

ВІДОМОСТІ ПРО АВТОРІВ

ШЕВЕЛЬ Борис – кандидат педагогічних наук, доцент, докторант кафедри технологічної і професійної освіти Глухівського національного педагогічного університету імені Олександра Довженка.

Наукові інтереси: професійній підготовці майбутніх інженерів на засадах дуального навчання.

СИДОРКО Наталія – викладач-методист, методист, Відокремленого структурного підрозділу «Боярський фаховий коледж Національного університету біоресурсів і природокористування України».

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INFORMATION ABOUT THE AUTHORS

SHEVEL Borys – Candidate of Pedagogical Sciences, Associate Professor, Associate Professor at the Department of Technological and Vocational Education Oleksandr Dovzhenko Hlukhiv National Pedagogical University.

Scientific interests: the role of a technical college lecturer in the professional training of future engineers based on dual education.

SYDORKO Nataliia – Teacher, Methodologist Separate structural subdivision «Boyarka professional college of the national university of life and environmental sciences of Ukraine».

Scientific interests: the role of a technical college lecturer in the professional training of future engineers based on dual education.

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ЮРЧЕНКО Артем –

кандидат педагогічних наук, доцент, доцент кафедри інформатики Сумського державного педагогічного університету імені А.С. Макаренка

ORCID: <https://orcid.org/0000-0002-6770-186X>
e-mail: a.yurchenko@fizmatsspu.sumy.ua

СКОРОПАД Геннадій –

аспірант кафедри інформатики Сумського державного педагогічного університету імені А.С. Макаренка

ORCID: <https://orcid.org/0009-0005-4118-6571>
e-mail: h.skoropad@fizmatsspu.sumy.ua

СЕМЕНІХІНА Олена –

доктор педагогічних наук, професор, професор кафедри інформатики Сумського державного педагогічного університету імені А.С. Макаренка

ORCID: <https://orcid.org/0000-0002-3896-8151>
e-mail: e.semenikhina@fizmatsspu.sumy.ua

**ПРАКТИКИ ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ
В ОРГАНІЗАЦІЇ ТА УПРАВЛІННІ ОСВІТНІМ ПРОЦЕСОМ
В УМОВАХ ДИСТАНЦІЙНОГО НАВЧАННЯ**

Стрімке поширення технологій штучного інтелекту змінює не лише методи навчання, а й способи планування, організації, моніторингу та коригування освітнього процесу. Водночас у науковій літературі використання штучного інтелекту здебільшого розглядають через окремі технології або педагогічні завдання: адаптивне навчання, інтелектуальні системи підтримки, генерацію навчального контенту, автоматизоване оцінювання чи прогнозування академічної успішності. Це ускладнює цілісне розуміння його організаційно-управлінського потенціалу. Мета статті полягає в систематизації практик використання штучного інтелекту для організації та управління освітнім процесом, визначенні їх відповідності основним управлінським функціям, а також обґрунтуванні можливостей, обмежень і ризиків їх впровадження в діяльність закладів освіти. Використано методи аналізу, порівняння, тематичного групування й аналітичного синтезу результатів сучасних досліджень. З'ясовано, що практики застосування штучного інтелекту доцільно систематизувати за функціями планування, організації, мотивації та підтримки, моніторингу, контролю й оцінювання, коригування, адміністрування та інституційного врядування. Розмежовано індивідуальний, педагогічний, програмний та інституційний рівні їх реалізації. Встановлено, що штучний інтелект найкраще виконує допоміжні, аналітичні, рекомендаційні й рутинні операції. Рішення, що мають істотні наслідки для доступу до освіти, оцінювання, індивідуальної траєкторії чи академічного статусу здобувача освіти, не повинні ухвалюватися без змістового людського контролю. Запропонована функціональна типологія дає змогу оцінювати впровадження штучного інтелекту не за кількістю використаних сервісів, а за тим, які управлінські завдання вони розв'язують, на основі яких даних працюють і як розподіляється відповідальність за результат.

Ключові слова: штучний інтелект, генеративний штучний інтелект, освітній процес, управління освітнім процесом, навчальна аналітика, персоналізоване навчання, автоматизоване оцінювання, управлінське рішення, заклад освіти.

YURCHENKO Artem –

Candidate of Pedagogical Sciences, Associate Professor, Associate Professor of the Department of Informatics, Sumy State Pedagogical University named after A.S. Makarenko

ORCID: <https://orcid.org/0000-0002-6770-186X>
e-mail: a.yurchenko@fizmatsspu.sumy.ua

SKOROPAD Hennadii –

Postgraduate student of the Department of Informatics,
Sumy State Pedagogical University named after A.S. Makarenko
ORCID: <https://orcid.org/0009-0005-4118-6571>
e-mail: h.skoropad@fizmatsspu.sumy.ua

SEMENIKHINA Olena –

Doctor of Pedagogical Sciences, Professor,
Professor of the Department of Informatics,
Sumy State Pedagogical University named after A.S. Makarenko
ORCID: <https://orcid.org/0000-0002-3896-8151>
e-mail: e.semenikhina@fizmatsspu.sumy.ua

PRACTICES OF USING ARTIFICIAL INTELLIGENCE IN THE ORGANISATION AND MANAGEMENT OF THE EDUCATIONAL PROCESS IN THE CONTEXT OF DISTANCE LEARNING

The rapid spread of artificial intelligence technologies is changing not only teaching and learning methods but also the ways in which the educational process is planned, organized, monitored, and adjusted. At the same time, the academic literature mainly examines the use of artificial intelligence through individual technologies or pedagogical tasks, including adaptive learning, intelligent support systems, learning content generation, automated assessment, and academic performance prediction. This makes it difficult to develop a comprehensive understanding of its organizational and managerial potential. The aim of the article is to systematize practices of using artificial intelligence for the organization and management of the educational process, determine their correspondence with the main management functions, and substantiate the opportunities, limitations, and risks of their implementation in educational institutions. The study employed methods of analysis, comparison, thematic grouping, and analytical synthesis of the findings of recent research. It was found that practices of using artificial intelligence can be systematized into the following functions: planning, organization, motivation and support, monitoring, control and assessment, adjustment, administration, and institutional governance. Implementation was distinguished at the individual, pedagogical, program, and institutional levels. The findings indicate that artificial intelligence is most effective in performing supportive, analytical, advisory, and routine operations. Decisions that have substantial consequences for access to education, assessment, individual learning pathways, or the academic status of learners should not be made without meaningful human oversight. The proposed functional typology enables evaluating the implementation of artificial intelligence not by the number of services used, but by the management tasks they address, the data on which they operate, and the way responsibility for the outcomes is distributed.

Key words: artificial intelligence, generative artificial intelligence, educational process management, learning analytics, personalized learning, automated assessment, managerial decision-making, educational institution.

Problem Statement. Artificial intelligence (AI) technologies are becoming part of the digital infrastructure of educational institutions. They are used to create learning materials, select tasks, provide feedback, predict academic difficulties, analyze learners' activity, prepare administrative documents, and support managerial decisions. However, academic publications often discuss AI through separate tools or tasks, such as adaptive learning, chatbots, automated assessment, academic performance prediction, or content generation. This approach describes individual practices well, but it does not always show how they are connected with the functions of educational process management.

In distance learning, this problem is especially visible. Educational interaction primarily occurs through digital platforms. Therefore, managerial decisions more often depend on data about activity, deadlines, assessment results, communication, and the use of learning resources. The availability of such data does not automatically lead to better management. It is necessary to define which operations AI can support, which decisions must remain under human responsibility, and which risks appear when automation becomes excessive.

Analysis of Current Research. Systematic reviews show that the most common areas of AI use in education are adaptive and personalized learning, intelligent support systems, academic performance prediction, automated assessment, chatbots, and learning management [1; 4; 15; 17]. A separate group of studies focuses on the pedagogical potential of chatbots, support for self-regulated learning, and the integration of learning analytics with predictive models [3; 8; 10]. These studies show that AI can process educational data faster, personalize tasks, provide quick feedback, and help identify difficulties earlier.

At the same time, the effectiveness of these practices depends on data quality, pedagogical design, and human control. Studies on automated assessment show that generative systems can create detailed comments and support formative assessment, but they may overrate work, give contradictory advice, or be unstable in complex tasks [6; 12]. Similar limitations are found in tools for detecting AI-generated text. Their accuracy is not sufficient to use their results as independent proof of academic misconduct [16].

Another research area concerns institutional, ethical, and competence-related conditions for AI use. Studies on AI policy distinguish pedagogical, managerial, and operational dimensions of implementation, including data protection, transparency, accountability, infrastructure readiness, and user training [2; 5; 7; 11]. International recommendations on trustworthy AI emphasize a human-centered approach. Automated systems should support professional judgment, but they should not replace it in decisions with serious consequences [5; 7; 11].

The requirements for the professional competence of teachers and managers are also changing. AI literacy is not limited to writing prompts. It includes understanding how models work, checking facts, evaluating data quality, identifying bias, protecting privacy, and designing learning activities in which AI supports, rather than replaces, learners' cognitive work [9; 14]. Teachers' trust in AI systems is also related to their awareness, self-efficacy, and institutional support [13]. Thus, the current discussion is moving from separate technical possibilities to the inclusion of AI in the management cycle of the educational process.

The aim of the article is to systematize practices of using artificial intelligence for the organization and management of the educational process, determine their correspondence with the main management functions, and

justify the opportunities, limitations, and risks of implementing AI in educational institutions.

Methods of the Study. The article is an analytical review. Its source base included studies on the use of AI for learning, teaching, assessment, learning analytics, prediction, administration, and institutional policy. Priority was given to systematic reviews, empirical studies, works with a clear methodology, and international recommendations on responsible AI use in education. Most publications were from 2023 to 2025. Several earlier sources were used to show the development of ethical and human-centered approaches.

The selection of sources was based on combinations of terms: artificial intelligence in education, generative AI in education, educational management, learning management, learning analytics, adaptive learning, AI assessment, AI chatbots, AI policy in higher education, and data-driven decision-making in education. The study used theoretical analysis, comparison, thematic grouping, classification, and analytical synthesis. First, AI practices described in publications were identified. Then they were related to the functions of educational process management, levels of implementation, and possible consequences of automated decisions.

Research Results. The educational process is a system of related actions aimed at achieving learning outcomes, developing competencies, and creating conditions for learning activity. Its organization includes goal setting, structuring content, defining the sequence of activities, allocating time and resources, selecting learning forms, methods, and tools, and coordinating interaction. Management also includes receiving information about the process, evaluating results, identifying deviations, and making corrective decisions.

The integration of AI changes the way management operations are performed, but it does not remove their pedagogical nature. A system can process large amounts of data, identify repeated patterns, make predictions, or offer possible decisions. However, a human defines the educational goal, evaluates whether a recommendation is appropriate, and considers circumstances not represented in the data. In this sense, AI performs four main roles: informational, analytical, recommendation-oriented, and operational.

The use of AI in educational process management involves the application of algorithmic and generative systems to support planning, organization, monitoring, assessment, adjustment, administration, and institutional governance. Pedagogical goals, criteria of acceptability, and responsibility for decisions remain with an individual or a collegial body within an educational institution.

AI practices are implemented at several levels. The individual level includes learners' self-management: goal setting, time planning, explanation of difficult issues, self-assessment, feedback, and resource selection. The pedagogical level concerns a teacher's work: lesson design, task differentiation, analysis of results, feedback preparation, and identification of typical difficulties. The program level concerns a subject, course, or educational program. At this level, data are used to analyze learning outcomes, component coherence, and the need to update content. The institutional level includes resource allocation, enrolment prediction, workload planning, management reporting, AI policies, data processing rules, audit, and complaint procedures.

These levels are not isolated. Data created at the individual and pedagogical levels may be aggregated to

analyze an educational program or an institution. Therefore, the local use of a tool does not always remain local. If learners' data are transferred to an external platform, used to train a model, or combined with other datasets, questions of privacy, legal status, and responsibility appear.

A functional typology of AI practices can be presented in terms of eight management functions. In planning, AI supports goal definition, content structuring, task selection, lesson planning, and resource prediction. Generative systems can draft programs, lesson scenarios, and materials, while analytical systems help predict workload and resource needs. However, such plans require expert review because they may be too standardized or inaccurate.

In the organization of learning, AI is used for adaptive selection of materials, task personalization, group formation, project coordination, and communication automation. Adaptive systems adjust the difficulty and sequence of learning based on the learner's performance [15; 17]. Chatbots answer typical questions, remind learners about deadlines, and explain requirements [8]. However, algorithmic grouping should not fixate on the "strong"- "weak" learner dichotomy, and automated answers must be based on verified sources.

In motivation and support, AI can provide hints, explanations, reminders, recommendations, and progress visualization. The main principles of such support are goal setting, self-assessment with feedback, and personalization [3]. Support should be balanced so as not to replace independent work. Generative systems should also not be used for psychological diagnosis or for independent responses to complex personal situations.

Monitoring through learning analytics enables tracking activity, deadlines, results, and learning dynamics. Predictive models can identify learners who may need additional support [10]. However, an algorithmic prediction is not a characteristic of a person and may not consider the reasons for low activity. Monitoring must be transparent: participants of the educational process should know which data are collected and how they are used.

Control and assessment are among the most sensitive areas. AI is used to create tasks, analyze errors, provide preliminary assessments, and prepare comments. Automated assessment is most reliable for tasks with a clearly defined answer. When checking texts and projects, generative systems can provide detailed feedback, but they may overrate work or give contradictory recommendations [6; 12]. Therefore, a mixed approach is more appropriate: AI performs a preliminary analysis, while the teacher reviews the results and makes the final decision. AI text detectors cannot be sufficient proof of academic misconduct because their accuracy is unstable [16].

Adjustment includes changing the pace, difficulty, sequence of material, or amount of support based on monitoring and assessment. At the program level, analytics helps identify the need to revise content, prerequisites, or assessment forms. At the same time, constant task simplification may limit the development of independence. Therefore, adjustments should consider not only current results but also long-term learning goals.

In administration, AI reduces routine work by drafting letters, messages, protocols, reports, and responses to typical requests. Chatbots can inform applicants and learners about procedures and educational opportunities. Analytical systems can also be used for scheduling and resource allocation. However, documents

that include legal provisions, personal data, or numerical indicators require mandatory checking, and optimization criteria must be open.

Institutional governance defines the conditions, limits, and responsibilities for AI use. In Chan's framework, the pedagogical, managerial, and operational dimensions of AI policy are distinguished [2]. An educational institution should set acceptable ways of using AI, rules for reporting its use, requirements for checking content, data protection, assessment, error review, and user training. The policy should consider different levels of risk. Language editing, practice task generation, and final assessment cannot be regulated in the same way.

The systematization of studies enabled the identification of the main opportunities of AI in the organization and management of the educational process. First, AI reduces the time spent on routine operations, such as drafting, initial information grouping, preparing standard messages, and preliminary analysis of results. Second, it speeds up managerial feedback because difficulties can be identified during learning, not only at the end of a course. Third, AI expands personalization by processing more individual data than any one person can analyze regularly. However, personalization should not be understood as isolation. The educational process should keep joint activity, discussion, and interaction.

Other opportunities include data-driven decision support, improved access to materials, and scalable support. AI can identify patterns in large datasets and create subtitles, translations, simplified explanations, and other accessible formats. However, scalability is useful only if quality is ensured. If one error is spread among many users, its consequences become more serious.

Discussion. The analysis shows that the organizational and managerial potential of AI is not defined by a separate service. It appears when technology is integrated into the management cycle of the educational process. Therefore, it is not enough to evaluate implementation only by the number of available tools. The proposed functional typology differs from classifications based on technology types. For example, Crompton and Burke distinguish assessment, prediction, AI assistants, intelligent tutoring systems, and learning management [4]. This classification reflects important research areas, but it partly combines technologies, functions, and fields of use. The functional approach allows seeing the same tool, such as a chatbot, as a means of organization, support, monitoring, or administration, depending on the task.

The results are consistent with Chan's framework, which considers AI integration across pedagogical, managerial, and operational dimensions [2]. At the same time, the proposed typology details the management cycle and shows how particular practices relate to planning, organization, monitoring, assessment, and adjustment. The most justified model is the support of human activity, not its complete replacement. AI can process large datasets, generate options for decision-making, identify recurring patterns, and perform routine operations. However, it cannot independently consider all pedagogical goals, individual circumstances, ethical consequences, incomplete data, and social dynamics [5; 7; 11].

The statement that a "human remains in the loop" does not by itself guarantee responsible AI use. Meaningful human oversight means that a worker

understands the logic and limitations of the system, has time, competence, and authority to check its recommendation, can disagree with it, and can make another decision [5; 7]. Without these conditions, human participation becomes no more than a formal approval of an automated conclusion.

Thus, the maturity of AI use in an educational institution should not be defined by how often AI is used. Signs of maturity include alignment with educational goals, clear distribution of responsibilities, control over data, differentiated rules, user training, and a procedure for reviewing automated decisions.

Conclusions. The organization and management of the educational process under the spread of artificial intelligence are becoming hybrid. A digital system performs part of informational, analytical, recommendation-oriented, and routine operations, while goal setting, evaluation of pedagogical appropriateness, and responsibility for decisions remain with humans.

AI practices should be systematized according to the functions of planning, organization, motivation and support, monitoring, control and assessment, adjustment, administration, and institutional governance. They are implemented at the individual, pedagogical, program, and institutional levels. This typology helps define which management operations are supported by technology, what their consequences may be, and what type of control is necessary.

The main opportunities of AI include reducing routine work, fast data analysis, personalization, early identification of difficulties, scalable support, and better accessibility to educational materials. Its limitations include unreliable generated content, algorithmic bias, lack of transparency in predictions, privacy risks, digital inequality, weakening of professional judgment, and excessive user dependence. Decisions that influence final assessment, access to education, academic status, or the confirmation of misconduct should not be made without meaningful human review. Further research should empirically test the proposed typology and define indicators of pedagogical appropriateness, fairness, and safety of managerial decisions made with AI support.

Use of artificial intelligence (AI) tools. During manuscript preparation, AI (Grammarly) was used as an auxiliary tool for the technical review of selected author-written text fragments at the levels of grammar, spelling, and punctuation. The AI tool was not used to generate the substantive parts of the article, including the aim, methodology, results, discussion, conclusions, or references. All language corrections suggested by the AI tool were verified by comparing them with the original text, checking terminology, content accuracy, and consistency with the cited sources. The use of AI did not affect the research results, their interpretation, or the conclusions.

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ВІДОМОСТІ ПРО АВТОРІВ

ЮРЧЕНКО Артем Олександрович – кандидат педагогічних наук, доцент, доцент кафедри інформатики Сумського державного педагогічного університету імені А.С.Макаренка.

Наукові інтереси: ІТ в освіті, комп'ютерна візуалізація знань та комп'ютерне моделювання, розвиток цифрової компетентності майбутніх учителів, спеціалізоване комп'ютерне програмне забезпечення в галузі природничих наук, підготовка вчителів.

ШАМОНЯ Володимир – кандидат фізико-математичних наук, доцент, доцент кафедри інформатики Сумського державного педагогічного університету імені А.С.Макаренка.

Наукові інтереси: цифрові технології в освіті, розвиток цифрової компетентності майбутніх учителів, навчання фізики та інформатики.

СЕМЕНІХІНА Олена – доктор педагогічних наук, професор, професор кафедри інформатики Сумського

державного педагогічного університету імені А.С.Макаренка.

Наукові інтереси: ІТ в освіті, комп'ютерна візуалізація знань, розвиток цифрової компетентності майбутніх учителів, підготовка вчителя, цифрові технології, медіаграмотність.

INFORMATION ABOUT THE AUTHORS

YURCHENKO Artem – Candidate of Pedagogical Sciences, Associate Professor, Associate Professor of the Department of Informatics Sumy State Pedagogical University named after A.S. Makarenko.

Scientific interests: IT in education, computer visualization of knowledge and computer simulation, development of digital competence of future teachers, specialized computer software in sciences, and teacher training.

SHAMONIA Volodymyr – Candidate of Physical and Mathematical Sciences, Associate Professor, Associate Professor of the Department of Informatics Sumy State Pedagogical University named after A.S. Makarenko.

Scientific interests: Digital technologies in education, developing the digital literacy of future teachers, teaching physics, and computer science.

SEMENIKHINA Olena – Doctor of Pedagogical Sciences, Professor Professor of the Department of Informatics, Sumy State Pedagogical University named after A.S. Makarenko.

Scientific interests: IT in education, computer-based visualization of knowledge, teachers' digital competence development, teacher training, digital technologies, media literacy.

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ПІКУЛЬ Дмитро –

аспірант кафедри цифрових і професійної освіти
Вінницького державного педагогічного університету
імені Михайла Коцюбинського
ORCID: <https://orcid.org/0009-0000-6440-6665>
e-mail: Dimkasss@gmail.com

РОЗВИТОК ЦИФРОВОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ УЧИТЕЛІВ У ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ

У статті досліджено теоретичні засади розвитку цифрової компетентності майбутніх учителів у процесі професійної підготовки в умовах цифрової трансформації освіти. Проаналізовано сучасні наукові підходи до визначення сутності цифрової компетентності, її структури та місця у системі професійної компетентності педагога. Узагальнено концептуальні положення вітчизняних і зарубіжних науковців щодо формування цифрової компетентності майбутніх учителів відповідно до сучасних вимог цифрового освітнього середовища. Обґрунтовано, що розвиток цифрової компетентності забезпечується інтеграцією цифрових технологій у професійну підготовку, використанням сучасних цифрових платформ і сервісів, інтерактивних та проєктних методів навчання, формуванням цифрової культури, інформаційної грамотності, академічної доброчесності та навичок безпечної роботи в цифровому середовищі. Визначено основні структурні компоненти цифрової компетентності майбутнього вчителя, які охоплюють мотиваційно-ціннісний, когнітивний, діяльнісно-практичний і рефлексивний компоненти.

У статті представлено модель розвитку цифрової компетентності майбутніх учителів у процесі професійної підготовки. Визначено основні педагогічні умови її реалізації: інтеграцію цифрових технологій, використання сучасних методів навчання, формування цифрової культури, практичну професійну діяльність і безперервний професійний розвиток. Обґрунтовано, що реалізація моделі сприяє формуванню готовності майбутніх педагогів до ефективної роботи в цифровому освітньому середовищі. Зроблено висновок, що цілеспрямований розвиток цифрової компетентності сприяє формуванню професійної готовності, підвищенню якості професійної підготовки та забезпечує конкурентоспроможність майбутніх учителів в умовах цифровізації освіти.

Ключові слова: цифрова компетентність; майбутні вчителі; професійна підготовка; цифрова трансформація освіти; цифрове освітнє середовище; цифрова культура; інформаційна грамотність; інформаційно-комунікаційні технології; заклад вищої освіти.

PIKUL Dmytro –

Postgraduate student of the Department
of Digital and Professional Education
of the Mykhailo Kotsiubynskyi Vinnytsia State Pedagogical University
ORCID: <https://orcid.org/0009-0000-6440-6665>
e-mail: Dimkasss@gmail.com