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DEVELOPMENT OF SCHOOL LEADERS' MANAGERIAL DIGITAL COMPETENCE THROUGH ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Abstract: The article examines the development of school leaders' managerial digital competence through artificial intelligence technologies. Managerial digital competence is interpreted as an integrative professional capacity that combines strategic digital leadership, data-informed decision-making, practical use of AI tools, digital communication, ethical governance, and continuous innovation. The article identifies six interrelated components of this competence and explains how AI can support school planning, administrative processes, staff development, communication, and institutional monitoring. Particular attention is paid to the risks of algorithmic bias, privacy violations, over-automation, and uncritical reliance on AI-generated recommendations. A three-stage model of competence development – diagnosis, guided application, and strategic transformation – is proposed. The study argues that AI should function as decision support while final responsibility remains with the school leader.

Keywords: school leadership, managerial digital competence, artificial intelligence, digital leadership, educational management, data-informed decision-making, AI governance.

The digital transformation of education is changing the professional role of school leaders. Principals are increasingly expected to manage digital platforms, interpret institutional data, coordinate online communication, support teachers' digital development, and make decisions in technology-rich environments. Research on professional digital competence has traditionally focused on teachers, but school leaders require a distinct managerial form of digital competence because they are responsible for institutional strategy, resource allocation, risk management, staff coordination, and the quality of school-wide digital change [1]. The rapid development of artificial intelligence strengthens this need by introducing new possibilities for analysis, automation, forecasting, content generation, and personalized support [2].

School leaders' managerial digital competence can therefore be defined as the capacity to strategically select, critically interpret, ethically govern, and



organizationally integrate digital and AI technologies in order to improve school management and educational quality. This competence is broader than technical literacy. It combines technological knowledge with leadership judgment, organizational responsibility, communication skills, and an understanding of the social consequences of automated systems. AI may assist leaders, but it cannot replace professional accountability, contextual knowledge, or human responsibility for consequential decisions [3].

The proposed structure includes six interrelated components. The first is strategic-digital competence: the ability to align AI initiatives with the school's mission, development plan, resources, and measurable priorities. The second is data-analytical competence, which involves interpreting student achievement, attendance, teacher workload, and other institutional data while checking the quality and limitations of AI-generated conclusions. The third is AI-operational competence: practical understanding of appropriate AI tools for drafting documents, summarizing information, organizing schedules, analysing feedback, and supporting routine administrative work. These functions can reduce repetitive workload, but all outputs require verification before managerial use [4].

The fourth component is communication-collaborative competence. School leadership depends on communication with teachers, students, parents, local authorities, and external partners. AI can support the preparation of announcements, summaries, reports, multilingual communication, and meeting materials, yet sensitive communication should remain human-centred. The fifth component is ethical-governance competence. Schools process information about minors, families, teachers, and learning outcomes, which makes privacy, transparency, fairness, data protection, and accountability essential. Leaders must determine what information may be entered into AI systems, which tools are acceptable, and which decisions require direct human review [5].

The sixth component is innovation-reflective competence. Because AI technologies change rapidly, school leaders need the ability to test new tools, evaluate their effects, collect feedback, identify unintended consequences, and revise institutional practices. Competence development should therefore be organized as continuous professional learning rather than as a one-time technology course. UNESCO guidance similarly emphasizes that AI competence must combine technical understanding, human-centred values, ethics, and professional development [6].





A practical model for developing managerial digital competence may include three stages. The first stage is orientation and diagnosis. School leaders assess their existing digital practices, identify management problems that could be supported by AI, and examine risks related to data protection, bias, and reliability. The second stage is guided application. Leaders solve authentic managerial tasks through case analysis, simulations, project work, and supervised use of AI tools. Examples include comparing an AI-generated school improvement proposal with actual school data, analysing parent feedback, drafting a staff development plan, or identifying unsupported assumptions in automated recommendations. The third stage is strategic transformation, when AI use becomes connected with institutional policy, professional learning, monitoring, and evaluation.

Assessment of managerial digital competence should also be multidimensional. Knowledge tests may measure conceptual understanding, but they do not show whether a leader can responsibly apply AI in a real management situation. Assessment should therefore include case-based tasks, digital portfolios, reflective reports, analysis of AI-generated outputs, and practical projects. DigCompEdu provides a useful methodological principle: digital competence is demonstrated through purposeful professional activity rather than through isolated technical operations [7]. For school leaders, the key indicator is not the number of digital tools used, but the quality of decisions, communication, governance, and organizational improvement achieved through them.

The effectiveness of AI-supported school leadership depends strongly on institutional culture. When AI is introduced only as a mechanism of control or efficiency, it can create resistance and mistrust. When leaders explain its purpose, involve teachers in decision-making, establish clear rules, and preserve human oversight, AI can support collaboration and innovation. Recent research on digital leadership also shows that principals influence teachers' readiness to integrate AI by creating supportive organizational conditions and professional learning opportunities [8]. Thus, managerial digital competence has both an individual and an institutional dimension.

In conclusion, artificial intelligence expands the informational, administrative, and strategic capacities of school management, but it also increases the responsibility of school leaders. The proposed six-component structure—strategic-digital, data-analytical, AI-operational, communication-collaborative, ethical-governance, and innovation-reflective competence—offers a concise framework for leadership development. AI should be treated as a tool for evidence-informed and human-centred management, not as an autonomous



decision-maker. Professional development programmes for school leaders should therefore integrate AI literacy with strategic leadership, ethical governance, practical problem-solving, and reflective evaluation.

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