фахівців на замовлення підприємств. До особливостей застосування моделей державно-приватного партнерства віднесено: забезпечення якості професійної підготовки фахівців, зменшення витрат з державного бюджету на реалізацію програм професійної (професійно-технічної) освіти, підвищення рівня працевлаштування за фахом випускників та зміцнення зв'язків між професійною (професійно-технічної) освітою і приватним бізнесом. Сформульовано рекомендації щодо активізації державно-приватного партнерства у професійній підготовці фахівців шляхом організації інформаційно-просвітницької роботи, вдосконалення нормативно-правової бази, забезпечення фінансування освітніх проєктів, координації зусиль з боку всіх заінтересованих партнерів, а також прозорості та підзвітності їхньої діяльності, щоб мінімізувати ризики корупції в реалізації проєктів державно-приватного партнерства тощо.

**Ключові слова:** державно-приватне партнерство, моделі, професійна (професійно-технічна) освіта, ринок праці, фахівці, приватний бізнес.

Received: 04 March 2024

Accept: 31 May 2024



# STRUCTURAL-FUNCTIONAL MODEL OF FORMING PROFESSIONAL VALUE ORIENTATIONS IN FUTURE AGRITECHNICIANS AT THE COLLEGE THROUGH CURATORIAL ACTIVITIES

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## Abstract

*Relevance.* *Relevance.* Current events in Ukraine and associated socio-economic and psychological transformations stimulate members of society to take responsibility for their own destiny, thereby gradually affirming a fundamentally new system of value orientations in people's consciousness. This underscores the importance of integrating future specialists' professional values with the values of a free democratic society; thus, the process of educational seekers' value self-determination should be viewed as a process of defining and forming a value-oriented system necessary for successful further professional activity in the "human – human", "human – world" system.

*Objective:* To substantiate the structural-functional model of curatorial educational activity as a significant factor in the formation of professional-value orientations in future agritechicians.

*Methods:* Study and analysis of philosophical, general scientific, methodological, psychological-pedagogical literature, and legal documentation; educational-planning documentation to assess the problem's current state; synthesis of obtained information to determine research directions (refinement of hypothesis, conceptual framework); comparison – for contrasting researchers' approaches to solving the problem of forming professional-value orientations; synthesis – for substantiating the conceptual-categorical apparatus, defining the content of future agritechicians' professional-value orientations, substantiating the role of the curator in their formation and development; modeling – to create a model of curatorial educational activity.

*Results and discussion:* The source base of the study was examined, its conceptual-categorical apparatus was specified; a theoretical analysis of the educational activity of the curator as a pedagogical problem was conducted; the structural-functional model of curatorial educational activity was substantiated, and the main tasks of the curator's work were formulated.

*Conclusions:* It was demonstrated that forming professional-value orientations in future agritechicians is a complex process that combines both future specialists' personal perceptions of their profession's values and considerations of the socio-cultural context of their professional training and adaptation; it was determined that forming professional-value orientations in future agritechicians is a methodologically substantiated educational process, aimed at the professional-personal establishment of educational seekers and mastering by future agritechicians of the norms and values of their future profession, recognizing themselves as subjects of this profession, and fostering a stable positive attitude towards future professional activity; it was clarified that the curator's influence on student groups is significant in forming professional-value orientations; the main tasks of the curator were formulated (preparing educational seekers to recognize the motivational-value system of the specialist; motivating educational seekers to align their motives and values with professional requirements; teaching future specialists to align personal traits and qualities with the characteristics and requirements of the profession; consulting educational seekers on professional development); the structural-functional model of curatorial educational activity was substantiated, presented in several blocks (normative-target, methodological, organizational-procedural, structural-criterial) and aimed at facilitating the formation of professional-value orientations in future agritechicians; prospective directions for further research were identified (preparing curators to address problems of educating future specialists and developing a system for evaluating the results of their educational activity).

**Introduction.** The structure of professional value orientations, inherent in a socially mature individual with a stable life stance, is an important characteristic of a subject of professional activity. Insufficient attention to the formation of professional-value orientations leads to an incomplete understanding by educational seekers of the essence and importance of the values of future professional activities, and their significance in personal development. A. Shydelko (2017) believes that value orientations are key elements of the internal structure of personality, formed based on life experience. They are intended to distinguish significant from unimportant. A formed complex of value orientations provides stability of personality regarding its demands, needs, interests, and hobbies. The system of value orientations determines the content side of the personality's orientation, helping it find its place in life, self-identify, and realize itself in the profession. It also creates a basis for relationships with the surrounding world, other people, and oneself, constitutes the basis of the worldview and motivation for life activity, and forms the life concept and philosophy of life. Therefore, the need to research this problem arises.

Currently, a significant body of scientific knowledge has been accumulated, necessary for studying the problem of forming professional-value orientations as a factor in the development of higher education seekers, and there are almost no studies on their formation in institutions of advanced professional education.

In contemporary society, values associated with the process of personal development, improvement, and actualization of the individual, which are the basis of the modern paradigm of personally-oriented advanced professional education, become a priority. New guidelines in the training of specialists in institutions of advanced professional education prompt the definition of the problem of forming professional-value orientations of future specialists, which constitute the internal basis of their attitude towards professional activity, which begins in the process of professional training in the institution.

**Sources.** The importance of forming the professional orientation of the personality is actualized in educational publications by researchers such as: A. Shydelko (2017), V. Holovenkin (2019),

S. Shevchuk and V. Kulishov (2021), and others. In the study, we also relied on the scientific conclusions of P. Luzan (2012) and O. Radkevych, (2012; 2020) regarding the importance of forming the professional orientation of the personality as one of the key tasks of professional education. We considered the position of O. Korets (Korets, 2018) that orientation determines the success of mastering a profession by a person and acts as a "system-forming" factor of a professional's personality. These works prompted the consideration of the problem of professional-value orientations of seekers of advanced professional education and the definition of the role of the curator in their formation.

**The purpose of the article** is to substantiate the structural-functional model of the educational activity of the curator as an important factor in the formation of professional-value orientations of future agritechnicians.

The implementation of the set goal involved solving the following tasks: clarifying the essence of the process of forming professional-value orientations; justifying the role of the curator in the formation and development of professional-value orientations of education seekers; justifying the structural-functional model of the educational activity of the curator as an important factor in forming the professional-value orientations of future agritechnicians.

**Research methods:** studying and analyzing philosophical, general scientific, methodological, psychological-pedagogical literature, normative-legal base, educational-planning documentation - to identify the state of development of the problem; summarizing the information obtained - with the aim of defining the directions of research (clarification of hypotheses, conceptual apparatus); comparison, juxtaposition - for comparing researchers' approaches to solving the problem of forming professional-value orientations; synthesis - to justify the conceptual-categorical apparatus, clarify the content of professional-value orientations of future agritechnicians, justify the role of the curator in their formation and development; modeling - to create a model of the educational activity of the curator.

**Results and discussion.** As a result of the analysis of scientific psychological-pedagogical research over the last two decades, we have

identified three main components in the structure of professional-value orientations: value, motivational, and cognitive-reflective. The degree of their formation influences the preparation and effectiveness of the professional formation of the personality of future agritechicians.

Considering the specificity of professional-value orientations as an important component in the structure of personality, under the formation of professional-value orientations of future agritechicians, we understand a methodologically prepared educational process, aimed at: professional-personal formation of education seekers and mastering by future agritechicians of norms and values of their future profession; realization of oneself as a subject of this profession; consolidation of a stable subjective and positive attitude towards professional activity in the future; understanding of own interests; ability to analyze the labor market, as well as evaluate one's opportunities and risks.

Within the framework of solving the second task, an analysis of scientific literature, normative acts of the state and local levels was conducted, which allowed defining the place, role, functions, and official duties of the curator of an academic group.

The primary goal of professional higher education is the preparation of specialists who are result-oriented and motivated for continuous professional growth. In the contemporary educational model, the curator is considered a key figure capable of influencing the formation of a holistic, professionally-oriented, and competitive member of society. The activity of the academic group curator should primarily focus on bridging the gap between education seekers and their chosen profession, creating favorable conditions for transitioning into adult, independent working life. The curator is responsible for addressing the tasks of developing in education seekers the ability to engage in continuous active personal and professional self-improvement (Holoventin, 2019).

The structurally functional model of curatorship proposed in our study requires specification of professional competencies that will enable the curator to effectively perform the main (professional-adaptation and organizational-coordination) functions, alongside those special skills described earlier, directing the curator's activities towards professional consulting and motivation.

Taking into account the peculiarities of the curator's role as a facilitator and organizer of

"subject-subject" relations with education seekers and drawing on F. Parsons' career guidance model (Parsons, 1991), the general content of the curator's career guidance work can be presented as follows: familiarizing with the motivational-value structure of education seekers; the curator presenting professional demands and motivating education seekers to recognize them; understanding these two factors and assisting the curator in helping the education seeker make a conscious decision regarding the direction of their personal professional course.

Considering the functional peculiarities of the curator's activities in the field of career guidance consulting, the following competencies have been identified, the formation of which is expected to lead to success in the professional path in the future: informational (readiness to form in education seekers an adequate perception of the future profession); technological (ability to select and implement optimal means, methods, forms, and approaches to education); personal competencies (analysis and evaluation, teamwork, and collaboration); coordination-mediation (ability to establish "subject-subject" relationships in the educational environment).

The analysis of literature on the specific features of current curatorial activities in the process of professional education enables us to assert that the curator is a central figure in the educational system of the college, supporting the life activities of all subjects of the educational process. The proposed model of curatorship refines professional competencies that will allow the effective performance of professional adaptation and organizational-coordinating functions, and is focused on professional consulting and motivation.

The formation of the aforementioned professionally significant skills and qualities will help ensure the effective activity of the curator regarding the best assimilation by education seekers of the norms, values, and traditions of the chosen professional direction, activation of their motivational component for acquiring the chosen and/or related profession, and stimulating professional development.

We define curatorial activity as the activity of a teacher who possesses professional competencies, whose main work is aimed at assisting education seekers on their path to adapting to professional activities, forming professional orientation in future agritechicians based on knowledge about the profession, acceptance of the

profession, and interiorization of professional values through intersubjective interaction.

The solution to the third task was the development and implementation in the college of a structural-functional model of the curator's educational activity as an important factor in forming the professional-value orientations of future agritechnicians (Fig. 1). In the structure of the model, four blocks are distinguished:

1. The normative-target block reflects the contradiction between the social order and the readiness of modern education seekers to meet the stated requirements; it includes the goal and tasks, mechanism, and means (curatorial activity) to solve the set tasks.

2. The methodological block defines the methodological foundation of the system for developing professional and value orientations in education seekers, where the curator plays a leading

role, which was composed of a set of interrelated and complementary methodological approaches and corresponding principles:

- a systemic approach (involved considering the existing relationships and regular connections between the structural components of the system for forming professional and value orientations of future agricultural technicians). It also ensured comprehensive research of the necessary structural components as a unified whole, with coordinated work of all elements and parts. The main components of the system for forming professional and value orientations of future agricultural technicians were defined, such as educational programs; methodological recommendations; interaction with enterprises; student activity in the college; and psychological support for students, among others.

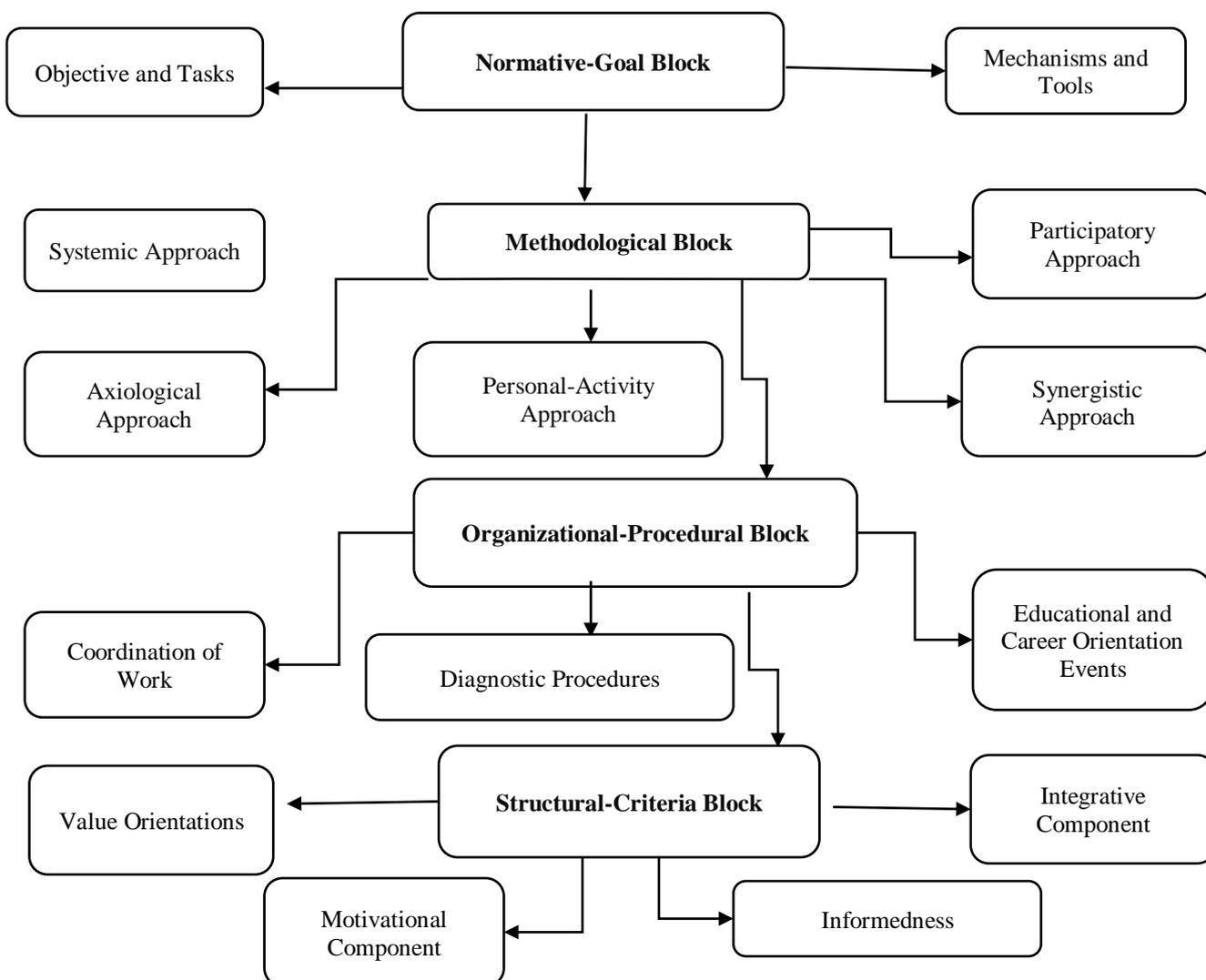


Fig. 1. Structural-Functional Model of Professional Value Orientations Formation of Future Agritechnicians in College

Changes have been implemented in all aspects of the software. The curricula have been reviewed and updated to reflect new requirements and needs of the modern labor market and the agricultural sector. Methodological recommendations have been adapted to the new programs, including the development of innovative approaches to teaching and learning aimed at forming professional values among students. The interaction with enterprises has been improved through the activation of partnership relations and the development of new internship and training programs for students. The student body of the college was actively involved in the educational process, influencing organizational and educational activities in the college. Additionally, the importance of psychological support for students was enhanced, providing them with access to qualified consultants and psychologists to assist in addressing personal and educational issues.

- the axiological approach encourages students to recognize the unique value of each individual and directs the educational process in the college towards forming a value-based attitude towards the future profession, based on the principles of professional appropriateness and polytechnism. Programs have been developed that focus on the unique value of each individual and the significance of the agronomist's activity for society and the environment. These programs are integrated into the curricula and methodological materials, aimed at forming a value-based attitude towards the future profession of agronomy. Additional educational events, including lectures and seminars, were conducted, during which values and the importance of the agronomy profession were discussed. Practicing professionals were involved in the educational process to inspire students to professional development and to enhance their value-based attitude towards their chosen profession. Subsequently, monitoring and evaluation were carried out to determine the effectiveness of the implemented measures and to collect feedback for further improvement of work on forming value orientations.

- the personality-activity approach emphasizes the formation of professional and value orientations of future agronomists in the process of active and conscious educational activity. It relies on the principles of openness and constructive cooperation, defining the interaction strategy of the "curator – academic group – sociocultural environment" system. The curricula and methodological materials have been supplemented

with a focus on active and conscious educational activity of the students. An open educational environment was created with regular discussions, seminars, and workshops. Constructive cooperation between curators, students, and the sociocultural environment was ensured through practices, internships, and joint projects. The activity of the curators was activated by providing them with the necessary resources and training. Cooperation with local communities and agricultural enterprises for joint activities was established. Monitoring and evaluation of the effectiveness of the approach were conducted, collecting feedback. Student initiatives and participation in extracurricular projects related to agronomy and agriculture were encouraged.

- synergistic (facilitates the perception of each student as an open system in active self-development). The college has created an environment that supports independent thinking and initiative in youth. Training sessions and seminars aimed at developing self-regulation and self-improvement skills have been conducted. Feedback systems have been implemented to monitor the progress of each student, allowing for quick response to their needs and further development.

- participatory (requires the enactment of pedagogical interaction based on the display of tolerance and mutual respect by the curator and students). To implement the participatory approach, active interaction between the curator and students was established, creating an atmosphere conducive to mutual understanding, tolerance, and respect. The curator genuinely showed interest in the students' opinions and initiatives, created conditions for open discussion and cooperation, involved students in decision-making and planning, provided opportunities to express their ideas, and assisted in problem-solving. Joint events were also organized where the curator and students could exchange thoughts and experiences, fostering trust and developing mutual respect.

3. The organizational-procedural block reveals the methodological content of the curator's activity as a means of forming professional-value orientations in future agrotechnicians. Key directions of work are highlighted: working with educational documentation, coordination with the structural subdivisions of the college, diagnostic procedures, educational events, and career-oriented activities using active and interactive forms and methods of the educational and educational processes.

4. The structural-criterion block represents a fundamental component of the functional model,

describing the structure and criteria of professional-value orientations of students in college. This block includes four interconnected components:

- value orientations: define the main values and principles that guide the individual in choosing and performing professional activities. Value orientations take into account moral, ethical, social, and other aspects that determine professional behavior;

- motivation (educational and professional): encompasses internal and external motives that support and stimulate the student to achieve success in the chosen professional field. Educational motivation pertains to the desire to acquire knowledge and skills, while professional motivation includes the desire to realize oneself in the chosen professional field;

- awareness of the future profession: represents the level of awareness and understanding by the student of the specifics, requirements, and prospects of future professional activity. This component includes knowledge about technological progress, market trends, potential opportunities, and challenges in the chosen field;

- integrative component - stability of professional orientation: represents the ability of the student to maintain and support their professional orientation in a changing socio-economic environment. This component reflects confidence and stability in the chosen professional path, readiness for further development and improvement in the selected field of activity.

Value orientations are the foundation of professional integrity of the personality, a system of attitudes that characterize an individual's approach to the profession, manifest in the acceptance or rejection of professional values, and act as a motivator for the individual's activity as a subject of professional activity, and determine the substantive aspect of the personality's orientation.

Motivation reflects value orientations, characterized by completeness (quantity) and quality (internal, external positive, and external negative) of motives. We also determine the degree of expression (dominance) of a particular motive. The hierarchy of motives determines the positive or negative orientation. Awareness of the profession is considered a system of representations, knowledge, and skills in which an individual can envision themselves in the role of a potential representative of the chosen profession.

The role of the curator in the process of forming professional-value orientations of future specialists is defined: consolidating positive

professional value orientations in the consciousness of education seekers, increasing the level of educational and professional motivation, increasing the degree of awareness of the content of the future profession, confirming that the formation of professional orientation through curatorial activities in implementing a complex of pedagogical conditions is effective; providing students not only with academic support but also with help in resolving personal problems, forming self-assessment, and developing confidence in their abilities; organizing seminars and trainings on presenting oneself in the job market, such as resume preparation, job interviews, entrepreneurship basics, etc.; acquainting education seekers with various opportunities for professional growth, such as internships, grants, conferences, professional networking, etc.; fostering the development of communication, leadership, and team working skills among education seekers, which are important for a successful career in agriculture; assisting education seekers in understanding their interests and abilities, helping them choose the optimal career path in agrotechnology.

**Conclusions.** It has been shown that the formation of professional-value orientations of future agrotechnicians is a complex process that combines both the personal representations of future specialists about the values of their profession and the consideration of the socio-cultural context of their professional training and professional adaptation. It has been determined that the formation of professional-value orientations of future agrotechnicians is a methodologically substantiated educational process aimed at professional-personal establishment of education seekers and mastering by future agrotechnicians the norms and values of their future profession, realizing themselves as subjects of this profession, and consolidating a stable positive attitude towards future professional activity. It has been found that the formation of professional-value orientations of future agrotechnicians is significantly influenced by the curator of the student group. The main tasks for organizing the work of the curator have been formulated (preparing education seekers to understand the motivational-value system of the specialist; motivating education seekers to work on matching their own motives and values to professional requirements; teaching future specialists to determine the correspondence of personal traits and qualities to the characteristics and demands of the profession; consulting education seekers on professional development).

A structurally-functional model of the educational activity of the curator, represented by several blocks (normative-target, methodological, organizational-procedural, structural-criteria), has been substantiated, which is aimed at facilitating the

formation of professional-value orientations of future agrotechnicians. Its development opens perspectives regarding the study of the problem of preparing the curator itself, as well as the system of assessing the results of their educational activity.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.167-175>

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## СТРУКТУРНО-ФУНКЦІОНАЛЬНА МОДЕЛЬ ФОРМУВАННЯ ПРОФЕСІЙНО-ЦІННІСНИХ ОРІЄНТАЦІЙ МАЙБУТНІХ АГРОТЕХНІКІВ У КОЛЕДЖІ ЗАСОБАМИ КУРАТОРСЬКОЇ ДІЯЛЬНОСТІ

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### Реферат:

*Актуальність:* сучасні події в Україні та пов'язані з нею соціально-економічні та психологічні перетворення стимулюють членів суспільства брати на себе відповідальність за власну долю, зумовлюючи цим поступове утвердження у свідомості людей принципово нової системи ціннісних орієнтацій. Це зумовлює важливість поєднання професійних цінностей майбутніх фахівців з цінностями вільного демократичного суспільства; відтак процес ціннісного самовизначення здобувача освіти має розглядатися як процес визначення та формування ціннісно-орієнтованої системи, необхідної для успішної подальшої професійної діяльності в системі "людина – людина", "людина – світ".

*Мета:* обґрунтування структурно-функціональної моделі виховної діяльності куратора як важливого чинника формування професійно-ціннісних орієнтацій майбутніх агротехніків.

*Методи:* вивчення й аналіз філософської, загальнонаукової, методичної, психолого-педагогічної літератури, нормативно-правової бази, навчально-плануючої документації – для виявлення стану розробленості проблеми; узагальнення одержаної інформації – з метою визначення напрямів дослідження (уточнення гіпотези, понятійного апарату); порівняння, зіставлення – для порівняння підходів дослідників до розв'язання проблеми формування професійно-ціннісних орієнтацій; синтез – для обґрунтування поняттєво-категоріального апарату, уточнення змісту професійно-ціннісних орієнтацій майбутніх агротехніків, обґрунтування ролі куратора у їх формування й розвитку; моделювання – для створення моделі виховної діяльності куратора.

*Результати та обговорення:* вивчено джерельну базу дослідження, уточнено його поняттєво-категоріальний апарат; здійснено теоретичний аналіз виховної діяльності куратора як педагогічної проблеми; обґрунтовано структурно-функціональну модель виховної діяльності куратора, сформульовано основні завдання його роботи.

*Висновки:* показано, що формування професійно-ціннісних орієнтацій майбутніх агротехніків є складним процесом, що поєднує як особисті уявлення майбутніх фахівців про цінності своєї професії, так і врахування соціокультурного контексту їхньої професійної підготовки та професійної адаптації; визначено, що формування професійно-ціннісних орієнтацій майбутніх агротехніків – це методологічно обґрунтований виховний процес, спрямований на професійно-особистісне становлення здобувачів освіти та опанування майбутніми аг-

ротехніками норм і цінностей своєї майбутньої професії, усвідомлення себе як суб'єктів цієї професії, закріплення стійкого позитивного ставлення до професійної діяльності у майбутньому; з'ясовано, що на формування професійно-ціннісних орієнтацій майбутніх агротехніків важливим є вплив куратора студентської групи; сформульовано основні завдання куратора (підготовка здобувачів освіти до усвідомлення мотиваційно-ціннісної системи фахівця; мотивування здобувачів освіти працювати над відповідністю власних мотивів і цінностей професійним вимогам; навчання майбутніх фахівців визначати відповідність особистісних рис та якостей особливостям і вимогами професії; консультування здобувачів освіти з професійного розвитку); обґрунтовано структурно-функціональну модель виховної діяльності куратора, що представлена кількома блоками (нормативно-цільовим, методологічним, організаційно-процесуальним, структурно-критеріальним) й покликана сприяти формуванню професійно-ціннісних орієнтацій майбутніх агротехніків; визначено перспективні напрями подальших досліджень (підготовка кураторів для вирішення проблем виховання майбутніх фахівців та розроблення системи оцінювання результатів їхньої виховної діяльності).

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**Ключові слова:** *професійна діяльність, професійно-ціннісні орієнтації, сформованість професійно-ціннісних орієнтацій, мотивація, куратор, кураторська діяльність, структурно-функціональна модель виховної діяльності куратора.*

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Received: 09 March 2024

Accept: 31 May 2024



*The publication was prepared within the framework of the research tasks of the Laboratory of Distance Professional Training of the Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine "Methodological Foundations of Professional Training of Future Qualified Workers in the Mechanical Engineering, Agricultural Sectors, and Service Fields under Blended Learning Conditions" (state registration number 0122U000446, years of implementation: 2022-2024).*

# VALUE-BASED PRINCIPLES AND ETHICAL STANDARDS OF INTERACTION AMONG PARTICIPANTS IN THE EDUCATIONAL PROCESS UNDER BLENDED LEARNING CONDITIONS FOR FUTURE QUALIFIED WORKERS IN VOCATIONAL EDUCATION INSTITUTIONS

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## Abstract

*Relevance:* The need to highlight the issues of forming and developing value-based principles of interaction among participants in the educational process of vocational education institutions is determined by society's requirements for the moral and ethical standards of social communication and the implementation of modern education under blended learning conditions using digital technologies and internet platforms.

*Purpose:* To identify and substantiate modern requirements for the value-based principles of educational process participants, as well as the forms and means of their implementation under blended learning conditions for future qualified workers in vocational education institutions.

*Methods:* The study of theoretical and methodological sources, legislative acts, regulatory documents, and empirical data to understand the essence of the value-based principles of educational process participants in vocational education institutions, which are revealed in their interaction under the implementation of blended learning during the preparation of future qualified workers in vocational education institutions; theoretical synthesis and analysis, generalization, and systematization of scientific approaches to the research problem to determine modern requirements for value-based principles and ethical standards of interaction among participants in the educational process of vocational education institutions; formation of conclusions.

*Results:* Modern requirements and means of implementing value-based principles and ethical standards that reflect the personal and civic positions of participants in the educational process under blended learning conditions for future qualified workers in vocational education institutions are highlighted and summarized.

*Conclusions:* Key competencies that need to be formed and developed in the vocational education system for the preparation of qualified workers in various specialties are identified; value-based principles reflecting personal and civic characteristics in the activities of future specialists are highlighted and substantiated. The essence of the concepts of value orientations, pedagogical ethics, ethical standards of participants in the educational process, digital etiquette, and the main ethical principles of participants in the educational process are revealed; conditions for the development of the value-based and activity aspects of personality, requirements for the implementation of modern strategies of social progress, and rules for ethical and effective interaction of participants in the educational process in cyberspace are disclosed.

**Introduction.** Each stage of societal development establishes its specific requirements for socio-psychological interaction within the education system, particularly in the system of professional training for future workers. These requirements focus on the formation of socially-personal competencies (commonly referred to as soft skills) necessary for each specialty, as well as basic abilities aimed at helping qualified professionals solve complex problems in a rapidly changing world.

The Law of Ukraine "On Education" states that "the purpose of education is the comprehensive development of a person as an individual and the highest value of society, their talents, intellectual, creative, and physical abilities, the formation of values and competencies necessary for successful self-realization, the education of responsible citizens capable of making conscious social choices, directing their activities for the benefit of other people and society, enriching the intellectual, economic, creative, and cultural potential of the Ukrainian people on this basis, increasing the educational level of citizens to ensure the sustainable development of Ukraine and its European choice" (Про освіту. Закон України, 2017). According to the defined purpose, the approved Standards of Professional Education for 2023 and 2024 highlight common key competencies for different specialties, including communicative competence, personal, social, and learning competences, civic and legal competence, environmental competence, and others (Затверджені стандарти професійної освіти 2023, 2024). These abilities are aimed at forming important personal and civic value orientations, which are realized in a person's activities, interpersonal relationships, civic manifestations, form environmental awareness, and motivate self-education, self-development, self-determination, and goal-setting.

**Sources of research.** The issue of effective interaction among participants in the educational process is a classical paradigm of scientific research from the inception of education to the present time. The value foundations of participants in the educational process and the moral and ethical principles of interaction in the educational field have been studied from

various scientific perspectives by Socrates, A. Wallon, M. Heidegger, G. Hegel, J.-F. Herbart, W. Humboldt, W. Dilthey, A. Diesterweg, J. Dewey, É. Durkheim, I. Kant, J.-A. Comenius, J. Korczak, A. Makarenko, M. Montessori, V. Sukhomlinsky, J. Searle, P. Freire, R. Steiner, K. Jaspers, and other world classics. Axiological approaches to personality formation in the educational process are revealed in contemporary Ukrainian studies by V. Andrushchenko, I. Bekh, T. Hrabovska, I. Zyazyun, I. Isayev, K. Korsak, V. Kremen, D. Leontiev, O. Okseniuk, N. Rozov, N. Svetlova, I. Stepanenko, O. Sukhomlynskaya, O. Tepla, S. Khrypko, H. Yatsenko, and others.

The value foundations of state policy in the field of education and the principles of activity of participants in the educational process are defined in the Laws of Ukraine "On Education" (2017), "On Higher Education" (2014), "On Professional (Vocational-Technical) Education" (1998), "On Professional Pre-Higher Education" (2019) and other legislative acts of our state, as well as in international documents such as the Bucharest Declaration of Ethical Values and Principles of Higher Education in Europe (2004), the Pedagogical Constitution of Europe (2013), the Recommendations of the Council of Europe "Ethical Behavior of Participants in the Educational Process" (2015), and others.

**The purpose** of the article is to disclose and substantiate modern requirements for the value foundations of participants in the educational process, as well as the forms and means of their implementation in the context of blended learning of future qualified workers in institutions of professional (vocational-technical) education.

The research methods involve: studying scientific sources, legislative, regulatory documents, and empirical data to clarify the essence of the value foundations of participants in the educational process of vocational (vocational-technical) education institutions, which are revealed in their interaction in the conditions of blended learning in the training of future skilled workers in vocational (vocational-technical) education institutions; theoretical analysis and synthesis, generalization of scientific approaches to

the studied problem to determine modern requirements for value foundations and ethical principles of interaction among participants in the educational process of vocational (vocational-technical) education institutions; and the formulation of conclusions.

**Results and discussion.** During the research, theoretical materials were processed, allowing the essence of terms such as value orientations, core pedagogical values, and ethics to be determined. This theoretical basis enabled the identification of the applied tasks of pedagogical ethics in modern conditions, as well as the ethical principles that all participants in the educational process must adhere to. An analysis of the main principles of netiquette and digital etiquette allowed the expansion of the definition of requirements for the ethics of interaction among participants in the educational process in the conditions of blended learning, which combines the most effective forms and methods of face-to-face and online education.

According to the interpretation provided in the Ukrainian Pedagogical Dictionary by Honcharenko S. U., "value orientations are a selective, relatively stable system of directing the interests and needs of an individual, focused on a certain aspect of social values. Value orientations are formed in the process of an individual's social development, their participation in working life. The upbringing of a person can be considered as the management of the formation or change of their value orientations" (Гончаренко С. У., 1997).

Undoubtedly, education should purposefully influence the process of forming personal values and value orientations of the younger generation through the application of various teaching and upbringing methods, through the specifics of interaction with peers and teachers, through the influence of the corporate culture of the educational institution, etc.

Teachers and their system of value-content orientations play a special role in forming the value foundations of education seekers. The moral and ethical qualities of teachers, their image, and behavior significantly influence the formation of behavioral models and worldviews of students, acting as a regulator of interpersonal relationships both within the student collective and beyond. The Pedagogical Constitution of Europe identifies the main pedagogical values as "tolerance, democracy, peace-loving, environmental safety, human rights and solidarity, mercy

and conscience, responsibility" (Педагогічна Конституція Європи, 2013). The mentioned requirements of the European document once again orient towards the idea that the spiritual values of education seekers should be consolidated in their consciousness meaningfully, through the influence of teachers' guidance and personal example, as opposed to the transmission of subject knowledge from various academic disciplines (Ціннісні орієнтири сучасної української школи, 2019, с.2).

The concept of value is usually interpreted as things, events, facts, etc., important to an individual (Heidegger Martin (1996) et al.). The concept of "value" can also be considered as a certain useful object for meeting needs (Maslow A. (1999) et al.); as the goal of human aspirations (Шрейдер Ю., 1999 et al.); as established obligatory norms (О. Краєва, 1995; Л. Орбан-Лембрик, 2003 et al.) etc.

In the Philosophical Encyclopedic Dictionary, it is noted that values are usually divided into lower and higher values. Lower, or material values, satisfy the biological needs of humanity, while higher values are spiritual. A feature of spiritual values is their internal, conscious potential. Spiritual values can be religious, moral, aesthetic, political, legal, as well as individual, collective, and universal. Universal or common human values are considered those that are shared by different peoples, cultures, etc. (Філософський енциклопедичний словник, 2002).

Historical experience of human development proves that progressive civilizational changes directly depend not only on global influences and challenges but primarily on the human factor, characterized by the conscious adherence of people to spiritual values as personal behavioral regulators. In this context, relying on practical experience and the opinions of scholars who have studied the impact of value orientations on social development, it can be stated that youth is one of the first social groups to respond to changes occurring in society. The nature and direction of such responses directly depend on the moral and ethical principles and values that have been consciously formed in the educational process of the younger generation or on random influences, which in such cases cause unpredictability and unconsciousness in behavior (Nguyen T. T., Deci E. L., 2016).

In this context, in order for the idea of education based on spiritual values not to be nullified or marked as an unnecessary formality, it is necessary to

adhere to the requirements defined in the content of the "Value Orientations of the Modern Ukrainian School," according to which "all participants in the educational process, regardless of age, knowledge, experience, or social status, should feel the need to critically evaluate themselves and self-improve" (Ціннісні орієнтири сучасної української школи, 2019, p.2).

Considering the importance of the educational component in the formation and development of the personality, it is important to determine the goals, tasks, forms, and methods of forming the value foundations of the younger generation in the Ukrainian education system. In this context, the value of education for the moral and spiritual development of each person should be determined by the substantial direction of the education system towards spiritual universal values and orientations. Considering that education, as defined in the Law of Ukraine "On Education," is the basis of the intellectual, spiritual, physical, and cultural development of the individual, its successful socialization, economic well-being, and the guarantee of the development of a society united by common values and culture, and the state (Про освіту. Закон України, 2017), it is appropriate to consider education as one of the most important life values of humanity.

At the same time, fulfilling its historically defined tasks of developing the personality and preparing it for conscious active activity, the education system, along with subject knowledge, should be oriented towards the formation of spiritual values and ideals that are essential and demanded in society.

In a complex, dynamic, and unpredictable time of contemporary realities, the process of educational development of a person must form an innovative component of their personality, psychological readiness for change, and a desire to independently influence changes. Such tasks require the ability to evaluate being and events that occur, the degree of their compliance with universal spiritual values, societal needs and interests, and their relevance to one's own goals and needs.

The issues of the formation and development of a person's value and moral orientations are studied by ethics. The essence of the concept of ethics (Lat. *ethica*, from Greek *ἠθος* – custom, character) in the electronic Encyclopedia of Modern Ukraine is defined as "a system of moral norms and values inherent

in a particular community, social, professional, or other group of people." It is noted that ethics focuses on the issues of the essence and practical manifestations of morality, examines the features of moral norms and values, determines the moral aspects of human consciousness, activities, and communication (Енциклопедія Сучасної України). Accordingly, pedagogical ethics can be interpreted as the science of the regularities of the formation and development of moral norms, requirements, values, and principles determined by the specifics of educational activity and realized in the relationships between the teacher and students, their parents, the administration of the educational institution, stakeholders, as well as in the relationships of the teaching staff, primarily determined by the personal qualities of the participants in the educational process.

According to Melnychuk L. B., the theoretical and applied tasks of pedagogical ethics in modern conditions can be defined as the formation of a humanistic orientation of pedagogical activity, the orientation of the teacher's personality towards the moral education of students; identification of factors that contribute to the increase of the moral level of the teacher and students or, conversely, hinder this process; investigation of the connection between the moral experience of students and their parents; solving problems of moral motivation of pedagogical activity, its moral, material stimulation, and public recognition (Melnychuk L. B., 2021). The comprehensive implementation of the outlined tasks of pedagogical ethics, in our opinion, will promote the moral education of students, the development of humanistic values of the pedagogical community, and have a positive impact on other participants in the educational process.

The recommendations of the Council of Europe "Ethical Behavior of Participants in the Educational Process" define 14 ethical principles that all participants in the educational process must adhere to, including: integrity; honesty; sincerity; openness; respect for others; reliability; responsibility; benevolence; democratic and morally-ethical management in the educational field; ensuring the quality of education; self-development and improvement of the education system; adherence to the principles of institutional autonomy; international cooperation (Document on "The ethical behavior of all actors in education", February, 2015).

In the context of the widespread use of digital information and communication technologies in education, new requirements for the interaction of participants in the educational process in cyberspace arise. During the pandemic and severe restrictions caused by the brutal war of aggression in Ukraine, there was a need to organize the educational process in a remote and/or mixed format using the internet and computer technologies. The practice of implementing internet interaction led to the definition of new norms regulating such activities based on the moral and ethical norms and principles of live communication.

The requirements for effective communication in cyberspace are determined by a set of rules, guidelines, and principles (Crystal, D., 2004). The rules of communication in the internet space are designated by various terms in scientific literature, such as netiquette, network, or digital etiquette. The term netiquette is formed by combining the bases of two English words "network" (netiquette – net) and "etiquette" (etiquette) and is used to denote the requirements for communication in chats and other internet forums (Chandler, D., 2011).

The rules of netiquette, like most modern behavioral norms, have been formed based on practical experience to ensure the most favorable conditions for interaction among various network users. These norms are usually not reflected in legislative acts and do not entail any sanctions other than public disapproval. The general rules of netiquette were defined by Virginia Shea in a work titled "Netiquette" in 1994, yet they remain relevant even after 30 years. Among the important principles of netiquette, Virginia Shea identifies the following requirements: always be polite; use appropriate symbols to indicate emotions; do not break the law; always reference original sources; respond appropriately to the topic or task; respect others' time and needs; write correctly; do not send anonymous letters and messages; help others when needed; avoid conflicts and do not provoke others. According to Virginia Shea, the basis of netiquette is simplicity, good manners, and business politeness (Shea, V., 1994).

In the context of internet communication, only the most constructive and useful moral and ethical norms are established. Among the most general moral principles, the principle of humanism and humanity can be included, which is embodied in the requirements to be polite, tactful, correct, courteous,

modest, and precise; the principle of appropriateness of actions, which necessitates behaving constructively, simply, and conveniently for oneself and others; the principle of maximum attention and respect for the uniqueness and traditions of different peoples and social communities, which is extremely important in a multicultural society and free internet communication (Андрійченко, Ж., Близнюк, Т., & Майстренко, О., 2021).

The widespread use of blended learning technologies in professional education has made it possible to determine that the main requirement for ensuring the effectiveness of the educational process in a digital environment is adherence to ethical norms both during educational sessions and in extracurricular activities. The experience of organizing the educational process in a blended format has revealed issues related to violations of certain ethical norms of business communication by participants in the educational process, which is important to focus on to eliminate them. This primarily concerns the ethics of email communication; the ethics of communication on social networks; the ethics of communication during video conferences; the image of educational process participants during online connections. It is proposed to focus more specifically on each of these positions.

Nowadays, electronic correspondence is one of the traditional forms of interaction between teachers and students. At the same time, when using email, some participants in the educational process make certain mistakes that violate the ethics of business communication. This includes, in particular, illiteracy, the mismatch of the form and content of the written to the requirements of business correspondence, and the anonymity of letters and messages.

An important resource for the interaction of educational process participants in blended learning conditions has become social networks, which have recently been actively integrated into the educational process and provide (given the availability of electricity and the internet) accessibility, speed, and the possibility of interactive interaction. At the same time, during communication on social networks, violations of moral and ethical norms are sometimes noted, which can only be corrected by the establishment of clear interaction rules by the institution administration or the teacher in the specified format, which must

be obligatory for all participants in the communication processes.

In the conditions of blended learning, it is widely practiced to conduct classes in the format of video conferences. The main problem is to make students work with their cameras on, which is necessary to maintain discipline among the learners and ensure better interaction during the class. Working with the camera off is allowed only in exceptional situations related to technical difficulties, or if the audience of the session exceeds 100 participants. An important ethical aspect in the digital educational environment is the image of the participants in the educational process. In this context, generally accepted ethical norms of official communication should apply. Participation in classes in the format of video conferences implies adherence to business dress code by all participants and proper preparation of the workplace, which are mandatory and obvious requirements for organizing the educational process.

Familiarizing participants of the educational process with the rules of business etiquette during online communications improves the quality of classes and, therefore, the quality of education. Students must know the basic rules: registering under their own names, turning on the camera, turning the microphone on and off, paying attention to the background, etc. Before starting work in an online format, the teacher must discuss with the learners all organizational issues of interaction on the internet, which may arise. This concerns possible delays, the need to disconnect during the class, forms of feedback, discussions of educational material, and asking questions.

The norms of behavior when organizing the virtual learning process should be the same as in everyday life. Every participant in the educational process should adhere to the culture of communication, avoid rudeness, and prevent conflict situations. The atmosphere in the classes should be tolerant and democratic, contributing to the disclosure of the educational and creative potential of the learners. It is an indisputable fact that the teacher's behavior significantly impacts the quality of material assimilation by the learners and their self-realization, shapes the image of the teaching staff, and is the basis of the corporate culture of the educational institution. Pedagogical ethics determine the prestige of teaching work, its

social perception, and the effectiveness of professional development. Adherence to ethical norms by all participants in the educational process is a necessary condition for the effective progress of the training of future professionals.

**Conclusions.** As a result of studying the issue of defining the value foundations and ethical principles of interaction between participants in the educational process in the conditions of blended learning for future skilled workers in vocational education institutions, key competencies that should be formed and developed in the system of vocational education for the training of skilled workers in various specialties have been identified. The value foundations reflecting the personal and civic positions in the activities of future specialists have been outlined and substantiated. The main ethical principles of the participants in the educational process and the conditions for the development of the value and activity aspects of personality, the rules of ethical and effective interaction of participants in the educational process in cyberspace have been revealed. The conducted scientific research leads to the conclusion that values are important defining qualities of human essence, the main lever for the implementation of social interaction, and the basis of the meaning of human existence. Considering that the educational process should be directed not only at achieving academic success of the learners but also at the development of the spiritual and practical-oriented aspects of the personality (Артемченко А. Б., 2018), for the harmonious development of future skilled workers, it is necessary that collective interaction of all participants in the educational process is implemented in tolerant, sincere communication, based on such important moral and ethical components as respect, equality, justice, multiculturalism, democracy, empathy, integrity, responsibility, trust, patriotism, etc. (Ціннісні орієнтири сучасної української школи, 2019, с.4). In the conditions of socio-economic challenges and disruptions caused by Russian aggressive aggression, the formation and development of moral and ethical values of future skilled workers in vocational education institutions are one of the important directions for creating a cultural basis for the revival and progressive development of the Ukrainian nation and the civil society of our state.

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The Bucharest Declaration concerning Ethical Values and Principles for Higher Education in the Europe Region. Bucharest, Romania, 2-5 September 2004. <http://surl.li/ucepd> <http://surl.li/mbkds> , [in English].

# ЦІННІСНІ ЗАСАДИ ТА ЕТИЧНІ ПРИНЦИПИ ВЗАЄМОДІЇ УЧАСНИКІВ ОСВІТНЬОГО ПРОЦЕСУ В УМОВАХ ЗМІШАНОГО НАВЧАННЯ МАЙБУТНІХ КВАЛІФІКОВАНИХ РОБІТНИКІВ У ЗАКЛАДАХ ПРОФЕСІЙНОЇ (ПРОФЕСІЙНО-ТЕХНІЧНОЇ) ОСВІТИ

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## **Реферат:**

*Актуальність:* визначається необхідністю висвітлення проблематики формування і розвитку ціннісних засад взаємодії учасників освітнього процесу закладів професійної (професійно-технічної) освіти, що визначається вимогами суспільства до морально-етичних принципів соціальної комунікації та реалізації сучасної освіти в умовах змішаного навчання із застосуванням цифрових технологій та інтернет платформ.

*Мета:* визначити та обґрунтувати сучасні вимоги до ціннісних засад учасників освітнього процесу, а також форми і засоби їх реалізації в умовах змішаного навчання майбутніх кваліфікованих робітників у закладах професійної (професійно-технічної) освіти.

*Методи:* вивчення теоретико-методологічних джерел, законодавчих актів, нормативно-правових документів, емпіричних даних – для з'ясування сутності ціннісних засад учасників освітнього процесу закладів професійної (професійно-технічної) освіти, що розкриваються при їх взаємодії в умовах реалізації змішаного навчання при підготовці майбутніх кваліфікованих робітників у закладах професійної (професійно-технічної) освіти; теоретичний синтез і аналіз, узагальнення та систематизація наукових підходів щодо проблематики дослідження з метою визначення сучасних вимог до ціннісних засад та етичних принципів взаємодії учасників освітнього процесу закладів професійної (професійно-технічної) освіти; формування висновків.

*Результати:* виділено та узагальнено сучасні вимоги та засоби реалізації ціннісних засад та етичних принципів, що відображають особистісні та громадянські позиції учасників освітнього процесу в умовах змішаного навчання майбутніх кваліфікованих робітників у закладах професійної (професійно-технічної) освіти.

*Висновки:* визначено ключові компетентності, що мають формуватися та розвиватися в системі професійної освіти при підготовці кваліфікованих робітників різних спеціальностей, виділено й обґрунтовано ціннісні засади, що відображають особистісні та громадянські характеристики в діяльності майбутніх фахівців. Розкрито сутність понять: ціннісні орієнтації, педагогічна етика, етичні принципи учасників освітнього процесу, цифровий етикет та визначені основні етичні принципи учасників освітнього процесу; розкрито умови розвитку ціннісного та діяльнісного аспектів особистості, вимоги до реалізації сучасних стратегій суспільного прогресу, а також правила етичної та ефективної взаємодії учасників освітнього процесу в кіберпросторі.

**Ключові слова:** педагогічні цінності, педагогічна етика, етичні принципи учасників освітнього процесу, змішане навчання, цифровий етикет.

Received: February 03, 2024

Accept: May 31, 2024



# DEFINITIONS AND CONDITIONS FOR THE FORMATION OF GRAPHICAL COMPETENCE OF FUTURE SPECIALISTS IN ELECTRONICS AND TELECOMMUNICATIONS THROUGH DIGITAL TECHNOLOGIES

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## Abstract

*Relevance:* Radio electronics is a high-tech priority sector of the global economy with a stable and constantly growing demand, significant export potential, low material consumption, and high unit value of products, which stimulates the development of information and communication technologies and such industries as mechanical engineering, instrumentation, medicine, etc.; the efficiency of the professional activity of a specialist in the field of electronics and telecommunications depends on the combination of research, graphical, and inventive activities during their professional training.

*Purpose:* To research and define key concepts (definitions) that characterize graphical competence and to determine the conditions necessary for its effective formation during the professional training of future specialists in the field of electronics and telecommunications using digital technologies.

*Methods:* Theoretical (analysis of higher education standards, scientific and methodological publications reflecting the research problems, critical analysis of existing theoretical and methodological ways of solving the initiated problem in Ukraine and abroad concerning the formation of graphical competence of future specialists in the field of electronics and telecommunications by means of digital technologies); empirical (questionnaire; observation of the educational process; surveys of employers and experts).

*Results:* The theoretical positions regarding the formation of graphical competence of future specialists in electronics and telecommunications by means of digital technologies have been analyzed and substantiated; based on the conducted analysis of the theory and practice of forming graphical competence of future specialists during their professional training, a number of definitions characterizing the result of the process of forming graphical competence have been established and the conditions for its formation have been determined; the peculiarities of the professional activity of a specialist in the field of electronics and telecommunications have been determined; the main professional skills of graduates have been identified.

*Conclusions:* The peculiarity of professional training of a specialist in the field of electronics and telecommunications lies in the combination of research, graphical, and inventive activities; the result of their professional training should be the acquisition of skills and abilities relevant to the digital labor market (readiness for lifelong learning; the ability to improve existing and design new products, perform their sketches and models, model them using three-dimensional and two-dimensional graphics; the ability to work taking into account modern ergonomic requirements with subsequent graphical design of the product; creativity); in order to effectively form the graphical competence of future specialists in the field of electronics and telecommunications, three main conditions must be implemented (ensuring the interconnection of professional and graphical activities, which is a prerequisite for the effective performance of

professional tasks; forming readiness for change and the ability to adjust activities according to the changing demands of society; ensuring the formation of the overall professional culture of the specialist as a whole).

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**Keywords:** *professional training, graphical competence, specialists in the field of electronics and telecommunications, higher education institutions.*

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**Introduction.** Radio electronics is a knowledge-intensive priority sector of the global economy with a stable and continuously growing demand, significant export potential, low material intensity, and high specific value of products. This stimulates the development not only of information and communication technologies but also of such industries as instrumentation, mechanical engineering, military equipment, medicine, communication, and others. Accordingly, the design, production, and application of radio electronic products are highly specialized and integrated across various technical directions, which should be reflected in the specificities of professional training of future specialists in the field of electronics and telecommunications. Domestic scientists V. Herasymchuk, V. Nesterenko, and T. Sakalosh (2009) point out the following possible ways of developing the radio electronic industry in Ukraine: attracting foreign investors to supply raw materials to domestic manufacturers of microelectronics and solar energy components, using modern technological equipment, and involving highly efficient human resources; significantly reducing the time (to a few months) for the development of new types of products, ensuring motivation for professional growth of employees, among others. It is considered necessary to supplement these conditions for the development of the radio electronic industry with a significant improvement in the professional training of future specialists in electronics and telecommunications in higher education institutions through the use of modern innovative teaching technologies.

**Sources.** Given the relevance of the outlined research direction, the issue of professional training of future specialists, including in the field of electronics and telecommunications, has been the subject of study by numerous domestic and foreign scientists. New strategies of thinking in the process of forming the graphic competence of specialists were considered in the works of H. Havryshchak, A. Uruskyi (2021), I. Hevko, O. Pysarchuk (2018), V.

Herasymchuk, V. Nesterenko, T. Sakalosh (2009), R. Hurevych, V. Harkushevskyi, S. Tsvilik (2014), O. Dzhedzhula (2007), O. Zharova (2014), Yu. Kozak (2016), M. Koziar, O. Parfenyuk, Z. Sasiuk (2021), P. Koliasa (2022), K. Lebedieva (2020), L. Martseva (2015), I. Nishchak (2017), N. Osadchuk (2019), O. Revyakina, O. Serdyukova (2014), S. Tsvilik, T. Asaulkova, S. Kordynal (2018), L. Tsvirkun (2017), H. Chemeris (2020), M. Yusupova (2010) and others. Abroad, the peculiarities of professional training of specialists in this field were studied by G. Amatori, H. Mesquita, R. Quelhas (2020), V. Bajrami (2019), H. Bakhshi, J. Downing, M. Osborne, P. Schneider (2017), U.-D. Ehlers, S. Kellermann (2019), A. Hussin (2018), D. Mitchell (2015), J. Mitchell, A. Nyamapfene, K. Roach, E. Tilley (2019), R. Morgan, S. Ion (2014), B. Norwich, A. Lewis (2005), J. Perkins (2013), F. Szabó (2017), and others.

Thus, the process of preparing competent specialists and creating conditions for their professional growth throughout their lives is an important condition for the development of the radio engineering industry. Currently, such training is carried out in three specialties: 171 Electronics, 172 Telecommunications and Radio Engineering, and 173 Avionics, each of which has certain differences from the others and its specific features.

The peculiarities of the professional training of junior specialists in the radio engineering profile are highlighted in the dissertation by L. Martseva (2015). The specificity of the cultural training of specialists in radio engineering specialties based on the acmeological approach was studied by N. Osadchuk (2019). The features and conditions of forming the information competence of future radio engineers in the process of professional training were clarified by O. Zharova (2019). In the dissertation by K. Lebedieva (2020), the ways of forming the professional competence of future specialists in the field of electronics and telecommunications based on the resource approach are determined.

Foreign researchers R. Morgan and S. Ion (2014), J. Perkins (2013) emphasized that the interest from manufacturing enterprises, professional associations, and students, whose needs are dynamic and change according to external conditions, has led to the necessity of reforming training programs for electronics specialists and the teaching style of professional disciplines in technical higher education institutions.

In the publication by researchers J. Mitchell, A. Nyamapfene, K. Roach, and E. Tilley (2019), an interesting experience in improving the educational process in this area of professional training of specialists is presented. Scientists planned and implemented a pedagogical experiment, the results of which substantiated the concept of educational reform and identified promising ways to ensure the quality of education. The research results demonstrated that forming the professional competence of specialists in the field of electronics and telecommunications is impossible without applying problem-based learning methods, developing soft skills, ensuring interdisciplinarity, and fostering motivation to acquire knowledge, master skills, and competencies, and forming general cultural and professional competence.

Researchers emphasized that the labor market is changing in response to new technologies. Therefore, future specialists must not only acquire professional knowledge and skills but also develop the ability to learn throughout their lives. It is no wonder that recently, the new term "Education 4.0" has been used to define the process of preparing specialists to work in the conditions of the fourth industrial revolution. Researcher A. Hussin (2018, pp. 92–98) believes that Education 4.0 involves implementing various methods and approaches introduced in higher education institutions to align educational programs for the most effective preparation of future graduates for work.

Significant attention by foreign researchers is devoted to creating educational programs for the inclusive professional training of students with special educational needs. The results of these researchers' studies are described in publications (Amatori, Mesquita, & Quelhas, 2020; Bajrami, 2019; Mitchell, 2015; Norwich, & Lewis, 2005).

Researchers have proven that the system of higher professional education needs significant

improvement in the methods of forming and delivering educational content, which should correspond to the level of technological development in the field of electronics and telecommunications. Innovative methods, in particular, can include solving real industrial and research problems by future specialists. With this approach to teaching new material, students solve interesting practical and scientific tasks, and the teacher can integrate the results of their scientific research into the educational process.

**The aim of the article** is to study and define key concepts (definitions) that characterize graphic competence, as well as to determine the conditions necessary for its effective formation in the process of professional training of future specialists in the field of electronics and telecommunications using digital technologies.

**Research methods:** theoretical (analysis of higher education standards, scientific and methodological publications reflecting research problems, critical analysis of existing theoretical and methodological ways of solving the initiated problem in Ukraine and abroad regarding the formation of graphic competence of future specialists in the field of electronics and telecommunications using digital technologies); empirical (questionnaires; observation of the educational process; surveys of employers and experts).

**Results and Discussion.** The conducted analysis of the efforts concerning the formation of graphic competence of future specialists in the field of electronics and telecommunications by means of digital technologies, in particular, the publications by S. Tsvelyk, T. Asaulova, S. Kordinal, R. Hurevych, M. Koziar, and others (Цвілик, Асаулова, & Кординал, 2018; Гуревич, Гаркушевський, & Цвілик, 2014; Козяр, Парфенюк, & Сасюк, 2021), allows identifying contradictions inherent in the process of forming graphic competencies, in particular:

- between the high degree of abstraction of the basic concepts, their high degree of logical interconnections, the high level of hierarchical system of these concepts used in a specific field of knowledge, and the weak level of propaedeutic graphic training of students entering technical universities;

- the insufficient overall level of development of theoretical thinking to master graphic concepts and methods at an appropriate level;

- between algorithmic methods of data processing in information systems of computer graphics and non-algorithmic ways of thinking of students, leading to certain problems at the initial stages of learning computer graphics;

- between traditional methods of teaching graphic disciplines in universities and the need to improve this process in the context of forming graphic competence for the successful implementation of professional activities.

This leads to the emergence of certain psychological and cognitive barriers in the education of future specialists in the field of electronics and telecommunications and negatively affects the outcome of professional training – the formation of integral competence.

It is necessary to note that currently the successful formation of graphic competence of future specialists in the field of electronics and telecommunications by means of digital technologies in higher education institutions requires students to have a high level of skills and abilities to perform scientific-intensive work related to the use of graphic editors and design modules for intelligent computer-aided design systems in the educational process. Therefore, in modern technical universities, the graphic competence of future specialists is formed in the process of professional training using modern digital technologies.

The determination of the structure and content of the graphic competence of future specialists in the field of electronics and telecommunications necessitates the construction of a strategy for its formation by means of digital technologies, and hence the need to consider the theoretical foundations of the outlined issue.

The analysis of scientific publications on the outlined issue demonstrated that a significant part of the research on the conditions for the formation of graphic competence was devoted to considering the problem of forming the graphic competence of future art specialists or future programming specialists. This is explained by the fact that their professional activity mainly involves working with graphic information. However, there are several

scientific studies focusing on the problem of forming the graphic competence of future technical specialists. Such publications emphasize the statement that there is a problem of the postmodern society's dependence on the qualitative visual presentation of a certain product or information. Consequently, graphic competence is an important component of the professional training of future specialists in technical universities.

Considering this, a significant number of enterprises in the field of electronics and telecommunications use computer modeling in the process of designing and developing products. Accordingly, the demand for specialists capable of performing such tasks using computer graphics methods has increased.

Based on the conducted theoretical analysis of the theory and practice of forming graphic competence of future specialists in the process of professional training, several definitions characterizing the outcome of the process of forming graphic competence were established, including such concepts as graphic activity and graphic training.

Graphic activity involves the future specialist in the field of electronics and telecommunications performing certain graphic tasks necessary for completing professional assignments, creating product sketches, and other activities that facilitate subsequent professional activity in production. These professional tasks may be aimed at analyzing production situations, finding optimal problem-solving algorithms, and developing (executing) project and design documentation for products. Carrying out graphic activities includes making drawings or other graphic images, analyzing forms, and the interaction of parts (phenomena) using graphic images.

Graphic training is a component of the professional training of future specialists in the field of electronics and telecommunications, characterized by acquiring a relevant system of knowledge and forming readiness for the effective application of acquired graphic knowledge and skills. Additionally, graphic training is a multifaceted and continuous process of forming graphic competence during professional training at higher education institutions for future specialists in electronics and telecommunications. Such training

is part of overall professional training and is based on mastering various aspects of applying graphic knowledge and skills, which are subsequently used for mastering the learning material of professional disciplines.

Theoretical analysis of sources on the research problem indicated that scientists consider the following tasks of graphic training for future specialists in technical fields to be relevant: integrating graphic knowledge into a unified complex aimed at stimulating students' cognitive and creative activity; clarifying definitions regarding the formation of graphic competence, considering the peculiarities of future professional activity; developing methodological ways to enhance the level of graphic training.

Modern scientific research is aimed at solving these tasks. For instance, O. Dzhedzhula (2007) proposed a methodological system of graphic training for students in technical higher education institutions, while M. Yusupova (2010) proposed a method of interactive teaching of graphic disciplines for students in technical specialties. H. Chemeris (2020) substantiated the need for forming graphic competence in future bachelors of computer science and suggested effective ways to address this pedagogical task. I. Hevko and O. Pysarchuk (2018) explored the problem of forming graphic competence in future professionals in vocational education. The solution to the problems of graphic training for future engineers was the goal of scientific research by L. Tsvirkun (2017). O. Revyakin and O. Serdyukova (2014) substantiated the significance of graphic training for students in engineering-pedagogical specialties, particularly in the context of improving the quality of specialist training. Researcher Yu. Kozak (2016) analyzed the content of graphic training in pedagogical higher education institutions and substantiated the importance of graphic competence in the professional training of future engineer-pedagogues. Author I. Nyshchak (2017) developed a methodological system for teaching graphic disciplines to future technology teachers.

Additionally, an important aspect is the use of digital technologies in the process of forming graphic competence. Scientific publications feature developments on substantiating certain pedagogical conditions for teaching graphic disciplines using

digital technologies, computer-aided design systems, or methodological teaching systems for specific specialties. For example, M. Kozyar (2009) proposed a way to form graphic competence using digital technologies through the introduction of interdisciplinary integration into teaching. P. Kolyasa (2022) researched the effective use of digital technologies to form graphic competence in future specialists in vocational education. G. Havryshchak and A. Uruskyi (2021) considered the peculiarities of forming graphic competence in higher education students using computer-oriented technologies.

Analyzing the methods of teaching graphic disciplines in technical universities, it was found that there is no single didactic approach to teaching disciplines related to the study of digital technologies within a certain field of knowledge, taking into account its characteristics, development rates, and the requirements of modern society for the professional activities of future specialists in electronics and telecommunications. This necessitates the creation and implementation of such educational tools in the professional training of future specialists in electronics and telecommunications, which will contribute to the formation of their graphic competence using modern digital technologies. The creation and implementation of modern digital tools in all sectors of the national economy impose significant requirements on the scientific and technical training of future specialists.

Summarizing the available developments in this direction, it is asserted that the formation of graphic competence of future specialists in technical universities requires a comprehensive, systematic approach, particularly in the process of designing graphic information and determining the graphic characteristics of certain objects. In the process of forming graphic competence, the following conditions should be taken into account:

- improvement of the educational process in the direction of creating opportunities for the formation of graphic competence, constructing it as a consistent, purposeful system with appropriate methodological, organizational, and personnel support;

- the formation of a creative educational environment that will contribute to the development

of the future specialist's personality and the formation of an understanding of the value of graphic activity, particularly through the development and implementation of a structural-functional model for the formation of graphic competence of future specialists in electronics and telecommunications;

- the creation of a favorable socio-psychological climate in the educational environment;

- the formation in the minds of each future specialist in electronics and telecommunications of the relevance, role, place, and practical importance of graphic competence and skills in computer literacy for effective future professional activities.

The effective use of digital technologies in the professional training of future specialists in electronics and telecommunications is currently a priority in the process of modernizing the system of higher technical education. It should be noted that the development of digital technologies significantly outpaces the practice of their use in training at universities. Therefore, mastering the methods of independent work using digital technologies is one of the key issues in the professional training of future specialists in technical specialties.

The educational programs for the training of specialists in electronics and telecommunications at the bachelor's level of higher education include the study of such graphic disciplines as descriptive geometry, engineering and computer graphics, modeling, and analysis of electronic circuits. Descriptive geometry is the theoretical foundation for further study of graphic and professional disciplines. Engineering and computer graphics provide the skills for constructing images using digital technologies.

Digital technologies have an undeniable impact on the features of professional training for future specialists in the field of electronics and telecommunications, as well as the formation of their graphic competence. The creation of automated design systems has contributed to the development and implementation of graphic editors in the educational process, including such tools as AutoCAD, MathCAD, ArhiCAD, and others. These tools enable the development of documentation, the study of electronic models of developed parts and products. The digital design system has significant

visualization capabilities, which not only forms students' graphic competence but also enhances their understanding of the functioning of electronic systems.

The creation of a digital graphic model is the initial stage in the design process and the subsequent production of ready-made products in the radio engineering field. This model facilitates calculations for the creation of the future design of the product, visualizes its image, checks how the product will work, develops the manufacturing technology, and organizes the design documentation. Thus, a feature of forming the graphic competence of future specialists in electronics and telecommunications is that it requires the unity of graphic and professional training of students, focused on creative innovative activity with the subsequent formation of readiness to implement innovations in professional activities.

At the same time, it should be remembered that higher education is moving towards increasing the volume of independent work at the expense of reducing the share of classroom work, involving students in real projects starting from the first years of study, which, in turn, demands well-formed graphic work skills. The professional development of specialists in the field of electronics and telecommunications occurs under the influence of several factors, such as the professional needs of students, stakeholder requirements, general requirements of the professional education system, as regulated in state documents and higher education standards. Today, the professional activity of specialists in electronics and telecommunications is impossible without the use of computer modeling principles and methods.

Currently, digital technologies make it possible to abandon traditional drawing methods and use appropriate software. Existing graphic models used in the process of professional training for future specialists in electronics and telecommunications are divided into two groups – two-dimensional and three-dimensional graphic models.

Two-dimensional graphic models use the computer as a replacement for paper and drawing tools; however, the construction process is more convenient thanks to the set of functions of the graphic editor. Two-dimensional graphic models include maps, images, plans, photo maps, drawings,

synthesized images, and more. Creating two-dimensional graphic models in the process of professional training for future specialists in electronics and telecommunications allows the formulation and solution of the following types of educational tasks: identifying images of a flat object, which is part of a real spatial object (in particular, printed circuit boards, which are the basis for creating a specific device); finding an image from several given ones for the studied flat object; evaluating the shape and size of a flat figure; creating images of the intersection of given flat figures, and so on.

The features of 2D graphic models are that they can combine geometric models (vector graphics), digital images (raster graphics), typed text (with specific content, font style and size, color, position, and orientation), mathematical functions, equations, and more. All components contained in a 2D model can be modified using geometric transformations, including parallel translation, rotation, scaling, and so on.

Three-dimensional graphic models. These models create the necessary conditions for carrying out project activities during which a model of a real object is created. Using 3D modeling, one can not only create an image of the appearance of an object but also determine its technical characteristics. 3D models are indispensable for presentations, exhibitions, and work with clients when it is necessary to visually show what the final result will be. Three-dimensional modeling allows for the creation of very accurate models that are as close to reality as possible. Modern graphic editors help ensure high detail. Moreover, this facilitates making any changes to the three-dimensional model. Special programs create opportunities for integration with any other professional software, including programs for production equipment, accounting software, engineering calculation applications, and more.

Today, computer graphics is the field of information technology that is developing the fastest. In education and scientific research, computer graphics is the tool that enhances the ability to think in complex spatial images and create models of products or processes through design. Computer graphics today have become tools for designers, researchers, constructors, and specialists in all sectors of the economy.

**Conclusions.** The peculiarity of the professional activity of a specialist in electronics and telecommunications lies in the fact that its effectiveness depends on the combination of research, graphic, and inventive activities. The specialist must be able to improve existing products and design new ones (methods), develop quality product mock-ups, model them using three-dimensional and two-dimensional graphics, and have a creative approach to the assigned task, which collectively involves possessing graphic activity skills and the ability to work in modern graphic editors. The main professional skills of a graduate include the ability to develop and execute sketches of products, mock-ups, and prototypes using design methods, considering ergonomic requirements with subsequent graphic design of the product.

The theoretical foundations of the formation of graphic competence of future specialists in electronics and telecommunications by means of digital technologies have been analyzed and substantiated. Based on the analysis of the theory and practice of training specialists, a number of definitions characterizing the result of the formation of graphic competence have been determined, and the conditions necessary for its effective development have been established. It has been found that the integration of digital technologies contributes to the increase in the level of graphic competence.

The results of the survey confirmed the hypothesis that employers consider such requirements as professional skills and abilities, work experience, the ability to construct, the ability to improve existing products, and the conduct of design activities using modern graphic editors to be appropriate. Therefore, in the process of professional training of future specialists in electronics and telecommunications, in order to effectively form their graphic competence, it is necessary to: implement the interconnection of professional and graphic activities, which is a prerequisite for the effective performance of professional tasks; develop readiness for changes and the ability to adjust activities according to the changing demands of society; ensure the formation of the general professional culture of the specialist as a whole.

This will allow determining the criteria and factors that affect the successful formation of graphic competence and, based on empirical research, propose specific changes to the

educational programs to improve the professional training of future specialists in the field of electronics and telecommunications, which is the prospect of further scientific research.

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# ДЕФІНІЦІЇ ТА УМОВИ ФОРМУВАННЯ ГРАФІЧНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ФАХІВЦІВ З ЕЛЕКТРОНІКИ ТА ТЕЛЕКОМУНІКАЦІЙ ЗАСОБАМИ ЦИФРОВИХ ТЕХНОЛОГІЙ

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## Реферат:

*Актуальність:* радіоелектроніка є наукомістким пріоритетним сектором світової економіки із стабільним і постійно зростаючим попитом, значним експортним потенціалом, низькою матеріаломісткістю та високою питомою вартістю продукції, що стимулює розвиток інформаційно-комунікаційних технологій і таких галузей як машинобудування, приладобудування, медицина тощо; ефективність професійної діяльності фахівця в галузі електроніки та телекомунікацій залежить від поєднання науково-дослідної, графічної та винахідницької діяльності в процесі їхньої професійної підготовки.

*Мета:* дослідження та визначення ключових понять (дефініцій), що характеризують графічну компетентність, а також визначення умов, необхідних для її ефективного формування у процесі професійної підготовки майбутніх фахівців в галузі електроніки та телекомунікацій з використанням цифрових технологій.

*Методи:* *теоретичні* (аналіз стандартів вищої освіти, наукових і методичних публікацій, що відображають проблеми дослідження, критичний аналіз наявних теоретичних та методичних шляхів вирішення започаткованої проблеми в Україні та за кордоном щодо формування графічної компетентності майбутніх фахівців у галузі електроніки та телекомунікацій засобами цифрових технологій); *емпіричні* (анкетування; спостереження за навчальним процесом; опитування роботодавців і експертів).

*Результати:* проаналізовано та обґрунтовано теоретичні положення щодо формування графічної компетентності майбутніх фахівців з електроніки та телекомунікацій засобами цифрових технологій; на основі проведеного аналізу теорії та практики формування графічної компетентності майбутніх фахівців в процесі професійної підготовки було встановлено низку дефініцій, які характеризують результат процесу формування графічної компетентності та визначено умови для її формування; визначено особливості професійної діяльності фахівця в галузі електроніки та телекомунікацій; виявлено основні професійні уміння випускників.

*Висновки:* особливості професійної підготовки фахівця в галузі електроніки та телекомунікацій полягає у поєднанні науково-дослідної, графічної та винахідницької діяльності; результатом його професійної підготовки має стати набуття умінь і здатностей, актуальних на цифровому ринку праці (готовність до навчання впродовж життя; здатність вдосконалювати наявний і проектувати новий виріб, виконувати його ескізи й макети, моделювати його за допомогою тривимірної та двовимірної графіки; вміння працювати з урахуванням сучасних вимог ергономіки з подальшим графічним оформленням виробу; креативність); з метою ефективного формування графічної компетентності майбутніх фахівців у галузі електроніки та телекомунікацій має бути реалізовано три основні умови (забезпечено взаємозв'язок професійної й графічної діяльності, що є передумовою ефективного виконання професійних завдань; сформовано готовність до змін і здатність до коригування діяльності відповідно до змінних вимог суспільства; забезпечено формування загальної професійної культури фахівця в цілому).

**Ключові слова:** професійна підготовка, графічна компетентність, фахівці у галузі електроніки та телекомунікацій, заклади вищої освіти.

Received: February 29, 2024

Accept: May 31, 2024



# ECO-ORIENTED EDUCATIONAL PRACTICES IN THE PROFESSIONAL TRAINING OF HOSPITALITY SPECIALISTS IN LEADING EUROPEAN COUNTRIES

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## Abstract

*Relevance.* The relevance of the research is determined by the orientation of the modern hospitality industry towards sustainable development and its significant impact on the environment due to excessive consumption of resources, waste production, and CO<sub>2</sub> emissions. This determines several important trends: in EU countries, consumers increasingly choose environmentally friendly products and services; in leading European countries, the training of hospitality industry specialists includes eco-oriented educational practices on energy conservation, waste management, and resource provision; environmental education enables future specialists to understand this impact and master methods of environmentalization; the environmental competence and culture of hospitality industry specialists determine the competitiveness of their enterprises; the introduction of eco-oriented practices promotes innovations in the hospitality industry, improves the quality of services, and reduces energy and material costs; the European experience of training hospitality industry specialists is open to the Ukrainian system of vocational (vocational-technical) education and requires thorough study.

*The aim* is to analyze the experience of leading European countries regarding the use of eco-oriented educational practices in the professional training of hospitality industry specialists and to develop relevant recommendations for vocational (vocational-technical) education institutions in Ukraine that train specialists for this industry.

*The methods* include analysis and synthesis methods for outlining the conceptual basis of the research, a search method for formulating general conclusions, and a prognostic method for substantiating ways to use innovative ideas from the experience of leading European countries in the professional training of hospitality industry specialists in Ukraine.

*The results* show that eco-oriented professional training in leading European countries aims at achieving sustainable development goals and enhancing the competitiveness of hospitality industry specialists in the international labor market; the use of eco-oriented practices, exemplified by leading European countries (Denmark, Norway, the United Kingdom, Spain), demonstrates the advantages of integrating eco-oriented skills into educational programs for training hospitality industry specialists, indicating their compliance with global environmental standards and leadership in sustainable development.

*The conclusions*, based on the analysis of the experience of training hospitality industry specialists in leading European countries (Denmark, Norway, Spain, the United Kingdom), provide recommendations for improving the professional training of these specialists in Ukraine by introducing European eco-oriented educational practices (integration of environmental management principles such as "Green Key", "Eco-Lighthouse"; inclusion of practice-oriented modules on energy conservation, waste management, and resource provision into educational programs; establishment of unified standards for eco-oriented practices; support for innovation; response to consumer demand for sustainable development strategies; monitoring and evaluation of eco-oriented professional programs).

**Keywords:** *hospitality industry, hospitality industry specialist, educational practices, eco-orientation, European Union countries.*

**Introduction.** The hospitality industry reflects rapid and qualitative shifts in the goal-setting vector, particularly the strengthening of

environmental responsibility and the growing demand for sustainable practices and measures to prevent environmental pollution. In leading

European countries, state policy is currently focused on fostering consumer environmental awareness, which has correspondingly influenced the concept of professional training for hospitality specialists and has given impetus to the development of eco-oriented education.

In the educational context, this process involves the implementation of eco-oriented practices in professional training, specifically in the comprehensive familiarization of future hospitality specialists with effective sustainable development strategies. These educational practices are characterized by a broad thematic spectrum, ranging from water and energy conservation to waste management and resource provisioning. They allow future specialists to thoroughly analyze successful eco-oriented initiatives and outline their own paths for practical implementation.

At the same time, it is essential to emphasize the practical significance of eco-oriented educational practices, as they provide future hospitality specialists with necessary eco-oriented skills and competencies and form their professional experience in utilizing greening mechanisms according to the requirements of the time. For example, such practices may include studying the experiences of international hotel chains and restaurants in reducing carbon emissions or adhering to zero waste strategies. These examples testify to the conceptual relevance and timeliness of eco-oriented professional training for hospitality specialists in leading European countries.

Thus, a detailed study of the experiences of leading European countries in applying eco-oriented educational practices will highlight the specific features of professional training for future hospitality specialists in light of today's environmental challenges. Meanwhile, Ukrainian specialists can leverage the positive aspects of this experience to improve the professional training of hospitality specialists within the domestic professional (vocational-technical) education system.

**Sources.** Recently, the problem of implementing eco-oriented practices in the professional training of hospitality specialists has been the focus of many studies in both domestic and international scientific discourse. Legrand et al. (2023) analyzed pressing issues related to

sustainable development and the hospitality industry. Their research predominantly addresses sustainable tourism and hospitality management. Salem et al. (2019) substantiated sustainable development practices in the hospitality industry and the effectiveness of fostering eco-oriented behavior. Font (2002) revealed the importance of corporate social responsibility. Pantelidis (2014) examined the state of development of environmental responsibility among future hospitality specialists. Ahuja et al. (2023) studied the effectiveness of eco-oriented educational practices in the context of improving eco-oriented skills and competencies among future hospitality specialists. Cavagnaro & Curiel (2022) identified the influence vector of eco-oriented practices on sustainability education. In particular, they emphasize the importance of experiential learning and real-life examples in forming eco-oriented behavior among future hospitality specialists.

According to O. Haiduk et al. (2022), "ways to harmonize the relationship between humans and nature (the environment) occur primarily through the transfer of necessary environmental experience, knowledge, and skills in environmental conservation through educational means" (p. 5). Thus, eco-oriented pedagogical technologies serve as an effective tool for addressing new environmental challenges of civilization by qualitatively updating the content of professional (vocational-technical) education in Ukraine, particularly in the professional training of hospitality specialists.

Simultaneously, as noted by A. Kalenskyi (2023, p. 25), "the preparation of cases is a labor-intensive process that occurs with the help of creativity, so the preparation of cases requires financial and time resources and significant intellectual costs; this method requires significant investment of intellectual creative labor not only in the creation of the case but also in working with it."

Thus, the aforementioned scholars significantly expanded the strategic approach to integrating eco-oriented practices into the professional training of hospitality industry specialists, in particular, they identified and substantiated the possible challenges and opportunities of the studied process. However, the raised problem of studying the potential of leading

European countries in promoting eco-oriented educational practices in professional education requires more detailed study.

Therefore, **the purpose of the article** is to study the experience of leading European countries regarding the use of eco-oriented educational practices in the professional training of hospitality industry specialists and to present appropriate recommendations for the system of professional (vocational-technical) education in Ukraine.

**Research methods:** To achieve the outlined purpose of the article, the following methods were used: analysis and synthesis – to outline the conceptual basis of the research; the search method – to formulate general conclusions; the prognostic method – to substantiate ways of using the innovative ideas of the experience of leading European countries in the professional training of hospitality industry specialists in Ukraine.

**Results and discussion.** The Green Key Programme – Denmark. Denmark's leadership in sustainable development is largely demonstrated by the international eco-certification program for hotels, "Green Key" (Green Key – Green Dreams, 2024). In Denmark, Green Key standards are organically integrated into the content of educational programs in the hospitality industry. Students are introduced to the basic principles of energy saving, waste management, and resource provisioning. For example, at the Copenhagen Hospitality College, the training modules are based on eco-oriented practices, allowing future hospitality industry specialists to minimize their ecological footprint in daily activities (Copenhagen Hospitality College, 2024). Graduates are able to effectively apply Green Key standards in practice, making them in demand among environmentally conscious employers. The Green Key program has led to a significant reduction in energy consumption and waste generation in participating establishments.

Eco-Lighthouse Certification – Norway. In Norway, the Eco-Lighthouse certification serves as a vivid example of eco-oriented education (Eco-Lighthouse, 2024). It is a recognized standard of environmental management and is implemented in various industries, including the hospitality industry. For instance, the Norwegian School of Hotel Management integrates Eco-Lighthouse principles into its educational programs (The University of

Stavanger, 2024). The training includes seminars and practical sessions on sustainable practices such as efficient resource use, pollution reduction, and biodiversity promotion. Hospitality professionals educated under this program are competent in achieving and maintaining Eco-Lighthouse certification for their employers. This has led to the wider adoption of sustainable practices in the hospitality industry in the country.

The Association of Eco-Oriented Restaurants (The Sustainable Restaurant Association – SRA) – United Kingdom. The Association of Eco-Oriented Restaurants (SRA) in the United Kingdom is foundational for sustainable development in the public catering sector. Its certification encompasses a wide range of ecological aspects, from resource provision to waste management (The Sustainable Restaurant Association, 2024). British educational institutions successfully integrate the Association's guidelines into hospitality programs, such as at the University of West London. Students participate in projects that include auditing and enhancing the eco-orientation of local restaurants, gaining practical experience in implementing eco-friendly practices (The University of West London, 2024). They also acquire skills in fostering a culture of sustainable development in the hospitality sector, particularly by assisting restaurants in obtaining the Association's certification. In turn, this increases the number of eco-oriented restaurants and reduces the overall environmental impact of the public catering sector.

The European Sustainable Hospitality Club (The European Sustainable Hospitality Club – ESHC) – Spain. The European Sustainable Hospitality Club (2024) is a network promoting sustainable development in the hospitality sector across European countries, with significant involvement from Spain (The European Sustainable Hospitality Club, 2024). Spanish educational institutions, such as the Escuela Superior de Hostelería de Sevilla (The Escuela Superior de Hostelería de Sevilla, 2024), actively collaborate with ESHC and implement sustainable development principles in their curricula. These programs cover a wide range of topics, including sustainable architecture, renewable energy use, and sustainable tourism practices. Graduates of such programs contribute to the growth of environmentally friendly

businesses in the hospitality sector within the country. The influence of ESHC has stimulated innovations in ecological construction and the promotion of sustainable tourism.

It is worth noting that the current eco-oriented professional training of hospitality specialists in the aforementioned leading European countries faces some challenges, such as:

1. Lack of standardization. A significant challenge is the absence of unified European standards for eco-oriented practices within the professional training of hospitality specialists. This inconsistency complicates the implementation and monitoring of measures aimed at achieving sustainable development goals.

2. High implementation costs. The financial burden associated with implementing and maintaining eco-oriented practices can be prohibitively high for some educational institutions. These costs include investments in sustainable technologies.

3. Variability in awareness and acceptance. The level of awareness and acceptance of eco-oriented practices varies across European countries, which may hinder the widespread adoption of sustainable practices.

At the same time, leading European countries offer excellent opportunities for the development of eco-oriented educational practices in the hospitality sector:

1. Financial support. European governments provide funding and support for sustainable development initiatives. This financial assistance enables educational institutions to overcome economic barriers to implementing eco-oriented practices.

2. Growing consumer demand. There is a growing demand for eco-orientation in the hospitality sector. This demand can stimulate the adoption of eco-oriented educational practices as businesses strive to meet consumer preferences.

3. Potential for innovation. The hospitality sector has significant potential for innovation in sustainable technologies and practices. This potential can lead to the development of new, more efficient methods of reducing environmental impact.

Thus, eco-oriented training of hospitality specialists in leading European countries is the key to achieving environmental goals and maintaining

competitiveness in a market increasingly driven by sustainable development principles. The examples of Denmark, Norway, the United Kingdom, and Spain demonstrate that despite existing challenges, the benefits of integrating eco-oriented practices into the professional training of future hospitality specialists are significant. They provide future specialists with eco-oriented skills and competencies necessary for adhering to modern environmental standards, thereby positioning these countries as leaders in sustainable development.

**Conclusions.** Based on the study of the professional training experience of hospitality specialists in leading European countries (Denmark, Norway, Spain, the United Kingdom), recommendations have been formulated for improving the professional training of such specialists in Ukraine by implementing a range of successful eco-oriented educational practices.

1. Adoption of the positive experience of leading European countries:

✓ Integration of the "Green Key" program. It is recommended to collaborate with relevant stakeholders regarding the integration of principles from effective eco-oriented programs, such as "Green Key", into the educational programs for training hospitality specialists in Ukrainian vocational education institutions.

✓ Certification model "Eco-Lighthouse". It is important to thoroughly study and adapt the "Eco-Lighthouse" certification model to develop similar standards that can be applied in Ukrainian vocational education institutions.

2. Development of eco-oriented educational programs:

✓ Modules built on sustainable practices. It is essential to introduce modules on energy saving, waste management, resource provision, and environmental management into the educational programs for training hospitality specialists in Ukrainian vocational education institutions.

✓ Practical training. Special attention should be given to practical classes where students can apply eco-oriented practices in real hospitality settings.

3. Cooperation and partnership:

✓ Cooperation between the hospitality industry and the education sector. Developing partnerships between educational institutions that implement

training programs for hospitality specialists and representatives of this industry is crucial for ensuring compliance with industry needs and standards.

✓ European partnerships. It is important to explore opportunities for cooperation with European institutions or organizations, such as the European Sustainable Hospitality Club (ESHCLUB), for the exchange of best practices and knowledge.

#### 4. Overcoming challenges:

✓ Promotion of standardization. It is vital to work on establishing unified standards for eco-oriented educational practices in the hospitality industry in Ukraine, particularly through cooperation with leading European countries.

#### 5. Innovations and projects:

✓ Encouragement of innovations. Innovation and sustainable development in the hospitality industry in Ukraine should be integrated through grants.

✓ Pilot projects. It is recommended to support pilot projects to test and implement new eco-oriented initiatives in Ukrainian hospitality settings.

#### 6. Consumer engagement:

✓ Response to consumer demand. It is essential to respond to the growing consumer demand for eco-orientation in the hospitality industry by integrating eco-oriented practices into the educational programs of vocational education institutions training future hospitality specialists.

#### 7. Systematic improvement:

✓ Monitoring and evaluation. It is important to implement mechanisms for monitoring and evaluating the effectiveness of eco-oriented educational programs in the context of professional training for hospitality specialists.

The prospects for further research lie in studying ways to implement eco-oriented educational practices in the professional training of hospitality specialists in leading Asian countries.

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DOI: <https://doi.org/10.32835/2707-3092.2024.28.197-204>

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## ЕКООРІЄНТОВАНІ ОСВІТНІ ПРАКТИКИ У ПРОФЕСІЙНІЙ ПІДГОТОВЦІ ФАХІВЦІВ ГАЛУЗІ ГОСТИННОСТІ У ПРОВІДНИХ ЄВРОПЕЙСЬКИХ КРАЇНАХ

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### Реферат:

*Актуальність* дослідження визначається орієнтацією сучасної галузі гостинності (hospitality industry) на сталий розвиток та її значним впливом на навколишнє середовище через надмірне споживання ресурсів, виробництво відходів і викиди CO<sub>2</sub>, що визначає низку важливих тенденцій: у країнах ЄС споживачі все більше обирають екологічно чисті продукти і послуги; у провідних європейських країнах підготовка фахівців галузі гостинності охоплює екоорієнтовані освітні практики з енергозбереження, управління відходами та ресурсозабезпечення; екологічна освіта дає змогу майбутнім фахівцям усвідомити цей вплив і опанувати методи екологізації; екологічна компетентність і культура фахівців галузі гостинності визначає конкурентоспроможність їхніх підприємств; упровадження екоорієнтованих практик сприяє інноваціям у галузі гостинності, покращує якість послуг, зменшує витрати на енергію та матеріали; європейський досвід підготовки фахівців галузі гостинності є відкритим для української системи професійної (професійно-технічної) освіти і потребує ґрунтовного вивчення.

*Мета:* проаналізувати досвід провідних європейських країн щодо використання екоорієнтованих освітніх практик у професійній підготовці фахівців галузі гостинності та сформулювати відповідні рекомендації для закладів професійної (професійно-технічної) освіти України, які здійснюють підготовку фахівців для цієї галузі.

*Методи:* методи аналізу та синтезу – для окреслення концептуальної основи дослідження, пошуковий метод – для формулювання загальних висновків та прогностичний метод – для обґрунтування шляхів використання інноваційних ідей досвіду провідних європейських країн в професійній підготовці фахівців галузі гостинності в Україні.

*Результати:* екоорієнтована професійна підготовка у провідних європейських країнах спрямована на досягнення цілей сталого розвитку і підвищення конкурентоспроможності фахівців галузі гостинності на міжнародному ринку праці; використання екоорієнтованих практик на прикладі провідних європейських країн (Данія, Норвегія, Велика Британія, Іспанія) демонструє переваги інтеграції екоорієнтованих умінь і навичок в освітні програми підготовки фахівців галузі гостинності, свідчить про їхню відповідність світовим екологічним стандартам та лідерство в галузі сталого розвитку.

*Висновки:* на основі аналізу досвіду підготовки фахівців галузі гостинності у провідних європейських країнах (Данія, Норвегія, Іспанія, Велика Британія) розроблено рекомендації для покращення професійної

підготовки цих фахівців в Україні через упровадження європейських екоорієнтованих освітніх практик (інтеграція принципів екологічного менеджменту «Green Key», «Eco-Lighthouse»; включення до освітніх програм практико-орієнтованих модулів із енергозбереження, управління відходами та ресурсозабезпечення; встановлення єдиних стандартів екоорієнтованих практик; підтримка інновацій; реагування на попит споживачів щодо стратегій сталого розвитку; моніторинг і оцінювання екоорієнтованих професійних програм).

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**Ключові слова:** *галузь гостинності, фахівець галузі гостинності, освітні практики, екоорієнтованість, країни Європейського Союзу.*

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Received: February 12, 2024

Accept: May 31, 2024



# COMPETENCIES OF TEACHERS IN THE FIELD OF ELECTRONIC SYSTEMS FOR SELF-ASSESSMENT OF PROFESSIONAL ACTIVITIES

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## Abstract

*Relevance.* The importance of implementing electronic systems for self-assessment of teachers' professional activities has been described. It has been emphasized that modern educational reforms require objective and transparent evaluation mechanisms. The implementation of such systems is shown to improve the quality of the educational process. The necessity of developing digital and analytical competencies among teachers for effective use of these systems is highlighted.

*Purpose* of the article is to substantiate the competencies of teachers in the field of electronic systems for self-assessment of professional activities.

*Methods:* questionnaires were used to evaluate teachers' perceptions and applications of electronic systems in their professional activities; interviews were aimed at gaining a deeper understanding of individual experiences with the use of electronic systems for self-assessment of professional activities; document and literature analysis covered curricula, methodological recommendations, reports, articles on the performance of professional tasks, and other documents related to teachers' professional activities; observation focused on identifying how teachers use electronic evaluation systems in their daily professional activities and how this affects their interactions with students.

*Results* of the study indicate that the implementation of electronic systems for self-assessment of teachers' professional activities within the context of educational reforms is a positive step. It has been found that these systems enhance the objectivity, transparency, and effectiveness of assessments while developing key competencies among teachers: informational and digital, evaluative-analytical, innovative, and reflective. The importance of continuous learning for adapting to technological changes is noted. It was found that teachers actively use digital tools, such as online learning, video conferencing, Google Forms, and Padlet. Although artificial intelligence is being implemented slowly, it holds great potential for personalizing learning.

*Conclusions.* The study emphasizes the importance of electronic self-assessment systems for improving the quality of education. The development of key teacher competencies – informational and digital, evaluative-analytical, innovative, and reflective – is crucial for the effective use of these systems. These competencies enable objective assessment of learning outcomes, adaptation of educational strategies, and enhancement of evaluation transparency, all of which positively influence the quality of the educational process. Continuous teacher learning ensures their ability to adapt to technological changes and introduce new approaches to teaching. Electronic systems stimulate reflection and professional development, enhancing teachers' expertise and creating a modern, interactive educational environment that meets the demands of the digital era.

**Keywords:** *informational and digital competence; evaluative-analytical competence; innovative competence; reflective competence; continuous learning; quality of education.*

**Introduction.** Electronic self-assessment systems for the professional activities of educational workers are becoming increasingly significant within the

framework of contemporary educational reforms. Such systems provide the means to achieve objectivity, trans-

parency, and efficiency in self-assessment, playing a crucial role in improving the quality of education. These systems encompass a wide range of indicators, from student performance to the professional development of teachers, making them a valuable tool for educators' professional growth. The implementation of these systems requires significant resources, time, finances, and personnel training. However, investments in these systems are justified by the improvement of the educational process quality and the enhancement of professional standards for teaching activities, creating a fair assessment environment where every teacher has the opportunity to demonstrate their contribution to the development of education.

It is essential to emphasize the need for objective and transparent assessment of teaching activities in the context of educational system development. Electronic systems minimize the impact of subjective factors and biases, making self-assessment more fair and objective. This also highlights the necessity for the development of new competencies in educators, such as digital literacy, analytical skills, and communication abilities, which are essential for the effective use of electronic systems.

The relevance of this research lies in promoting the implementation of electronic systems for the assessment and self-assessment of teachers' professional activities, particularly in identifying the key competencies teachers need for their effective use. The research results aim to enhance education quality by providing teachers with valuable information for analyzing and improving their professional performance. This is achieved through the development of professional development programs that help teachers cultivate the competencies required for working with these electronic systems.

**Sources.** One study that confirms the importance of teachers' competencies in using electronic self-assessment systems is the work of S. Ivanov (2017). In his article, he notes that educators who possess the skills to work with electronic systems can not only improve the assessment of students' achievements but also ensure a more objective and transparent assessment process. This research highlights that inadequate teacher preparation in this area can become a significant barrier to the implementation of innovative technologies in education. The scientific inquiry conducted by O. Radkevych (2024) demonstrates that competent teachers can more effectively integrate electronic self-assessment systems of professional performance into the educational process. The author notes that the ability to use such systems enhances the interaction between students and teachers and provides the possibility of real-time feedback. This research indicates that the development of teachers' competencies is a key aspect of the successful application of digital technologies in education.

Regarding the use of self-assessment tools for teachers' digital competencies, especially in the context of martial law and quarantine restrictions, O. Ovcharuk (2023) focused her attention on this matter. She emphasized the relevance of self-assessment as a means for teachers to become aware of their competencies and learning needs, which is particularly important during the rapid transition to distance learning. She identified digital competence as a set of knowledge, skills, and abilities that enable the effective application of digital technologies in the educational process. The researcher reviews various approaches to this concept in both domestic and foreign scientific literature, stressing the need for the unification and standardization of requirements for teachers' digital competencies.

The process of preparing future teachers for the use of digital technologies in the learning process is highlighted by Z. Lakomchak (2015). She explores the key competencies that educators must acquire for the effective use of digital tools and resources. The author describes various stages of preparation, covering both theoretical and practical aspects, and emphasizes the importance of continuous professional development and self-education. Special attention is given to the consideration of modern educational technologies and electronic platforms that can be used in the learning process. Continuing this topic, O. Stoika (2023) examined contemporary methods and approaches to teacher preparation in the context of education digitalization. The author analyzes the need for integrating digital technologies into the process of teacher training and proposes various strategies for effective learning. In particular, she emphasizes the importance of developing digital literacy, adapting educational programs to the latest technologies, and implementing interactive teaching methods. Additionally, examples of the successful implementation of digital technologies in educational institutions and their impact on the quality of teacher preparation are discussed.

Focusing on the aspect of self-assessment of teachers' professional activities, it is important to highlight the article "Electronic Tools for Internal Control and Evaluation of Education Quality," which examines the features of electronic tools such as Moodle, Google Classroom, ExamSoft, and Turnitin. Each of these tools is described from the perspective of the functions and capabilities they offer for controlling and assessing education quality. It has been established that their use contributes to enhancing the efficiency and productivity of the educational process and ensures convenient and accurate internal quality control of education (Radkevych, 2023). In this context, the review of reflective competence is essential. In the article "Reflec-

tive Competence as a Component of a Future Specialist's Professional Characteristics," V. Raskalinos (2011) argues that reflective competence is key for modern professionals, as it enables them to adapt to change, engage in continuous learning and development, make effective decisions, and take responsibility for the results of their professional activities. The author describes the structure of reflective competence and methods for its development in future professionals, emphasizing the importance of this competence for higher education. At the same time, there is a shortage of scientific studies analyzing teachers' competencies in the context of working with electronic assessment systems, particularly in terms of self-assessment of teachers' professional activities.

The aim of the article is to substantiate teachers' competencies in the field of electronic systems for self-assessment of professional activities. Methods: To explore the research problem, several methods were employed: a survey was conducted to evaluate how teachers perceive and use electronic systems in their professional activities. The questions focused on determining their level of computer literacy, attitudes toward electronic assessment methods, and perceptions of the impact of electronic systems on the effectiveness of their professional work. Interviews were used to gain a deeper understanding of the individual experiences with electronic systems for self-assessment of professional activities. The interviews provided reliable data on teachers' personal experiences, professional challenges, and successes when using electronic systems for self-assessment of professional performance. Document and literature analysis covered curricula, methodological recommendations, reports, articles on professional tasks, and other documents related to teachers' professional activities. This made it possible to assess which electronic systems have been integrated into the educational process and how they affect teaching standards and the evaluation of learning outcomes. Observations were focused on identifying how teachers use electronic assessment systems in their daily professional activities and how this impacts their interaction with students.

Results and discussion. Self-assessment of teachers' professional activities using electronic systems is aimed at achieving important pedagogical goals that contribute to improving education quality and teachers' professional development. One of the main goals is to ensure objectivity in assessment, which helps teachers better understand their strengths and weaknesses. Electronic systems ena-

ble the collection and analysis of data on professional activities in real-time, making it possible to respond promptly to the information received and adapt teaching methods accordingly. The self-assessment process encourages teachers to engage in self-reflection and self-improvement, which is critically important for continuous professional development. On the basis of electronic educational systems, a platform is created for systematically updating professional knowledge and skills. This, in turn, enhances the effectiveness of the educational process as teachers become more purposeful in performing their work. It also allows teachers to better plan their professional development by setting specific goals and strategies to achieve them. Electronic systems can serve as tools for tracking progress in implementing these plans, providing opportunities for regular updates and adjustments, which contribute to more effective and meaningful professional growth. Thus, self-assessment of professional activities using electronic systems becomes a central element in maintaining a dynamic and productive pedagogical environment. The data obtained from electronic systems provide teachers with an evidence base for reflecting on their teaching methods, which can lead to more thoughtful implementation of changes in educational practice. This, in turn, promotes higher educational standards and the development of professional competencies that are important for the modern educational field. Additionally, electronic systems for self-assessment of professional activities can include tools for tracking and analyzing trends in teaching activities at the institutional level. This allows school administrations to evaluate the overall effectiveness of educational programs and make informed decisions regarding resource needs, planning professional development courses for teachers. The use of these systems enables the creation of a more dynamic and adaptive educational environment aimed at the continuous improvement of learning quality and addressing contemporary educational needs.

Considering that electronic systems for evaluating the professional activities of teaching staff play a key role in modern secondary education institutions, they contribute to the effective assessment and analysis of teachers' work. These systems encompass various components that facilitate feedback collection through questionnaires and surveys. This ensures objective evaluation of employees' professional activities by colleagues and supervisors. For instance, tasks and tests as elements of self-assessment help determine the level of knowledge and skills in specific areas of professional activity, which

serves as a foundation for planning teachers' training and professional development. Self-assessment enables educators to independently analyze their achievements and identify areas for improvement, fostering their self-awareness and motivation. The analytical capabilities of these systems provide detailed reports on the performance of teaching staff, helping to identify strengths and weaknesses both at the individual and organizational levels. Finally, electronic self-assessment systems for professional activities contribute to the development of targeted development programs for teachers, supporting their professional growth and adaptation to changing conditions in the educational process.

A survey among educational staff was conducted using the Google Forms system, with 941 respondents participating. This number of respondents

$$n = \frac{N \cdot Z^2 \cdot p \cdot (1-p)}{(N-1) \cdot E^2 + Z^2 \cdot p \cdot (1-p)} \quad (1)$$

Where:

- $n$  – the sample size required for analysis.
- $N$  – the total population size (in your case, the total number of teaching staff).
- $Z$  – the Z-score corresponding to the chosen confidence level (for example, 1.96 for 95%).
- $p$  – the assumed proportion of responses, usually taken as 0.5, as this provides the maximum sample size.
- $E$  – the margin of error (for example, 0.05 or 5%).

Let us consider the competencies that play a key role in the self-assessment of the professional activities of teaching staff. Specifically, teachers' information and digital competence is critical in the context of applying electronic self-assessment systems for professional activities in general secondary education institutions. This competence encompasses not only knowledge and skills related to electronic systems but also ensures the ability to effectively use digital technologies in professional activities (Barlit, 2022). Mastery of this competence enables teachers to adapt to the dynamic educational environment, where digital technologies are increasingly utilized. It is essential to note that the ability to navigate the information space, search for, critically evaluate, and use information in professional activities is a significant component of information and digital competence. This pertains not only to acquiring new knowledge and information but also to the ability to filter out irrelevant data, which is crucial

is significant, as it significantly exceeds the minimum required sample size to achieve representativeness. The total number of teaching staff in 2021 was 434,755, and to obtain valid survey results with a confidence level of 95% and a margin of error of 5%, a minimum of 384 respondents needed to be involved. Thus, the inclusion of 941 respondents is more than sufficient to ensure reliability and reflect general trends among teaching staff. Formula (1) allows for a high probability of analyzing and interpreting the data obtained from the survey, contributing to the formation of well-founded conclusions and recommendations for the further development of the educational field.

when applying electronic self-assessment systems. The ability to effectively use available digital resources and create new ones as needed is vital for improving the quality of the educational process. It promotes the integration of innovative approaches in teaching and opens new possibilities for individualizing the educational process and adapting it to the specific needs of students. The application of digital technologies in the educational process is not merely a convenience but a necessity in the modern educational environment. Teachers who possess information and digital competence can effectively use electronic self-assessment systems and integrate digital tools into the teaching process, thereby enhancing the quality of education and fostering the development of students' critical thinking (Timotheou et al., 2023).

The understanding of information and digital competence in contemporary scientific thought covers a broad spectrum of skills and knowledge necessary for successful integration into the information society. Researchers offer various interpretations of this competence, highlighting its key aspects. For example, L. Potapyuk and I. Potapyuk (2019) define information and digital competence as the critical use of information and communication technologies in various spheres of life, including professional activities, personal communication, and public space. They emphasize components such as information and media literacy, programming, algorithmic thinking, and database skills, as well as internet safety and ethical aspects of working with information, which

are essential for ensuring secure and responsible use of digital technologies. O. Sakhno (2020) focuses on the use of information and communication technologies in professional activities. According to his definition, information and digital competence includes the collection, processing, transmission, and storage of information, the automation of information-methodological support processes, and the evaluation of electronic resources. Additionally, the researcher emphasizes the organization of interaction through interactive means, which is crucial for digital education, as well as the application of digital technologies in teaching, considering the specifics of the subject area. O. Barlit, V. Mogilevska, and O. Sibil (2022) view information and digital competence as a multifunctional skill that not only contributes to the successful organization of the educational process but also enables teachers to effectively adapt to changes in the educational environment. They underline the universality of this competence, making it important not only for professional activities but also for other spheres that require the effective use of digital tools.

O. Tryfonova (2018) pays special attention to the process of finding, systematizing, and evaluating information using digital tools and filters. She emphasizes the possibility of creating information databases from various sources and assessing competency levels in different areas. Information and digital competence as a set of knowledge, skills, abilities, and personal qualities that enable individuals to work effectively with information from various sources is examined by Sinienko K. (2021). An important component is the use of various media, which accelerates adaptation to the challenges and demands of a high-tech society. O. Polyakova (2022) focuses on the ability of individuals to navigate the information space and work effectively with information according to their own needs and the demands of the modern world. It is essential to understand how these needs evolve with the rapid development of technology. A. Chudesa (2020) concentrates on the technical aspects of information and digital competence, highlighting the ability to configure software, work with multimedia tools, and use resources to create educational materials. The researcher also emphasizes the importance of mastering basic technologies and website development skills. Analyzing various approaches to defining in-

formation and digital competence, it can be concluded that most researchers focus on the importance of digital knowledge and skills for modern individuals. However, key differences lie in some researchers emphasizing the professional sphere, while others focus on general media literacy or technical skills. Summarizing these approaches, information and digital competence can be interpreted as a set of skills, knowledge, and abilities that enable individuals to work effectively with information technologies in various professional fields, critically evaluate information, and use it to achieve their professional and personal goals.

The results of assessing the level of teachers' information and digital competence (Figure 1) revealed that most of them use various digital tools to enhance the educational process. In particular, software for online learning, which includes tools for organizing distance learning and interaction, is used by 89.6% of respondents. This indicates a positive trend in the acceptance of distance learning technologies. Video conferencing, which allows for online lessons and meetings, is even more popular, with a rate of 91.7%. Additionally, a high percentage of teachers use social networks and online communities (74.4%) and mobile devices (83.3%) for educational purposes, indicating a trend toward integrating everyday digital experiences into the educational process. Interactive whiteboards, used by 52.1% of respondents, contribute to increasing interactivity and student engagement in learning. However, less common tools, such as virtual laboratories (6.3%) and educational programs and games (10.4%), despite their potential to provide more engaging and practical learning experiences, are used far less frequently. This indicates the need for further support and development of these technologies. Learning management systems (20.8%) and student e-portfolios (31.3%), as reported by respondents, can serve as important tools for tracking educational achievements and managing learning content. Artificial intelligence, although used by 35.4% of teachers, still holds significant potential for expansion, given its ability to personalize learning and adapt materials to students' individual needs. These data illustrate the wide range of digital tools used in education and highlight the importance of continuous development of information and digital competence among teaching staff.

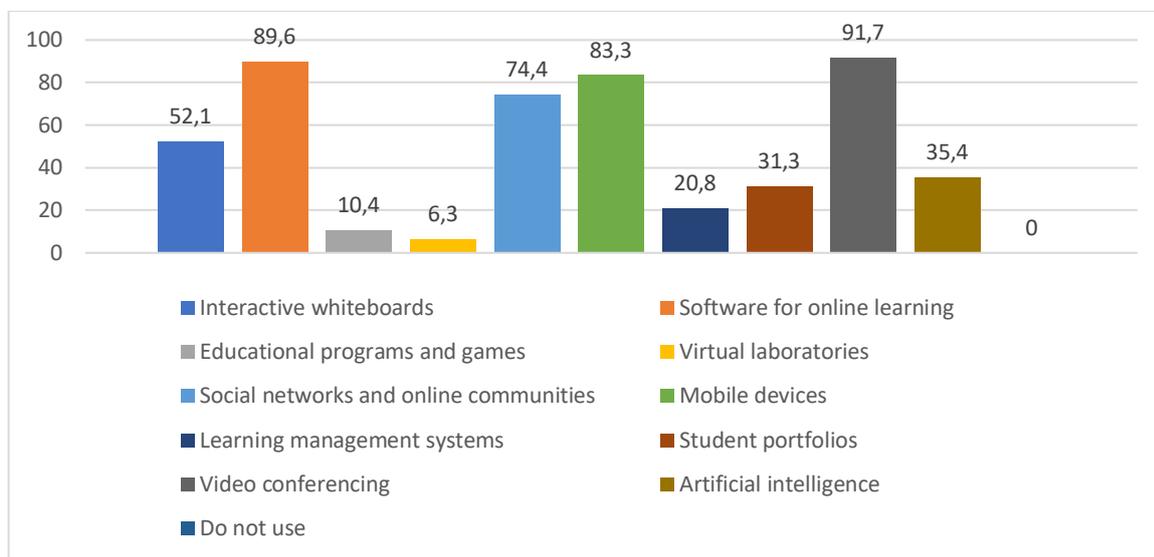


Figure 1. Which digital learning technologies do you use in the educational process? (data in percentages)

In the context of using electronic self-assessment systems, the evaluative and analytical competence of educators in secondary education institutions enables teachers not only to analyze and interpret data on students' learning outcomes but also to effectively apply this information to improve the educational process. The importance of evaluative and analytical competence increases in light of the necessity to adapt teaching methods to students' individual needs and to enhance the overall quality of educational services (Bykov et al., 2020). It should be noted that the ability to critically assess information obtained from electronic self-assessment systems requires teachers to develop critical thinking skills and the ability to work with data analytically. This not only contributes to improving the quality of education through the individualization of the educational process but also prepares students for effective interaction with an information-rich world. The ability to assess students' learning outcomes is fundamental to pedagogical activity. Electronic self-assessment systems offer a wide range of tools for measuring and analyzing various aspects of students' achievements, from academic knowledge to social and emotional skills. These systems allow teachers to make timely adjustments to the educational process based on objective data. The ability to analyze students' learning outcomes encompasses not only the interpretation of quantitative data but also the qualitative analysis of students' responses, reflections, and projects. This includes the use of analytical tools to identify trends, problem areas, and successes in learning, which enables teachers to develop targeted strategies for each student's development.

Given this, the ability to perform self-assessment and peer assessment of learning outcomes becomes crucial. Thus, electronic self-assessment systems can foster the development of students' self-analysis, self-criticism, and responsibility for their own learning. Peer assessment, on the other hand, supports the development of communication skills and collaboration, forming the basis for effective group work and mutual assistance among students (McMillan & Hearn, 2008). Understanding evaluative and analytical competence by various researchers underscores its importance for effective pedagogical activity. For example, S. Pokrova (2022) defines it as a key component that encompasses solving pedagogical tasks and making decisions, whether standard or creative. According to her, this competence is based on the teacher's ability to assess situations in a timely manner, analyze decision options, and choose the best one. The structure of this competence includes skills that enable teachers to successfully solve professional tasks in pedagogical activity.

Another approach is presented by a group of authors led by O. Shkvir (2023). They argue that a teacher's evaluative and analytical competence involves the adequate assessment of learning outcomes and the ability to conduct both self-assessment and peer assessment. This process requires the integration of theoretical knowledge and practical skills acquired during classes. Participation in scientific-practical events, according to the authors, is an important element, as it contributes to the development of skills in analyzing and assessing learning outcomes. Evaluative and analytical competence is viewed as a means for the effective use of electronic

systems to analyze students' academic achievements (Radkevych, 2024). This competence presupposes the presence of critical thinking and analytical abilities, which are necessary for working with large amounts of data, as well as the ability to adapt the educational process to the modern educational needs of society. This competence forms the foundation of pedagogical activity, helping teachers to effectively apply various assessment methods, which enables them to make the educational process more transparent and systematic. Teachers should be able to summarize their own experience and adequately present it (Onopriienko, 2021).

V. Yatsenko (2024) adds the ability to appropriately apply assessment criteria for students in secondary education institutions to the understanding of evaluative and analytical competence. This skill is fundamental to educational practice, as it helps teachers adequately assess students' academic achievements and foster their development. G. Chaus and I. Romanets (2023) emphasize the systematic nature of assessment, which allows tracking students' progress and identifying their individual needs. Moreover, these authors highlight the importance of self-assessment and peer assessment as mechanisms that develop students' responsibility for their own learning. Thus, an analysis of interpretations indicates that evaluative and analytical competence encompasses a wide range of knowledge, skills, and abilities necessary for the effective evaluation, analysis, and adaptation of the educational

process to contemporary demands. According to the author, evaluative and analytical competence is the foundation of pedagogical activity, as it enables teachers not only to adequately assess students' outcomes but also to critically analyze the educational process and ensure its continuous modernization.

Based on the results of a survey of educational staff regarding the presence of evaluative and analytical competence in the use of digital tools in the educational process (Figure 2), one can observe a distribution of preferences for their application in assessing learning outcomes. Among the most popular tools, Google Forms stands out with a 77.1% share, indicating its widespread use and recognition in educational institutions. Other platforms, such as Padlet and Kahoot!, are also significantly used, with respective rates of 35.4% and 31.3%. Meanwhile, Quizizz is used less actively, with a share of only 14.6%. An important aspect is that 14.6% of responses (corresponding to 137 teachers from the total number of respondents) indicated that these educators do not use digital tools to assess learning outcomes. This may point to barriers or limitations existing in educational institutions or among individual teachers regarding the adaptation to new technologies. Such information can serve as the basis for further research on the reasons for the inaccessibility or unacceptability of digital tools and the development of measures to increase the level of integration of digital technologies into the educational process.

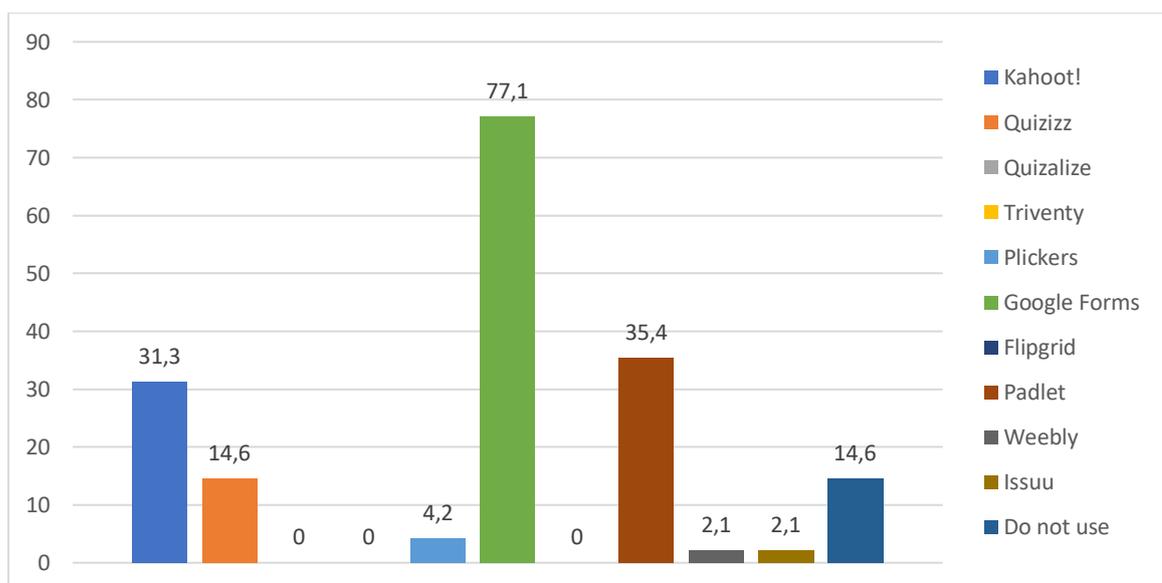


Figure 2. What digital tools for assessing students' learning outcomes do you use? (data in percentages)

One of the key roles in the modern educational process, especially in the context of integrating electronic self-assessment systems, is played by the innovative competence of teachers. Its primary advantage lies in the ability of educators to adapt and implement the latest technologies and methodologies, which enhances the efficiency of the educational process (Vashchenko, 2022). The use of digital tools not only simplifies the self-assessment procedure but also stimulates the development of an innovative culture among educators. Teachers who possess this competence can critically analyze educational content and effectively integrate scientific knowledge into their work. This contributes not only to the development of students' critical thinking but also improves the quality of the educational process, making learning more interactive and efficient. Innovativeness in the professional activities of educators is a crucial aspect that requires continuous development and self-improvement. The application of innovations not only modernizes the educational process but also enables teachers to stay at the forefront of educational trends. The integration of electronic self-assessment systems serves as an example of such innovations, enhancing the effectiveness and transparency of student achievement evaluation (Nykytuk, 2018). The ability to apply various approaches to problem-solving in pedagogical activity is an essential component of innovative competence. This encompasses not only the use of traditional teaching methods but also the integration of digital technologies and interactive methodologies. Such an approach expands opportunities for educators, creating a more flexible and adaptive learning environment for students. The use of electronic self-assessment systems and the integration of innovations into the educational process enable educators to improve the effectiveness of learning and foster the development of their own professional competence. Thus, innovative competence becomes the foundation for creating flexible and adaptive educational programs capable of meeting the needs of the modern educational environment.

The issue of understanding innovative competence increasingly draws the attention of scholars, who attempt to define its key elements and impact on professional activity. In the modern world, innovative competence extends beyond merely technical skills, encompassing a significant set of abilities, knowledge, and personal qualities that shape the capacity for innovative thinking and professional activity. Researchers offer their own perspectives on this competence, revealing the multifaceted nature

of its interpretations and opportunities for further exploration. V. Radkevych (2024) defines innovative competence as a key component that enables educators to successfully adapt the educational process to the new demands of the labor market and technological changes. According to her, this competence includes the ability to implement new methods and technologies into pedagogical practice, which contributes to the quality of professional training for students. The author emphasizes the importance of seeking original approaches that allow educators to create innovative educational products. Innovative competence is viewed as a component of general professional-pedagogical competence, emphasizing the creative and continuous nature of innovative activity (Konovalchuk, 2011). The researcher notes that innovative competence is driven by the societal significance of innovation and is aimed at developing the personal and professional potential of educators, focusing on the importance of developing the ability to create new solutions and propose original approaches. This understanding is complemented by the view that innovative competence also includes the ability to find new elements in already stable conditions of the educational process and to offer radically new solutions to existing problems. This approach indicates not only a readiness for change but also the ability to deeply analyze existing processes and seek ways to improve them (Vientseva & Karapetrova, 2022). O. Yevdokymova and N. Aleksiyenko (2017) emphasize that innovative competence is crucial for the effective fulfillment of professional duties and encompasses a readiness for constant innovations. They highlight its significance as a mechanism for cultural and intellectual exchange, which helps professionals not only to acquire new knowledge but also to effectively transmit it to others. This interpretation focuses on the role of competence as a tool for professional and personal development in a rapidly changing world.

As a systemic formation, innovative competence encompasses all aspects of innovative activity, from goals and objectives to methods and outcomes (Dziubenko, 2020). It is not isolated from the personality of the teacher, as its development is connected to a conscious approach to finding new educational solutions. M. Radchenko (2017) views innovative competence as the ability of an individual to adapt to changes and implement innovations, emphasizing such characteristics as creativity, improvisation, and continuous learning. His definition highlights the importance of receptivity to new ideas and active intellectual activity, which promotes individual self-actualization and professional growth.

A group of researchers, including S. Shevchuk, A. Yermolenko, and V. Kulishov (2020), consider innovative competence as the ability to implement changes at the system level. They emphasize methodological and informational literacy, which is essential for evaluating and implementing innovations. This definition underscores the importance not only of personal skills but also of the organizational conditions that foster the development of the innovative potential of educational institutions. Based on an analysis of the interpretations of this concept, it can be concluded that innovative competence is a complex category that includes both personal and professional components. It encompasses the ability to implement new approaches in professional activity, integrate the latest knowledge and skills, and be ready for continuous learning and adaptation to the rapidly changing conditions of the educational process.

According to the survey results (see Fig. 3), the level of application of modern innovative technologies in the educational process, particularly artificial intelligence, was determined. Respondents

were divided into two groups: 47.1% were positive and 52.8% were negative. This indicates that while almost half of the respondents support the integration of artificial intelligence in education, a similar proportion expresses concerns or skepticism regarding this technology. Such a division indicates the need for a deeper investigation of the issues causing concern and the development of strategies to increase the acceptance and application of artificial intelligence in educational institutions. It is important to note that artificial intelligence already demonstrates significant potential in addressing educational challenges, as mentioned in the article "Artificial Intelligence in Solving Educational Problems" (Olena Skrynnyk et al., 2022), which provides examples of successful technology integration to improve learning outcomes and optimize educational processes. This also requires proper teacher preparation to reduce fears and uncertainties about the impact of artificial intelligence on the quality and safety of learning.

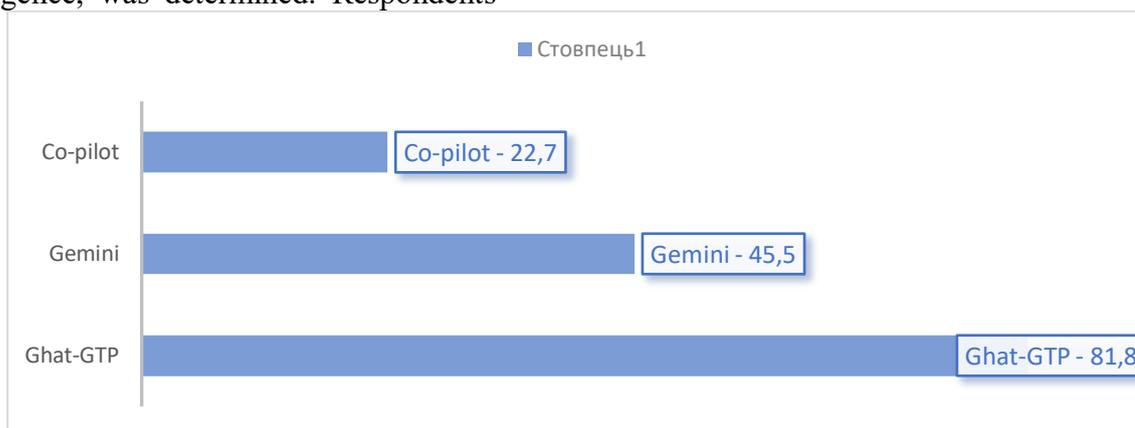


Figure 3. Application of modern innovative technologies in the educational process, including artificial intelligence. (data in percentages)

In the self-assessment of the professional activities of educational workers, the presence of reflective competence plays a significant role. It encompasses the ability to contemplate one's own practice, analyze successes and shortcomings, which contributes to identifying areas for further professional growth. This process not only promotes self-improvement but also ensures the high quality of the educational process. Reflective practice involves not only individual self-analysis but also the application of feedback from electronic self-assessment systems. These systems provide objective data on the effectiveness of professional activities, allowing for a more accurate self-identification in the field of pro-

fessional development (Zhelanova, 2020). It is important to understand how the collected information can be utilized for the correction and improvement of one's own teaching practice. Moreover, reflective competence facilitates educators' ability to monitor their activities and determine individual professional needs. This includes the analysis of their own skills, knowledge, as well as emotional and psychological states in the context of professional activities. Such an approach enables educators to be more adaptable to changes in the educational environment and respond to them adequately.

For the effective application of reflective competence, educators require access to high-quality digital tools for self-assessment and analysis,

which can be integrated into electronic systems. These tools take into account not only quantitative but also qualitative indicators, allowing for a deeper analysis of teaching activities. Reflective competence is one of the key characteristics of an individual's effective adaptation and development in professional and personal environments. Research conducted by scholars highlights the multifaceted nature of this concept, emphasizing its various aspects. For instance, O. Savchenko (2016) defines the reflective competence of a teacher as the ability to self-analyze, self-regulate, and self-improve, which helps them solve intellectual problems. It encompasses a set of reflective abilities that enable the application of personal resources to resolve internal conflicts through reflection and analysis of one's actions. This definition focuses on internal organization and the conscious resolution of personal contradictions, which are the main aspects of reflective activity.

O. Malykhin and O. Herasymova (2015) draw attention to the role of reflective competence in the context of the professional training of future teachers. They consider it an integral part of professional competence that contributes to personal and professional development during the learning process. It is emphasized that reflection assists in forecasting, planning, and implementing professional activities, directing individuals toward self-realization in socially significant activities. This underscores the importance of reflection in the educational process and its direct interaction with teaching practice. Reflective competence is viewed as a fundamental ability for understanding and critically reflecting on one's own thoughts, feelings, and actions in a professional context. Particular attention is given to introspection – the ability to reconsider one's actions and thoughts, which fosters personal development (Zhelanova, 2020). S. Lytvynenko and V. Yamnytskyi (2014) expand the definition of reflective competence by including creativity and the ability to interact productively in complex situations. They emphasize the importance of reflection for developing creative abilities, which contributes to the harmonious resolution of personal and professional tasks. The authors also highlight the role of reflection in the educational process at all its stages, making it a central competence for any specialist.

O. Homoniuk, O. Onyshko, and V. Raiko (2019) view reflective competence through the lens of rethinking personal and professional experience, which stimulates the formation of new professional standards. Their approach emphasizes the significance of reflection in professional development, par-

ticularly through the actualization of new performance benchmarks, which ensures the growth and improvement of educators. L. Kyashko (2019) underscores the role of reflective competence in professional activities, defining it as the ability to critically rethink thought stereotypes and create new content. The author emphasizes that this competence contributes not only to professionalism but also to personal growth, making it an integral part of professional development. From the analysis of these approaches, it can be concluded that reflective competence encompasses not only the ability to self-analyze but also the development of creative thinking, the ability to overcome stereotypes, and the pursuit of personal and professional growth. It fosters the formation of new approaches to problem-solving and ensures harmonious development in the professional environment.

To maintain a high level of professional competence among educational workers in a dynamically changing world, the ability to engage in lifelong learning is crucial. This is particularly relevant in the context of mastering new electronic self-assessment systems, which serve as a tool for improving the educational process and enhancing the quality of education. This competence not only encourages teachers to self-improve but also stimulates their active participation in professional communities, sharing knowledge and experience (Lenkova & Tretyak, 2021; Radkevych & Radkevych, 2021). It should be noted that electronic self-assessment systems enable educators to analyze their own activities, determine the conditions and resources for professional development. This contributes to objective self-assessment and planning of an individual learning trajectory, which is necessary for effective professional growth in the context of constantly evolving educational demands and standards.

The support of a high level of professional competence requires educators not only to have a deep understanding of current trends in the educational sphere but also the ability to adapt to new technologies. Electronic self-assessment systems are an important tool for achieving this goal, as they provide access to relevant digital educational resources, teaching methods, and forms of assessment. It should be noted that the ability to collaborate with other teachers on the principles of partnership and support is critically important for their professional development. Mentoring, supervision, and participation in professional communities allow for knowledge exchange, the development of joint projects, and the implementation of innovative approaches in the educational process. This not only

improves the quality of education but also fosters the development of the professional community as a strong support network.

The issue of understanding lifelong learning as a competency encompasses a wide range of aspects of educational development and personal growth. Modern scholars offer various definitions of this concept, focusing on the key characteristics of the continuous education process. Understanding lifelong learning as a competency largely depends on the context of societal, economic, and cultural development, as well as the individual's personal aspirations for self-improvement. For example, O. Markozova (2016) defines lifelong learning as a process that involves systematic and continuous acquisition of knowledge, skills, and competencies at all stages of life. Her approach emphasizes the active participation of individuals in various educational activities aimed at enhancing educational levels and professional training. This process helps individuals remain competitive in the labor market by maintaining the relevance of their knowledge and skills in the context of technological changes. The main goal of this approach is to support the intellectual development of the individual, enabling adaptation to the challenges of modern society.

Lifelong learning encompasses both formal and informal education, emphasizing the importance of continuous self-improvement and the acquisition of new knowledge outside traditional educational institutions. Her approach highlights that learning is not limited to formal education but also requires continuous development in social and professional life. In this context, lifelong learning becomes an important tool for self-realization and the development of critical thinking (Radkevych & Radkevych, 2021). The ability to engage in lifelong learning is considered a key competency, which is formed at the early stages of education and is complex in nature, encompassing content-based, motivational, and procedural components that contribute to the development of learning skills. The content-based component relates to cultural and general educational skills, the motivational component focuses on the significance of knowledge, and the procedural component concerns the organization of learning activities (Kodliuk & Kobryn, 2021). Analyzing these definitions, one can argue that the ability to engage in lifelong learning is a multifaceted competency that involves not only acquiring new knowledge but also developing skills in self-organization, motivation for learning, and the ability to adapt to changes.

Such a competency forms the foundation for continuous professional and personal growth, contributing to social integration and economic development.

The identification of informational-digital, evaluative-analytical, innovative, reflective competencies, and lifelong learning as key parameters for electronic self-assessment systems of professional activity for teachers in general secondary education institutions is determined by modern trends in education and the demands of the teaching profession. These competencies reflect the ability of educators to adapt to rapid changes in the technological and informational environment, effectively analyze and assess students' educational achievements, implement innovative approaches in the educational process, and develop their professional mastery through constant self-reflection and improvement. Unlike other competencies, such as linguistic-communicative, subject-methodological, psychological, emotional-ethical, and others, the selected competencies ensure a comprehensive approach to self-assessment of professional activity, emphasizing the importance of integrating digital technologies, analytical thinking, innovation, and self-development in the professional activities of modern educators. These competencies correspond to the needs of the modern educational process, which demands that teachers possess not only deep knowledge in their field but also the ability to quickly adapt to changes, implement new technologies in teaching and education, and develop critical thinking and self-education skills.

Thus, the competencies of teaching staff in the field of electronic self-assessment systems for professional activity not only contribute to teachers' professional development but also enhance the overall quality of education. The ability to adapt to new technologies, develop innovative teaching methods, and use electronic resources for self-assessment is fundamental to ensuring high-quality education.

**Conclusions.** In the context of modern education, the application of electronic self-assessment systems for teachers' professional activities requires the identification and thorough analysis of key competencies. One of the most important is digital competence, which defines the ability of teachers in general secondary education institutions to effectively use digital tools for collecting, processing, and analyzing information. The significance of this competence is determined by the fact that teachers must not only be able to work with technologies but also critically assess the reliability of information. This enables them to quickly adapt to constantly changing technological conditions, thus contributing to the

improvement of the quality of the educational process, which is a key factor in enhancing teachers' professional mastery.

The application of evaluative-analytical competence enables teachers to accurately determine the level of students' knowledge acquisition, which serves as a foundation for individual adaptation of educational strategies. As a result, teachers can conduct a thorough analysis of the obtained outcomes and develop more effective teaching strategies that promote higher learning outcomes. This competence is particularly important in the context of evaluating teachers' professional activities, as it enhances the precision and objectivity of the self-assessment process. The innovative competence of teachers plays a crucial role in modern educational practice. It involves the ability to implement new ideas, technologies, and methods in the educational process. This competence allows teachers not only to adapt to new conditions but also to actively shape new approaches to teaching, which stimulates students' interest in the educational process. Such an approach fosters the development of creative potential in both teachers and students, which in turn positively impacts the effectiveness of the educational process and improves its outcomes.

Reflective competence plays a critical role in ensuring the continuous professional development of teachers. It defines the ability of educators to self-assess and analyze their professional activities, which aids in understanding their strengths and weaknesses. Reflection enables teachers to continuously improve their teaching approaches, making

adjustments to the educational process to enhance its quality. This competence allows educators to effectively adapt their methods to new challenges and maintain a high level of pedagogical expertise.

Particular attention should be paid to the competence of lifelong learning, which is an essential component of teachers' professional development. This competence encompasses an openness to continuously acquiring new knowledge and skills, regardless of age or professional experience. In the context of rapid technological changes and the development of modern education, the ability to engage in lifelong learning ensures that teachers remain competitive and maintain a high level of professionalism in the long term. Through this competence, teachers can quickly adapt to new demands and develop their skills to provide high-quality education to learners.

Thus, the implementation of electronic self-assessment systems for teachers' professional activities requires the development of several key competencies, including digital, evaluative-analytical, innovative, reflective, and lifelong learning competencies. These competencies are essential for ensuring the high quality of the educational process, enhancing teachers' professional mastery, and adapting to modern educational challenges. In view of the above, these competencies form the foundation for the effective adaptation and application of electronic self-assessment systems in the educational process, ensuring a high level of professionalism and innovation in teachers' professional activities.

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# КОМПЕТЕНТНОСТІ ПЕДАГОГІЧНИХ ПРАЦІВНИКІВ У СФЕРІ ЕЛЕКТРОННИХ СИСТЕМ САМООЦІНЮВАННЯ ПРОФЕСІЙНОЇ ДІЯЛЬНОСТІ

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## Реферат:

*Актуальність.* Описано важливість впровадження електронних систем самооцінювання професійної діяльності педагогічних працівників. Наголошено, що сучасні освітні реформи потребують об'єктивних та прозорих механізмів оцінювання. Визначено, що впровадження таких систем дає змогу підвищити якість освітнього процесу. Підкреслено необхідність розвитку цифрових та аналітичних компетентностей педагогів для ефективного використання цих систем.

*Мета* статті полягає в обґрунтуванні компетентностей педагогічних працівників у сфері електронних систем самооцінювання професійної діяльності

*Методи:* анкетування – для оцінювання педагогами сприйняття та застосування електронних систем у професійній діяльності; інтерв'ю – спрямовувалось на отримання більш глибокого розуміння індивідуального досвіду застосування електронних систем самооцінювання професійної діяльності; аналіз документів/літератури – охоплював навчальні плани, методичні рекомендації, звіти, статті про виконання професійних завдань та інші документи, пов'язані з професійною діяльністю педагогів; спостереження – спрямовувалось на визначення як вчителі використовують електронні системи оцінювання у своїй повсякденній професійній діяльності та як це впливає на їхню взаємодію з учнями

*Результати* дослідження свідчать, що впровадження електронних систем самооцінювання професійної діяльності педагогів у контексті освітніх реформ є позитивним кроком. Встановлено, що ці системи підвищують об'єктивність, прозорість та ефективність оцінювання, розвиваючи ключові компетентності педагогів: інформаційно-цифрову, оцінювально-аналітичну, інноваційну та рефлексивну. Зазначено важливість безперервного навчання для адаптації до технологічних змін. Виявлено, що педагоги активно використовують цифрові інструменти, такі як онлайн-навчання, відеоконференції, Google Forms та Padlet. Штучний інтелект, хоча впроваджується повільно, має великий потенціал для персоналізації навчання

*Висновки.* Дослідження підкреслює важливість електронних систем самооцінювання для покращення якості освіти. Розвиток ключових компетентностей педагогів – інформаційно-цифрової, оцінювально-аналітичної, інноваційної та рефлексивної – є вирішальним для ефективного використання цих систем. Ці компетентності дозволяють об'єктивно оцінювати результати навчання, адаптувати освітні стратегії та підвищувати прозорість оцінювання, що позитивно впливає на якість освітнього процесу. Безперервне навчання педагогів забезпечує їхню здатність адаптуватися до технологічних змін і впроваджувати нові підходи у викладанні. Електронні системи стимулюють рефлексію та професійне вдосконалення, що підвищує майстерність педагогів і створює сучасне, інтерактивне освітнє середовище, відповідне вимогам цифрової ери.

**Ключові слова:** інформаційно-цифрова компетентність, оцінювально-аналітична компетентність, інноваційна компетентність, рефлексивна компетентність; безперервне навчання, якість освіти.

Received: 03 February 2024

Accept: 31 May 2024