UDC 377:004.8:37.011.3-051
ISSN: 2707-3092 (Online)
DOI: https://doi.org/10.32835/2707-3092.2026.32.132-143

Professional Pedagogics/1(32)'2026, pp. 132-143

To cite this article: Kushnir, V., & Belan, V. (2026). METHODOLOGICAL PRINCIPLES OF USING ARTIFICIAL INTELLIGENCE IN THE PROFESSIONAL ACTIVITIES OF EDUCATORS OF VOCATIONAL EDUCATION INSTITUTIONS. *Professional Pedagogics*, *1*(32), 132-143. https://doi.org/10.32835/2707-3092.2026.32.132-143

METHODOLOGICAL PRINCIPLES OF USING ARTIFICIAL INTELLIGENCE IN THE PROFESSIONAL ACTIVITIES OF EDUCATORS OF VOCATIONAL EDUCATION INSTITUTIONS

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Abstract

Relevance. The digital transformation of education in the global dimension is accompanied by the active implementation of artificial intelligence technologies, which are reshaping approaches to the organization of the educational process, the assessment of learning outcomes, and the management of education quality. These processes acquire particular significance in the field of vocational education, where the demand for adaptive, personalized, and analytically grounded educational solutions is increasing. At the same time, existing approaches to the use of artificial intelligence in pedagogical practice remain fragmented and insufficiently methodologically substantiated. A gap is observed between the technological capabilities of intelligent systems and their pedagogical integration, as well as the absence of comprehensive methodological foundations for their application in the professional activities of teachers.

Purpose. The purpose of the study was the theoretical substantiation of the methodological foundations for the use of artificial intelligence in the professional activities of teachers in vocational education institutions and the determination of their role in the transformation of the educational process.

Methods. The study was conducted on the basis of a theoretical analysis of contemporary scholarly sources, the generalization of international experience in the implementation of intelligent educational systems, a systemic approach to modeling educational processes, and elements of comparative analysis. Methods of content analysis of scientific publications, structural and functional analysis of educational systems, as well as conceptual modeling were employed to identify the interrelationships among pedagogical, technological, and managerial components.

Results. It was established that the integration of artificial intelligence into the professional activities of educators ensures a transition to data-oriented management of the educational process, increases the objectivity of assessment, and promotes the personalization of learning. In particular, the application of educational analytics makes it possible to identify risks of academic underachievement at early stages, while the use of adaptive algorithms enhances learning effectiveness. It can be concluded that the implementation of intelligent systems contributes to an increase in the effectiveness of learning activities and to the improvement of the quality of educational decisions. A relationship was identified between the level of educators' digital competence and the effectiveness of the use of intelligent tools, and the role of a three-component model (pedagogical, technological, and human resource) in ensuring their effective application was determined.

Conclusions. It is substantiated that the use of artificial intelligence in the professional activities of educators acts as a factor in the transformation of the educational environment, contributes to increasing the adaptability of learning, and forms a basis for the implementation of analytically grounded education management. The obtained results expand theoretical understandings of the digitalization of vocational education and create prerequisites for the development of practical recommendations for the implementation of intelligent technologies in pedagogical practice.

Keywords: *educational analytics, adaptive learning, digital transformation of education, data-driven approach, intelligent educational environments.*

Introduction. The current stage of educational development is characterized by intensive digital transformation, which encompasses all levels of educational systems and is accompanied by the active implementation of artificial intelligence technologies in pedagogical practice. In the global scholarly discourse, increasing attention is being paid to the transition from traditional learning models to intelligent educational environments, within which data serve as the basis for pedagogical and managerial decision-making. Such an approach is associated with the development of the concepts of data-driven education, learning analytics, and adaptive learning (Fig. 1), which open up opportunities for the flexible consideration of individual educational needs and for enhancing the effectiveness of the learning process (Ifenthaler & Yau, 2020; Baker, 2019).

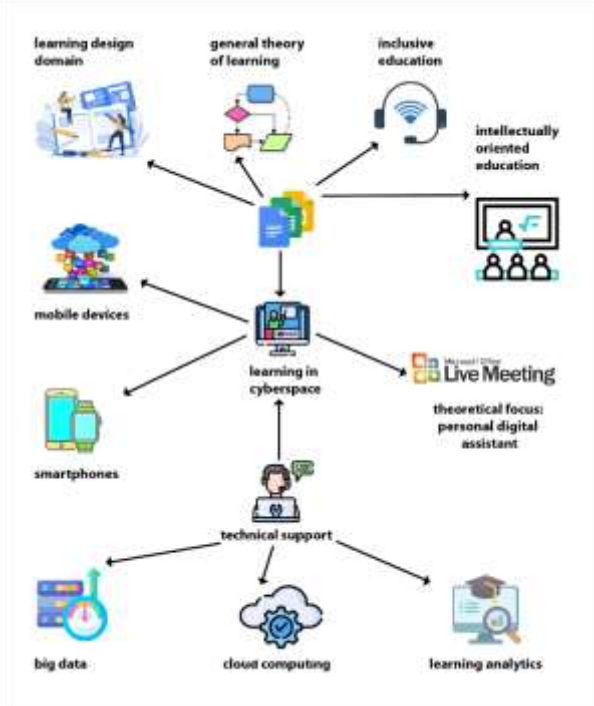

Figure 1. Conceptual model of ubiquitous learning within an artificial intelligence–oriented educational ecosystem

In recent years, studies presented in publications indexed in Scopus and Web of Science have emphasized the significant potential of artificial intelligence as a tool for the modernization of education. In particular, it has been demonstrated that the use of intelligent tutors, adaptive platforms, and educational analytics systems contributes to the growth of academic achievement, an increase in learner engagement, and the improvement of feedback quality (Roll & Wylie, 2016; Bond et al., 2020).

The generalization of empirical research findings demonstrates the effectiveness of predictive analytics in identifying risks of academic underachievement at early stages of learning, which creates prerequisites for timely pedagogical

intervention. At the same time, contemporary scholarly works emphasize that the integration of artificial intelligence goes beyond technological changes and entails a transformation of the educator's role, who increasingly acts as a learning facilitator, an educational data analyst, and a coordinator of individualized educational trajectories (Holmes et al., 2019; Selwyn, 2019).

The problem of using artificial intelligence in vocational education institutions is of particular relevance, where the educational process is oriented toward the formation of practical competencies and rapid adaptation to changes in the labor market. In this context, intelligent educational systems are considered as an integrative tool that combines pedagogical, technological, and managerial components of the educational environment. They ensure continuous monitoring of learning outcomes, personalization of educational trajectories, and support for managerial decision-making based on analytical data (Luckin et al., 2016; Chounta et al., 2024). The concept of ubiquitous learning, presented in the works of Gros, Kinshuk, and Maina (2016), reflects a transition to a new educational paradigm in which learning is no longer tied to a specific place, time, or formal educational setting, transforming into a continuous, integrated, and context-dependent process. Within this approach, digital technologies perform not only an instrumental function but become the environment of educational activity, ensuring constant access to knowledge, interaction among participants of the educational process, and adaptation of learning content to the individual characteristics of learners. Of particular importance is the integration of artificial intelligence, which enables the personalization of learning, real-time analysis of educational data, and the formation of individualized educational trajectories.

In this context, a synthesis of three interrelated levels takes place: technological, pedagogical, and analytical. The technological level encompasses digital platforms, mobile environments, and intelligent systems; the pedagogical level is oriented toward adaptive teaching methodologies and facilitation of the educational process; the analytical level ensures the processing of large data sets and supports decision-making. The interaction of these levels forms an integrated intelligent educational environment in which learning acquires a flexible, personalized, and predictive character.

In the near future, it can be expected that AI technologies aimed at personalization and adaptability will revolutionize the way both individuals (through individualized learning pathways) and groups or teams learn, improving both the educational process and group interaction. Their implementation will facilitate broader access to advanced digital technologies, expanding the share of the research-based approach in education and improving the quality of educational services.

The development of educational environments incorporating AI elements for the professional development of teaching staff will contribute to the modernization of the scientific and educational process in institutions of higher pedagogical and postgraduate pedagogical education, enhance the effectiveness of implementing immersive technologies, cloud computing tools and services, and AI-based systems in the educational process, improve the quality of teacher training, and increase the level of teachers' digital competence (Bezruchenkov & Shchuka, 2025).

At the same time, despite significant scholarly interest in the issue of artificial intelligence in education, a number of unresolved issues are identified in contemporary research. First, a considerable proportion of scientific works focuses on the technological aspects of developing intelligent systems, whereas the methodological foundations of their use in the professional activities of educators remain insufficiently developed. Second, there is no coherent concept for the integration of artificial intelligence into pedagogical practice that would take into account the specifics of vocational education, in particular the combination of theoretical training with practice-oriented learning. Third, a gap is observed between the potential of educational analytics and its actual implementation in practice, which is associated with an insufficient level of educators' digital competence and the absence of clear methodological guidelines (Baker, 2019; Bond et al., 2020).

The ethical dimension of the application of artificial intelligence in education acquires particular significance. Scientific studies emphasize the need to ensure algorithm transparency, the

protection of personal data, and the prevention of algorithmic bias (Pardo & Siemens, 2014). These aspects form the basis for the development of ethical standards for the use of learning analytics and intelligent systems, ensuring a balance between the effectiveness of digital solutions and the protection of the rights of participants in the educational process (Holmes et al., 2019).

Thus, the current state of scientific research demonstrates the existence of a significant theoretical and methodological gap between the development of artificial intelligence technologies and their pedagogical interpretation in the field of vocational education. This necessitates a systematic conceptualization of the methodological foundations for the use of artificial intelligence in the professional activities of educators, which determines the scientific relevance and focus of the present study.

Artificial intelligence is understood as the ability of a machine or computer program to think, act, and respond in a human-like manner. The characteristics of AI include intelligent behavior, environmental analysis, and the use of goal-oriented actions to achieve specific objectives with certain degrees of autonomy. It should be noted that there is still no single universally accepted definition of AI, although the attention of scholars such as Yoshua Bengio, Luciano Floridi, Demis Hassabis, Geoffrey Hinton, Yann LeCun, Ray Kurzweil, Andrew Ng, Jürgen Schmidhuber, Josh Tenenbaum, and Thomas Wiegand has been focused on defining the essence of this concept and its structure (Svortsova & Symonenko, 2025).

Among Ukrainian scholars who actively research and implement AI in the field of education, the following may be highlighted: Oleksandr Romaniuk – intelligent systems and machine learning; Ihor Halat – artificial intelligence in learning systems; Olha Shpakivska – computational intelligence; and Mykola Novikov – AI in educational process management systems. Ukrainian researchers conduct important studies and developments in the field of artificial intelligence in education, contributing to the further advancement of educational technologies and the improvement of learning quality. Moreover, the issues of using artificial intelligence in education have been examined by Vizniuk I. and Koblyk V., while AI as an innovative information technology in pedagogical research has been analyzed at the level of an analytical review by Huraliuk A. The potential and challenges of applying artificial intelligence in the educational environment were addressed in the study by Melnyk A. (Huraliuk & Melnyk, 2023; Koblyk, 2024).

It is worth noting that AI is gradually becoming one of the leading tools of the digital transformation of vocational education. Its use contributes to improving the quality of specialist training, enhancing educational processes, and ensuring a more accurate alignment of learning content with the individual needs of learners.

An example of the use of AI for personalized learning is that AI systems make it possible to analyze students' individual learning pathways, identify their strengths and weaknesses, determine their level of knowledge, and assess the pace at which they assimilate material. Based on these data, an individualized learning plan is created with an appropriate selection of materials, tasks, and completion deadlines (Bezruchenkov & Shchuka, 2025).

Research objective. Within the framework of this study, contemporary theoretical approaches to the use of artificial intelligence in the educational process were analyzed, in particular in the field of vocational education, taking into account the transformation of pedagogical activity under conditions of digitalization. Methodological foundations for the integration of artificial intelligence tools into the professional activities of educators were developed, which involve the combination of pedagogical, technological, and analytical components of the educational environment. A relationship was established between the level of educators' digital competence, the effectiveness of the use of intelligent educational technologies, and the quality of the educational process, which is manifested in improved learning outcomes, the personalization of educational trajectories, and the optimization of pedagogical decision-making.

According to the aim, the following hypotheses are formulated. The first hypothesis states that integrating artificial intelligence into teachers' work ensures greater effectiveness of the educational process through adaptation of learning

content and use of analytics. The second hypothesis assumes that the effectiveness of intelligent technologies depends directly on the level of digital and pedagogical competence of instructors. The third hypothesis is based on the assumption that implementation of analytically oriented approaches to educational process management contributes to improving assessment objectivity and timely identification of risks of academic underachievement among learners.

Methodology. The methodological basis of the study is formed by a combination of theoretical analysis, pedagogical modeling, and quantitative empirical investigation of the readiness of educators in vocational education institutions to use artificial intelligence tools in their professional activities. Such an approach was chosen in view of the need not only to substantiate the methodological foundations of artificial intelligence use but also to verify the extent to which the outlined provisions correspond to actual educational practice. The overall research design included three interrelated stages: analytical-theoretical, diagnostic, and generalization-interpretative.

At the first stage, an analysis of scholarly works devoted to the digitalization of vocational education, learning analytics, adaptive learning, intelligent educational systems, and pedagogical aspects of artificial intelligence use was carried out. Within this stage, methods of analysis, synthesis, comparison, systematization, and scientific interpretation were applied. This made it possible to identify the main structural components of educators' professional activities within which the use of artificial intelligence is methodologically appropriate. These components include the preparation of instructional and methodological materials, the personalization of learning, assessment of outcomes, pedagogical communication, monitoring of learning achievements, and analytical support of the educational process.

At the second stage, an empirical study was conducted aimed at identifying the level of educators' readiness to apply artificial intelligence tools and establishing the relationship between digital competence, the intensity of the use of intelligent services, and the subjective assessment of their pedagogical effectiveness. The study was of a descriptive nature and was implemented in the form of an online survey. The choice of this instrument was determined by the possibility of covering educators from various vocational education institutions, ensuring standardized data collection, and unifying subsequent statistical processing of the results.

The research sample consisted of teaching staff from vocational education institutions who provide instruction in vocational-theoretical, general education, and specialized disciplines. A total of 128 respondents from different regions of Ukraine were involved. The sample was formed according to criteria of professional affiliation, actual experience in pedagogical activity, and engagement with digital educational tools. The sample included instructors, vocational training instructors, methodologists, and educational staff who had experience using digital platforms, electronic educational resources, or generative artificial intelligence services. To ensure representativeness within the accessible population, such characteristics as teaching experience, field of training, and type of professional activity were taken into account.

The structure of the sample was as follows: 34.4% were instructors of vocational-theoretical training, 28.1% were vocational training instructors, 21.9% were instructors of general education subjects, and 15.6% were methodologists and other pedagogical staff. According to teaching experience, respondents were distributed as follows: up to 5 years – 18.8%, from 6 to 10 years – 24.2%, from 11 to 20 years – 31.3%, and over 20 years – 25.7%. Such a distribution made it possible to take into account the influence of professional experience on attitudes toward innovative digital solutions.

The research instrument was constructed in the form of a questionnaire consisting of four content blocks. The first block was aimed at collecting socio-professional characteristics of the respondents. The second block identified the level of educators' digital competence. The third block recorded the frequency of the use of artificial intelligence tools in professional activity. The fourth block focused on assessing pedagogical appropriateness, practical effectiveness, ethical risks, and implementation difficulties of such tools. The main part of the questions was structured using a five-point Likert scale, where 1 point indicated

complete disagreement or a minimal level of manifestation of the characteristic, while 5 points indicated full agreement or a high level of manifestation.

To assess the level of digital competence, an integral indicator was developed, calculated as the arithmetic mean of the aggregate of responses according to the relevant indicators:

$$I_{dc} = \frac{\sum_{i=1}^{n} x_i}{n},$$

Where I_{dc} – is the integral indicator of a teacher's digital competence, xi is the score for a specific indicator, and n – is the number of indicators.

Similarly, the integral indicator of the intensity of the use of artificial intelligence tools in professional activity was determined:

$$I_{ai} = \frac{\sum_{j=1}^{m} y_i}{m},$$

where I_{ai} – is the index of the use of artificial intelligence tools, y_j – is the score of the frequency or regularity of use of a specific tool, and m – is the number of investigated tools.

To verify the internal consistency of the questionnaire, Cronbach's reliability coefficient was used:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum S_i^2}{S_t^2}\right),$$

where α – is the reliability coefficient, k – is the number of scale items, S_i^2 – is the variance of a single item, and S_t^2 – is the variance of the total test score. A value of α≥0,70) was considered sufficient for the use of the scale in further analysis.

For the quantitative interpretation of the results, three levels of the formation of the studied indicators were introduced. The low level corresponded to values from 1,00 to 2,33 points, the medium level – from 2,34 to 3,67 points, the high level – from 3,68 to 5,00 points. Such grading made it possible to carry out a comparative analysis between individual groups of respondents and to identify trends in the use of artificial intelligence in pedagogical practice.

Statistical processing of the results was carried out using methods of descriptive and inferential statistics. At the level of descriptive statistics, the arithmetic mean, median, standard deviation, minimum, and maximum values were calculated. The arithmetic mean was determined using the formula:

$$\bar{x} = \frac{\sum_{i=1}^{N} x^i}{N},$$

where $\bar{x}$ – the mean value of the indicator, x_i – are the individual values, and N – is the number of respondents.

The standard deviation was used to assess the variability of the results:

$$s = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \bar{x})^2}{N-1}}$$

where s – the standard deviation, x_i – the individual values, and $\bar{x}$ – the mean value of the indicator.

To establish the relationship between the level of digital competence and the intensity of the use of artificial intelligence tools, Pearson's correlation coefficient was applied:

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

where r – the correlation coefficient, x and y – the values of two variables, $\bar{x}$ and $\bar{y}$ – their mean values. The interpretation of the strength of the relationship was carried out according to the traditional scale: up to 0.3 – weak relationship, from 0.3 to 0.7 – moderate, above 0.7 – strong.

To test the statistical significance of differences between groups of educators with different teaching experience or different intensity of the use of artificial intelligence, Student's t-test was applied:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where $\bar{x}_1$ and $\bar{x}_2$ are the mean values of the two groups, S_1^2 are the variances of the groups, and n_1 and n_2 are the sample sizes of the groups.

Differences were considered statistically significant at $p \leq 0.05$.

To identify the influence of several factors on the integral indicator of pedagogical effectiveness of the use of artificial intelligence, the application of multiple linear regression was provided:

$$Y=\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon,$$

Y – the indicator of pedagogical effectiveness, X_2 – the intensity of the use of artificial intelligence tools, X_3 – teaching experience, β_0 – the intercept term, β_1, β_2, β_3 – regression coefficients, ε – the random error term.

The application of regression analysis was appropriate for testing the hypothesis that it is precisely digital competence and practical experience of working with intelligent tools that determine the effectiveness of their pedagogical use.

The research procedure involved several sequential steps. First, a draft questionnaire was developed and subjected to expert evaluation. Experts in the fields of vocational education, digital technologies, and pedagogical measurement were involved in the review process. This was followed by a pilot survey conducted on a small group of respondents to clarify question wording, identify ambiguities, and verify the logical structure of the questionnaire. Based on the pilot results, certain formulations were adjusted, and the instrument was finalized for the main data collection stage. Subsequently, the main survey was organized, ensuring voluntary participation of respondents, anonymity of responses, and adherence to ethical standards of academic research. At the final stage, data coding, statistical processing, interpretation of results, and generalization of conclusions were carried out.

Special attention was given to the criteria of research validity. Content validity was ensured by the correspondence of the questions to the research aim and hypotheses.

Construct validity was achieved through the logical alignment of indicators with the main studied concepts – digital competence, pedagogical readiness, and the effectiveness of the use of artificial intelligence. The reliability of the results was supported by a standardized data collection procedure and the use of statistical methods for testing the internal consistency of the scales.

For a comprehensive analysis of the problem of using AI in the professional activities of teachers in vocational education institutions, as well as the implementation of AI in vocational education, it is advisable to classify these issues by levels and categories. Such an approach makes it possible to identify the impact of each problem on an individual vocational education learner or teacher, on the functioning of a vocational education institution, on the alignment of workforce training with the needs of industry, and on regulatory and financial support at the state level.

An analysis of the challenges associated with implementing AI technologies indicates that the outlined issues create a space for transformative opportunities. The prospects for the application of AI lie in increasing the adaptability, efficiency, safety, and accessibility of vocational education, as well as in developing competencies that meet the demands of modern industry and the digital economy (Radkevych et al., 2025).

Thus, the proposed methodology ensures the possibility of a comprehensive investigation of the problem of the use of artificial intelligence in the professional activities of educators in vocational education institutions, combining theoretical substantiation, empirical verification, and quantitative interpretation of the obtained results.

Results and discussion. As a result of the conducted empirical study, generalized quantitative indicators were obtained, reflecting the level of educators' digital competence, the intensity of the use of artificial intelligence tools, and the assessment of their pedagogical effectiveness. Data processing showed that the mean value of the integral indicator of digital competence was $\bar{x}$=3,74, which corresponds to an above-average level. At the same time, the index of the use of artificial intelligence tools was $\bar{x}$=3,12, indicating a moderate level of integration of such technologies into the professional activities of educators.

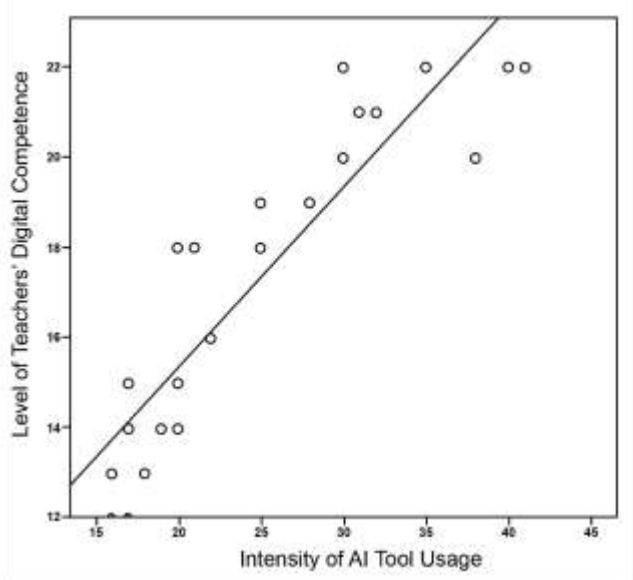

Figure.2. The relationship between the level of educators' digital competence and the intensity of the use of artificial intelligence tools

The analysis of the presented data made it possible to establish that although the overall level of educators' digital competence is sufficiently high, the actual use of artificial intelligence tools lags behind. This confirms the existence of a gap between the potential capabilities of the digital environment and the actual practices of its use.

The subsequent analysis revealed the existence of a statistically significant relationship between the level of digital competence and the intensity of the use of artificial intelligence tools. Pearson's correlation coefficient was r==0,68, indicating a moderately strong positive relationship. This means that with an increase in the level of educators' digital competence, the frequency of the use of intelligent technologies in the educational process also increases.

At the same time, the research results reveal a number of problematic aspects. A significant proportion of educators report difficulties related to an insufficient level of methodological support for the use of artificial intelligence, the absence of clear guidelines for integrating such tools into the educational process, and limited access to high-quality digital resources. In addition, a certain level of concern has been identified regarding ethical risks, in particular those related to the reliability of results, authorship of educational materials, and the protection of personal data.

Particular attention was paid to assessing the impact of the use of artificial intelligence on the quality of the educational process. According to the survey results, 72,6 % of educators noted an increase in the effectiveness of preparing educational materials, 64,1% – an improvement in the quality of feedback with learners, and 58,3% – an increase in the level of individualization of learning. This indicates the positive impact of intelligent technologies on the organization of the educational process.

At the same time, the study has certain limitations. First, the research sample is limited to educators of vocational education institutions in Ukraine, which may affect the generalizability of the results. Second, the use of the self-report method may lead to subjectivity in responses. Third, the study is predominantly descriptive in nature and does not take into account the long-term effects of the use of artificial intelligence in the educational process.

Despite the stated limitations, the obtained results make it possible to form a holistic understanding of the current state of the use of artificial intelligence in the professional activities of educators and to identify promising directions for further research related to the development of methodological recommendations, the enhancement of educators' digital competence, and the creation of integrated educational ecosystems.

Conclusions. Within the framework of the study, a theoretical generalization and empirical verification of approaches to the use of artificial

intelligence in the professional activities of educators in vocational education institutions were carried out. The obtained results confirm that the integration of intelligent technologies contributes to the transformation of the educational process towards the personalization of learning, the enhancement of the effectiveness of pedagogical interaction, and the implementation of analytically grounded decision-making. It was established that the level of educators' digital competence acts as a determining factor in the effectiveness of the use of artificial intelligence tools, while their systematic application has a positive impact on the quality of preparing learning materials, organizing feedback, and individualizing learners' educational trajectories (Althubyani, 2024; OECD, 2025).

The theoretical value of the study lies in the deepening of scientific understanding of the essence and structure of the use of artificial intelligence in the professional activities of educators, as well as in the development of methodological foundations for its integration into the educational process. A conceptualization of the interaction of pedagogical, technological, and analytical components forming an integrated model of the application of intelligent educational systems is proposed. The understanding of the educator's role as a subject of digital transformation of education is expanded, whose activity combines the functions of a facilitator, an educational data analyst, and a developer of individualized educational solutions.

The practical value of the obtained results lies in the possibility of their use for improving the educational process in vocational education institutions. The research findings can be applied in the development of professional development programs for teaching staff, the creation of digital educational environments, as well as in the implementation of artificial intelligence tools in teaching and assessment practices. The outlined approaches contribute to the formation of a data-oriented culture of educational process management and to the improvement of the quality of educational decisions.

Based on the conducted research, a number of practical recommendations have been formulated. It is advisable to systematically enhance educators' digital competence through the organization of specialized training sessions and professional development programs focused on the use of artificial intelligence tools. An important direction is the development and implementation of methodological guidelines for the integration of intelligent technologies into the educational process, taking into account the specifics of vocational education. It is necessary to establish local educational analytics centers that will ensure the collection, processing, and interpretation of educational data to support pedagogical and managerial decision-making. Special attention should be paid to compliance with ethical standards of artificial intelligence use, in particular ensuring algorithm transparency, the protection of personal data, and the prevention of potential forms of algorithmic bias.

Conflict of Interest

The authors certify that no conflict of interest (financial, professional, or personal) exists that could have influenced the objectivity of the research results or conclusions. The integrity of the double-blind peer review process was ensured through a mandatory declaration of the absence of conflict of interest submitted via the journal's editorial system. This protocol guaranteed complete author anonymity and the independence of the expert evaluation throughout the entire editorial cycle.

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МЕТОДИЧНІ ЗАСАДИ ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ У ФАХОВІЙ ДІЯЛЬНОСТІ ПЕДАГОГІВ ЗАКЛАДІВ ПРОФЕСІЙНОЇ ОСВІТИ

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Реферат:

*Актуальність***.** Цифрова трансформація освіти у глобальному вимірі супроводжується активним упровадженням технологій штучного інтелекту, які переформатовують підходи до організації освітнього процесу, оцінювання результатів навчання та управління якістю освіти. Особливого значення ці процеси набувають у сфері професійної (професійно-технічної) освіти, де зростає попит на адаптивні, персоналізовані та аналітично обґрунтовані освітні рішення. Водночас чинні підходи до використання штучного інтелекту в педагогічній практиці залишаються фрагментарними та недостатньо методологічно обґрунтованими. Спостерігається розрив між технологічними можливостями інтелектуальних систем та їхньою педагогічною інтеграцією, а також відсутність комплексних методологічних засад їх застосування у професійній діяльності педагогів.

*Мета***.** Метою дослідження було теоретичне обґрунтування методологічних засад використання штучного інтелекту в професійній діяльності педагогів закладів професійної освіти та визначення їхньої ролі у трансформації освітнього процесу.

*Методи***.** Дослідження проведено на основі теоретичного аналізу сучасних наукових джерел, узагальнення міжнародного досвіду впровадження інтелектуальних освітніх систем, системного підходу до моделювання освітніх процесів та елементів порівняльного аналізу. Для виявлення взаємозв'язків між педагогічними, технологічними та управлінськими компонентами було використано методи контент-аналізу наукових публікацій, структурно-функціонального аналізу освітніх систем, а також концептуального моделювання.

*Результати***.** Встановлено, що інтеграція штучного інтелекту в професійну діяльність педагогів забезпечує перехід до освітнього менеджменту на основі даних, підвищує об'єктивність оцінювання та сприяє персоналізації навчання. Зокрема, застосування освітньої аналітики дає змогу виявляти ризики академічної неуспішності на ранніх етапах, тоді як використання адаптивних алгоритмів підвищує ефективність навчання. Можна зробити висновок, що впровадження інтелектуальних систем сприяє зростанню результативності навчальної діяльності та покращенню якості управлінських рішень в освіті. Виявлено взаємозв'язок між рівнем цифрової компетентності педагогів та

ефективністю використання інтелектуальних інструментів, а також визначено роль трикомпонентної моделі (педагогічної, технологічної та кадрової) у забезпеченні їхнього дієвого застосування.

*Висновки***.** Обґрунтовано, що використання штучного інтелекту в професійній діяльності педагогів виступає чинником трансформації освітнього середовища, сприяє підвищенню адаптивності навчання та формує підґрунтя для реалізації аналітично обґрунтованого управління освітою. Отримані результати розширюють теоретичні уявлення про цифровізацію професійної освіти та створюють передумови для розроблення практичних рекомендацій щодо впровадження інтелектуальних технологій у педагогічну практику.

Ключові слова: *освітня аналітика, адаптивне навчання, цифрова трансформація освіти, підхід на основі даних, інтелектуальні освітні середовища.*

Manuscript received 20.02.2026
Accepted for publication after peer review 21.04.2026
Published 23.05.2026