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IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN PRESCHOOL EDUCATION MANAGEMENT AND IMPROVEMENT OF THE INNOVATIVE MANAGEMENT MODEL

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Abstract: This article provides a scientific-theoretical analysis of the opportunities for implementing artificial intelligence (AI) technologies in the management of preschool education organizations and ways to improve the innovative management model. In the context of digital transformation, leaders of preschool education organizations face tasks such as effectively organizing management processes, supporting educators' activities, improving communication with parents, and protecting children's interests. AI tools can assist in document workflow, scheduling, classifying inquiries, resource planning, data summarization, and preparing pedagogical materials. However, risks such as the confidentiality of preschool children's data, algorithmic errors, digital inequality, and the diminishing human factor require special management measures. Methods such as literature analysis, systems approach, comparative analysis, and theoretical generalization were used in the research. As a result, an innovative management model based on step-by-step AI implementation, maintaining human oversight, developing staff digital competence, and measuring outcomes is proposed. The article is theoretical and analytical in nature, noting the need for empirical research to test the proposed model in practice.

Keywords: preschool education, education management, artificial intelligence, digital transformation, innovative management, digital competence, data security.

INTRODUCTION

The rapid development of digital technologies in modern society sets new requirements for the management of all levels of the education system, including preschool education organizations. Preschool education is a crucial stage in a child's physical, intellectual, social, and emotional development, during which the quality of the educational environment, the potential of educators, and cooperation with families are of particular importance. Therefore, using innovative approaches in management should be viewed not merely as a tool to accelerate administrative processes, but as a means to ensure child-centered, high-quality service.

Artificial intelligence allows analyzing large volumes of data, generating text and other content, automating repetitive tasks, and preparing additional information for decision-making. UNESCO's guidance on generative AI emphasizes that applying technologies in education must align with principles of human interests, privacy, equity, and pedagogical suitability.[1] Such an approach is particularly vital in preschool education because decisions regarding children's data and development demand a high degree of caution.

In preschool education management, AI tools can assist the leader in formulating work plans, coordinating staff schedules, accounting for food and household resources, sorting inquiries from parents, preparing internal reports, and drafting methodical materials for educators. At the

[1] Miao, F., & Holmes, W. (2023). Guidance for generative AI in education and research. UNESCO.

same time, AI recommendations should not be automatically accepted as correct; they must be verified by a manager or a qualified specialist.

The relevance of the topic lies in the fact that purchasing digital tools or using a separate application alone does not constitute innovative management. For effective results, organizational goals, workflow processes, employee competencies, information security, financial resources, and performance evaluations must be unified into a single system. UNICEF recommends prioritizing safety, personal data protection, non-discrimination, transparency, and the best interests of the child when developing and implementing AI systems related to children.[2]

The purpose of the article is to identify the opportunities for applying AI technologies in preschool education management, analyze organizational and pedagogical conditions associated with their implementation, and propose an innovative management model. To achieve this goal, tasks were set to describe management directions where AI can be applied, identify potential risks, systemize implementation stages, and develop performance criteria.

LITERATURE REVIEW

The issue of using artificial intelligence in education is closely linked to digital transformation, education management, pedagogical innovation, information security, and technology ethics. International sources on the topic acknowledge the potential of AI tools while highlighting the necessity of using them under human supervision with clear goals and accountability.

The "Guidance for Generative AI in Education and Research" prepared by UNESCO states that generative AI has the capacity to create educational resources, support teaching activities, and ease certain workflows. However, data privacy, age appropriateness, pedagogical rationale, and preserving human autonomy in decision-making are highlighted as essential conditions. For preschool education management, these principles mean that documents, recommendations, and analyses generated with AI must be reviewed by a specialist.

UNESCO's "AI competency framework for teachers," published in 2024, systemizes educators' AI competencies across areas such as a human-centered approach, AI ethics, understanding core technologies, pedagogical application, and continuous professional development. These views substantiate the need to develop digital literacy not only for leaders but also for educators and methodologists in preschool education organizations.[3]

UNICEF's "Guidance on AI and children" document stresses that AI systems should support children's well-being, ensure inclusivity, adhere to fairness and non-discrimination, protect children's personal data, and operate in a transparent and accountable manner. These requirements carry special significance when dealing with children's photos, health data, developmental characteristics, and family information in preschool organizations.[4]

OECD analyses on digital education note that digital technologies can support management and learning processes in the education system, but technology itself does not automatically improve quality. The outcome depends on the alignment of technology, pedagogical approach, organizational capacity, and management policy. This perspective allows viewing AI implementation not as an isolated project, but as an integral part of the organization's development strategy.[5]

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[2] UNICEF. (2025). Guidance on AI and children: Version 3.0. UNICEF Office of Strategy and Evidence – Innocenti.
3 UNESCO. (2024). AI competency framework for teachers. UNESCO.
4 UNICEF. (2025). Guidance on AI and children: Version 3.0. UNICEF Office of Strategy and Evidence – Innocenti.
5 OECD. (2023). OECD Digital Education Outlook 2023: Towards an effective digital education ecosystem. OECD Publishing.

Research conducted by Uzbek scholars also focuses on digitalizing the preschool education system, developing innovative management, and enhancing educators' digital literacy. In particular, A.A. Temirov covers the issues of improving innovative management and developing staff digital literacy in preschool education organizations. These approaches indicate that effective digital technology implementation requires not only providing technical tools, but also developing employees' professional readiness.[6]

F.M. Kholdarova's research examines the pedagogical, psychological, didactic, and ethical aspects of using digital technologies in the preschool education system. The author's approach justifies the importance of using digital tools in accordance with children's age characteristics, needs, and educational goals.[7] Inomjon Bilolov's study dedicated to the pedagogical possibilities of using artificial intelligence in preschool education addresses individual approaches, tracking development dynamics, inclusivity, and ethical issues related to technology use.[8]

These local studies, in line with international recommendations, demonstrate the need to collectively consider the organizational, pedagogical, and ethical aspects of implementing artificial intelligence in preschool education management. Furthermore, developing a holistic model that combines workflow automation, data security, and performance evaluation based on clear criteria defines the main direction of this study.

The uniqueness of the preschool education environment is that a child's development cannot be measured solely by standard indicators. Play, live communication, emotional safety, movement, and social interactions are at the core of education and upbringing. Therefore, AI tools should not replace an educator's professional judgment or direct interaction with the child. It is expedient to use them primarily to ease administrative tasks, identify general trends, and support pedagogical planning.

Source analysis reveals that implementing AI technologies in preschool education management requires three interconnected directions: first, selecting technology appropriate for management needs; second, establishing ethical-legal mechanisms protecting the interests of employees, parents, and children; and third, evaluating implementation results through clear indicators. These very factors constitute the theoretical foundation of the innovative management model.

METHODOLOGY

The research is theoretical-analytical in nature, utilizing methods of literature review, systems approach, comparative analysis, and theoretical generalization. Recommendations from UNESCO and UNICEF regarding AI, education, and children's rights, as well as international analytical approaches to digital education and management, served as the methodological foundation.

Through theoretical analysis, the concepts of preschool education management, artificial intelligence, innovative management, and digital competence were examined in relation to one another. Based on a systems approach, organization leadership, educators, methodologists, technical staff, parents, and information systems were analyzed as components of a unified management environment.

6 Temirov, A. (2025). Innovative management and digital literacy in preschool education organizations. Science and Innovations, 3(3), 101–102.
7 Temirov, A. (2025). Innovative management and digital literacy in preschool education organizations. Science and Innovations, 3(3), 101–102.
8 Bilolov, I. (2026). Pedagogical possibilities of using artificial intelligence in preschool educational institutions. Journal of Preschool and School Education, 4(3).

Using comparative analysis, principles of human-centered management, confidentiality, inclusivity, transparency, and accountability put forward in international guidelines were linked to the practical needs of preschool education organizations. In the generalization phase, stages of AI technology implementation, key management directions, and performance criteria were developed.

No surveys, interviews, or statistical data from specific organizations were collected within the framework of this study. Therefore, the model and indicators in this article are presented not as practically proven results, but as theoretical proposals to be tested in future empirical research.

RESULTS

The theoretical analysis revealed that using AI technologies in preschool education management can primarily serve to reduce administrative workload, organize information, use resources rationally, and prepare evidence-based data for decisions. In this context, AI should be defined not as a final decision-making entity, but as a tool supporting the work of leaders and specialists.

The following main directions were identified for implementing AI technologies:

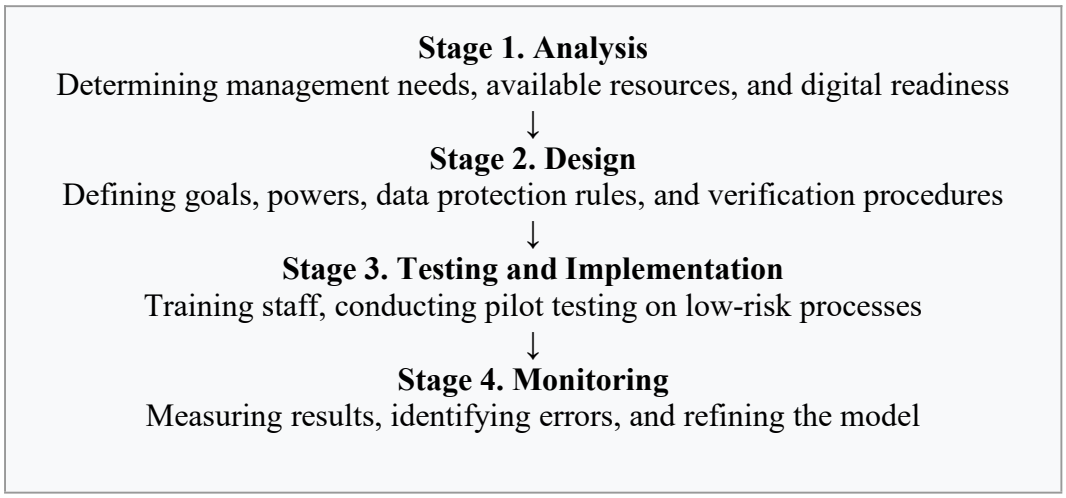
№	Management Direction	Use of AI Technology	Expected Result
1	Administrative Documents	Assistance in drafting reports, meeting minutes, and letters	Time savings and improved document structure
2	Planning	Analyzing options for schedules, duties, and resource allocation	Coordination of workflows
3	Communication with Parents	Sorting inquiries by topic, preparing draft response templates	Increased speed and convenience of communication
4	Pedagogical-Methodical Support	Creating initial drafts of lesson ideas and materials	Supporting educators' preparation work
5	Monitoring and Analysis	Summarizing anonymized data and highlighting trends	Preparing information for management decisions
6	Safety and Quality	Controlling data access rights, introducing result verification procedures	Strengthening privacy and accountability

Table 1. Main directions of using AI technologies in preschool education management. Source: Developed by the author based on international recommendations and theoretical analysis.

The proposed innovative management model consists of four stages. The first stage — Need and Readiness Analysis: repetitive tasks in the organization, existing digital infrastructure, staff competence, and data security status are examined. The second stage — Setting Goals and Rules: tasks where AI will be used, responsible persons, permissible data inputs, and result verification procedures are defined. The third stage — Limited Testing and Implementation: starting with low-risk tasks, staff are trained, and outcomes are observed. The fourth stage —

Monitoring and Improvement: performance, errors, user feedback, and security status are evaluated, and necessary adjustments are made.

Figure 1. AI-based innovative management model in a preschool education organization



Source: Theoretical model developed by the author.

To apply the model in practice, the following performance criteria are proposed:

№	Evaluation Criterion	Measurement Method
1	Time spent on administrative work	Comparing time expenditure before and after implementation
2	Document quality	Recording instances of errors requiring edits and reprocessing
3	Digital competence of staff	Results of practical tasks before and after training
4	Communication with parents	Response time to inquiries and feedback analysis
5	Data security	Report on unauthorized access, misdirection, and privacy incidents
6	User satisfaction	Anonymous survey of educators and leadership

Table 2. Criteria for evaluating the effectiveness of AI-based innovative management.
Source: Criteria proposed by the author.

When applying these indicators, it is necessary to record the initial state, set target outcomes in advance, and make comparisons across specific time periods. Measuring time savings alone is insufficient: result accuracy, impact on staff work, convenience for parents, and data security must also be evaluated.

Risk management was identified as an important outcome when using AI tools. It is recommended not to enter personal data such as children's full names, photos, health info, family conditions, or developmental traits into open AI services; use organization-approved secure

systems when necessary; verify AI-generated texts; and develop clear guidelines for employees. Major decisions regarding a child's development, health, or educational needs must not rely solely on algorithm recommendations.

DISCUSSION

The analysis results show that AI technologies hold significant potential as supporting tools in managing preschool education organizations. However, introducing a technological novelty does not automatically improve management quality. The outcome depends on the institution leader's strategic approach, employee readiness, clear task division, and information security policy. Therefore, the innovative management model must consider technological, organizational, and human factors together.

The first critical issue is selecting the right tasks for AI application. It is advisable to begin with low-risk tasks such as preparing initial document drafts, sorting general information, or creating draft schedules. In high-impact processes such as individual child assessment, disciplinary conclusions, or health-related decisions, AI should not be used as an independent decision-maker.

The second issue is staff competence. UNESCO's AI competency framework emphasizes that alongside understanding technology, critically evaluating it, adhering to ethical principles, and maintaining human responsibility are essential. Hence, preschool education organizations should not limit themselves to a one-time orientation, but establish regular practical sessions, internal guidelines, and experience-sharing systems.[9]

The third issue is children's rights and privacy. Preschool children cannot independently evaluate how their data is being used. Thus, management must take measures such as informing parents, collecting minimal data, restricting access, and setting data retention periods. Principles of the child's best interests, safety, fairness, and transparency from UNICEF recommendations can serve as guidelines in this regard.[10]

The fourth issue is equal opportunities and resources. Not all preschool education organizations may have sufficient internet access, modern devices, or technical specialists. Therefore, an infrastructure and cost analysis should precede implementation, simple and accessible tools should be chosen for staff, and non-tech-savvy employees should not be left behind. AI technology must not be introduced at the expense of reducing live pedagogical interaction and play activities.

A limitation of the study is that the article relies on theoretical literature analysis without empirical data from active institutions. Thus, the proposed model's effectiveness is not yet considered empirically proven. In the future, it is advisable to test the model through pilot projects across different regions, interviews with leaders and educators, parent surveys, and work-time tracking.

CONCLUSION

This article theoretically analyzed the possibilities of introducing artificial intelligence technologies in preschool education management and improving the innovative management model. The analysis demonstrated that AI tools can assist in administrative documentation, planning, communication with parents, preparing methodical materials, and summarizing anonymized data.

For effective AI implementation, it is necessary to analyze organizational needs, set clear goals and responsibilities, enhance employees' digital competence, conduct small-scale trials, and

9 UNESCO. (2024). AI competency framework for teachers. UNESCO.
10 UNICEF. (2025). Guidance on AI and children: Version 3.0. UNICEF Office of Strategy and Evidence – Innocenti.

regularly monitor outcomes. The proposed model covers the stages of analysis, design, testing and implementation, monitoring, and improvement.

In preschool education, children's interests must remain the priority. Protecting personal data, verifying algorithmic errors, preventing discrimination, and retaining human responsibility for final decisions are indispensable requirements of AI management. Artificial intelligence should be applied not as a replacement for educators and leaders, but as a technology supporting their professional practice.

Overall, the innovative management model should be built on a balance between technology, human capacity, security, and educational quality. Future recommendations include empirically testing the proposed approach in real preschool education organizations, evaluating cost-benefit ratios, and developing practical guidelines tailored to local conditions.

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