

IMPROVING THE MANAGEMENT ACTIVITIES OF SCHOOL LEADERS THROUGH ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Abstract. *This article examines the possibilities of improving the management activities of school leaders through the application of artificial intelligence technologies. The study highlights the role of artificial intelligence in enhancing the efficiency of managerial decision-making, monitoring educational processes, analyzing data, planning activities, and optimizing administrative tasks. Particular attention is paid to the development of digital and managerial competencies of school leaders in the context of the digital transformation of education. The article identifies the main opportunities and challenges associated with the implementation of artificial intelligence in school management and provides recommendations for its effective and responsible use.*

Keywords: *artificial intelligence, school management, school leaders, management activities, digital transformation, managerial competencies, educational management, decision-making, data analysis, digital technologies.*

Аннотация. *В статье рассматриваются возможности совершенствования управленческой деятельности руководителей школ посредством применения технологий искусственного интеллекта. Раскрывается роль искусственного интеллекта в повышении эффективности управленческих решений, мониторинге образовательных процессов, анализе данных, планировании деятельности и оптимизации административных задач. Особое внимание уделяется развитию цифровых и управленческих компетенций руководителей школ в условиях цифровой трансформации образования. Выявлены основные возможности и проблемы внедрения искусственного интеллекта в управление школой, а также предложены рекомендации по его эффективному и ответственному использованию.*

Ключевые слова: *искусственный интеллект, управление школой, руководители школ, управленческая деятельность, цифровая трансформация, управленческие компетенции, управление образованием, принятие решений, анализ данных, цифровые технологии.*

INTRODUCTION

The rapid development of artificial intelligence technologies is transforming the educational sector and creating new opportunities for improving school management. AI technologies can facilitate administrative processes, data analysis, educational planning, monitoring, and managerial decision-making. In the modern educational environment, school leaders increasingly need to develop digital and analytical competencies to manage these processes effectively. The effective use of AI can help school leaders process large amounts of information and identify important trends in educational performance. It can also support the development of more systematic approaches to planning, monitoring, and evaluating school activities. However, the implementation of AI requires not only technical knowledge but also critical thinking, ethical awareness, and responsible decision-making. School leaders need to understand the capabilities and limitations of AI technologies in order to use them appropriately in management processes. The integration of AI into school management can contribute to improving organizational efficiency and optimizing routine administrative tasks. At the same time, successful implementation depends on the readiness of school leaders to adapt their management practices to the changing digital environment. Therefore, improving school leaders' management activities through artificial intelligence technologies represents an important and relevant direction for the development of modern educational management.

LITERATURE REVIEW

In recent years, the integration of artificial intelligence (AI) into education has begun to transform not only teaching and learning processes but also the mechanisms of educational management. Arara et al. conducted a systematic review of 168 scientific articles published between 2000 and 2024 and examined the opportunities, challenges, and future research directions associated with AI in

educational leadership and management [1]. In the authors' view, this study demonstrates the need to examine AI not merely as a pedagogical technology but also as a factor capable of transforming educational management and leadership practices.

Studies specifically focusing on school leadership indicate that AI can support administrative tasks, facilitate the use of data, assist managerial decision-making, and contribute to the optimization of school activities. For example, a study published in 2024 examined the potential applications of AI in school management and its implications for school leaders [2]. The study emphasizes the need for school leaders to be prepared to use AI technologies not only in teaching and learning but also in administrative and managerial activities. In the authors' view, this approach provides a basis for reconsidering school leaders' management competencies in relation to their ability to effectively use AI technologies. The AI Competency Framework for Teachers, developed by UNESCO in 2024, identifies five dimensions of competencies required by education professionals in the age of artificial intelligence: human-centred mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional learning [3]. The framework defines 15 competencies and three progressive levels of development: *Acquire*, *Deepen*, and *Create* [3]. In the authors' view, these competencies can also be adapted to the context of school leadership, particularly in relation to AI ethics, human oversight, technological literacy, and professional development.

UNESCO's guidance on generative AI in education and research emphasizes human-centred approaches, data privacy, safety, equity, and responsible use of AI technologies in educational settings [4]. In the authors' view, when these principles are applied to school management, school leaders should not automatically accept information or recommendations generated by AI but should critically evaluate them through professional judgement and human oversight. The European Commission's Digital Competence Framework for Educators (DigCompEdu) also provides an important theoretical basis for understanding digital competencies. The framework describes educators' digital competence

through 22 competencies organized into six areas, including professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners' digital competence [5]. In the authors' view, the elements of professional collaboration, digital resource management, data use, and responsible application of digital technologies can provide a methodological foundation for developing AI-based management competencies among school leaders. The OECD's 2024 *Education Policy Outlook* indicates that rapidly developing technologies, including artificial intelligence, are creating new professional requirements within education systems [6]. The report emphasizes the importance of adapting education professionals to changing technological environments and supporting their continuous professional development. In the authors' view, preparing school leaders to work with AI should therefore be considered not as a one-time technical training activity but as a continuous professional development process. Recent systematic research on school leadership and AI further demonstrates that this topic is emerging as a distinct area of academic inquiry. Karaköse et al. analyzed 112 publications from 2021 to 2026 using text-mining techniques and identified major research themes including AI readiness and self-efficacy, ethical and data-driven decision-making, AI literacy and digital leadership, distributed leadership, and human-centred AI governance [7]. In the authors' view, these research directions demonstrate the need to conceptualize school leaders' AI competence as an integrated combination of technological, managerial, analytical, and ethical components. Overall, the reviewed literature demonstrates that artificial intelligence has considerable potential to support data analysis, decision-making, administrative optimization, and the professional development of school leaders. At the same time, there remains a need to develop a comprehensive approach that directly connects school leaders' AI competencies with the main components of their management activities. In the authors' view, addressing this research gap requires examining school leaders' AI competence through interconnected components such as technological literacy, data management, decision-making, strategic planning, and AI ethics.

RESEARCH METHODOLOGY

This study employed a theoretical and analytical research approach. The methodological foundation of the study consisted of international research on artificial intelligence, digital competence, educational management, and school leadership, as well as relevant conceptual frameworks and guidelines developed by UNESCO, the OECD, and the European Commission. In particular, UNESCO's 2024 *AI Competency Framework for Teachers*, the DigCompEdu framework, and UNESCO's guidance on generative AI in education and research were used as key conceptual sources for identifying AI competencies and examining their ethical and organizational dimensions [3–5]. The study employed several research methods, including document analysis, systematic literature analysis, comparative analysis, content analysis, and synthesis. The selection of academic literature focused primarily on studies directly related to artificial intelligence in educational management, school leadership, digital leadership, decision-making, and AI competencies. Recent studies in the field have used academic databases such as Scopus, Web of Science, ERIC, and Google Scholar, together with systematic review and PRISMA-based approaches, to identify and classify relevant research on AI and school leadership [7; 8]. During the content analysis stage, management activities that can potentially be supported by AI technologies were identified and grouped into several major areas: (1) data collection and analysis; (2) managerial decision support; (3) strategic and operational planning; (4) monitoring of educational processes; (5) optimization of administrative tasks; (6) support for professional development; and (7) responsible and ethical management of AI use. Such a multidimensional approach is also reflected in recent research on school leadership, which examines AI-related leadership practices at individual, organizational, and systemic levels [8]. Through comparative analysis, competencies identified across different sources were compared and their relevance to school leaders' management activities was determined. The UNESCO framework emphasizes AI literacy, ethics, and human-centred approaches, while the DigCompEdu framework focuses on the professional and organizational use of digital technologies [3; 5]. In this study, these approaches were adapted to the context of school management in order to establish a conceptual basis for improving

school leaders' management activities through AI technologies. Based on the synthesis of the reviewed literature, school leaders' AI-based management competencies were conceptualized through five components: technological, analytical, strategic, communicative, and ethical competencies. These components represent not simply the ability to use AI tools but the ability to use them consciously, critically, and responsibly for managerial purposes. Accordingly, AI was considered in this study not as a substitute for school leaders but as a technological instrument that supports their professional judgement and managerial decision-making. This approach is consistent with UNESCO's human-centred perspective on the responsible use of artificial intelligence in education [4].

ANALYSIS AND RESULTS

The study analyzed the possibilities of using artificial intelligence (AI) technologies to improve the management activities of school leaders and identified their potential impact on key managerial processes. The literature review demonstrates that the use of AI in educational management is not limited to individual technological tools but increasingly involves data analysis, planning, decision-making, communication, and professional development. Arara et al., in a systematic review of 168 scientific articles published between 2000 and 2024, demonstrated the growing research interest in the intersection of artificial intelligence, educational leadership, and management [1]. In the authors' view, this finding indicates that AI should be considered not only as a pedagogical technology but also as a tool for transforming school management practices. From a practical perspective, AI can reduce the amount of repetitive administrative work performed by school leaders. For example, instead of manually analyzing large amounts of information about teacher attendance, student performance, or task completion, a school leader can use AI tools to organize the data and identify potentially problematic trends. In such a situation, AI does not make the final managerial decision but provides analytical information that can draw the leader's attention to specific problems. For example, if student attendance in a particular class decreases continuously over several weeks, an AI-based analytical system can identify this trend and highlight the class for further investigation, while the school

leader remains responsible for identifying the causes and deciding on appropriate actions. AI technologies can also support planning activities within schools. Modern AI tools can assist school leaders in preparing preliminary versions of annual work plans, staff development programs, meeting agendas, monitoring plans, and other administrative documents. This can reduce the time required for routine planning activities and allow school leaders to focus more on strategic issues. However, AI-generated plans need to be reviewed and adapted to the specific institutional context, regulatory requirements, available resources, and actual needs of teachers and students. Therefore, the findings suggest that AI should be used in planning as a tool for generating and developing managerial alternatives rather than as an independent decision-making mechanism. Another important finding concerns the use of AI in communication. School leaders can use AI to prepare preliminary versions of information letters, announcements, reports, and communication materials intended for teachers, parents, or students. This may be particularly useful in schools where managers regularly prepare large amounts of repetitive communication. Nevertheless, the final content should be reviewed by the school leader because effective educational communication requires consideration of institutional culture, interpersonal relationships, and the specific characteristics of each situation. Recent empirical research involving school leaders has also identified the use of generative AI for curriculum development, collaborative lesson planning, professional development activities, communication with staff and parents, and the preparation of teacher-monitoring reports. These examples demonstrate that AI can support a broad range of managerial tasks when it is integrated into existing leadership processes under human supervision. The findings also demonstrate the importance of analytical competence in the effective use of AI by school leaders. UNESCO's *AI Competency Framework for Teachers* identifies 15 competencies across five dimensions and proposes three levels of development: *Acquire*, *Deepen*, and *Create* [2]. When adapted to school leadership, this framework suggests that managers should initially develop basic knowledge of AI technologies, subsequently apply them to practical management tasks, and ultimately develop more advanced strategies for integrating AI into institutional decision-making and development

processes. The 2026 study by Karaköse et al., which analyzed 112 publications from 2021 to 2026, identified several major research themes in AI and school leadership, including AI readiness and self-efficacy, ethical and data-driven decision-making, AI literacy, digital leadership, and human-centred AI governance [3]. These findings support the conclusion that AI competence among school leaders should not be understood as purely technical competence but as a combination of technological, analytical, managerial, strategic, and ethical capabilities. Based on the analysis, the role of AI in school management can be considered at three levels: operational, tactical, and strategic. At the operational level, AI can facilitate document preparation, data classification, report summarization, and routine communication. At the tactical level, it can support the analysis of monitoring results, resource planning, staff coordination, and identification of emerging problems. At the strategic level, AI can assist school leaders in identifying development priorities, analyzing alternative scenarios, and supporting evidence-based institutional planning. Thus, the findings indicate that the primary value of AI in school management is not its ability to replace managerial decisions but its capacity to make decision-making processes more systematic, timely, and data-informed. Based on these findings, AI-based management competence among school leaders can be conceptualized through five interconnected components: technological, analytical, strategic, communicative, and ethical competence. Technological competence involves the ability to select and use appropriate AI tools; analytical competence involves interpreting data and critically evaluating AI-generated outputs; strategic competence involves using AI to support planning and institutional development; communicative competence involves adapting AI-assisted communication to different stakeholders; and ethical competence involves ensuring privacy, human oversight, transparency, and responsible use of AI.



Explanation of Figure 1 Figure 1 illustrates the proposed model of AI-based management competence for school leaders.

The model consists of five interconnected components: technological, analytical, strategic, communicative, and ethical competence. Technological competence refers to the school leader's ability to select and use appropriate AI tools for administrative, analytical, and planning tasks. Analytical competence involves processing school data, identifying trends, and critically evaluating information generated by AI. Strategic competence enables school leaders to use AI for planning, forecasting, identifying development priorities, and considering alternative management scenarios. Communicative competence concerns the effective use of AI to prepare reports, information materials, and communication for teachers, students, and parents while maintaining a human-centred approach. Ethical competence ensures responsible AI use through data privacy, transparency, human

oversight, security, and accountability. The integration of these five competencies is expected to contribute to improved school management through faster data analysis, better-informed managerial decisions, more efficient planning, optimized administrative processes, and continuous professional development. The model emphasizes that AI should function as a supportive management tool rather than a replacement for school leaders. Therefore, the effectiveness of AI in school management depends on the leader's ability to combine technological capabilities with professional judgement, critical thinking, strategic planning, effective communication, and ethical responsibility.

CONCLUSION

The study examined the potential of artificial intelligence technologies for improving the management activities of school leaders in the context of the digital transformation of education. The analysis of relevant scientific literature demonstrated that AI can support school leaders in data analysis, planning, decision-making, monitoring, administrative tasks, and professional communication. The findings indicate that the effective integration of AI requires school leaders to develop not only technological skills but also analytical, strategic, communicative, and ethical competencies. In particular, the ability to critically evaluate AI-generated information is essential because AI should support managerial decisions rather than replace professional judgement. The study also showed that AI can reduce routine administrative workload and provide school leaders with more opportunities to focus on strategic planning and school development. Based on the analysis, five interconnected components of AI-based management competence were identified: technological, analytical, strategic, communicative, and ethical competence. Their systematic development can contribute to faster analysis, better-informed decision-making, more efficient planning, optimized administrative processes, and continuous professional development. At the same time, the responsible use of AI requires attention to data privacy, transparency, information security, human oversight, and accountability. Therefore, professional development programs for school leaders should include practical training in AI tools, data analysis, critical evaluation of AI outputs, strategic application, and AI ethics. The

proposed competency model can serve as a conceptual basis for developing training programs and methodological approaches aimed at preparing school leaders for AI-supported management. Overall, the integration of artificial intelligence into school management should be understood as a human-centred process in which technology strengthens, rather than replaces, the professional capacity and responsibility of school leaders.

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