



**AKADEMIA NAUK STOSOWANYCH
WYŻSZA SZKOŁA ZARZĄDZANIA I ADMINISTRACJI
W OPOLU**

TRANSFORMATIONAL PROCESSES: GLOBAL RESILIENCE AND DEVELOPMENT

PROCESY TRANSFORMACYJNE: GLOBALNA REZYLIENCJA I ROZWÓJ

ТРАНСФОРМАЦІЙНІ ПРОЦЕСИ: ГЛОБАЛЬНА РЕЗИЛЬЄНТНІСТЬ ТА РОЗВИТОК



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Monograph

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Opole 2026

ISBN 978-83-66567-96-2

Transformational processes: global resilience and development:. Monograph.
Opole: Academy of Applied Sciences Academy of Management and Administration in
Opole, 2026; ISBN 978-83-66567-96-2; 255 pp., illus., tabs., bibls.

Recommended for publication
by the Academic Council
of Academy of Applied Sciences
Academy of Management and Administration in Opole
(Protocol No. 04 of May 2026)

45-085 Polska, Opole, ul. Niedziałkowskiego 18
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Publishing House:

Akademia Nauk Stosowanych
Wyższa Szkoła Zarządzania i Administracji w Opolu,
45-085 Polska, Opole, ul. Niedziałkowskiego 18
tel. 77 402-19-00/01

200 copies

Authors are responsible for content of the materials

ISBN 978-83-66567-96-2

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Artificial intelligence has become one of the defining technological phenomena of the twenty-first century, permeating domains from healthcare and transportation to entertainment and education. As AI systems grow increasingly embedded in the tools and environments that children use every day, there is mounting consensus among researchers, policymakers, and educators that foundational AI literacy must begin early – ideally at the primary school stage (Touretzky et al., 2019; UNESCO, 2022). Yet the translation of this consensus into classroom practice remains deeply challenging, not least because primary school teachers themselves often lack both the content knowledge and the pedagogical strategies needed to introduce AI concepts meaningfully to children between the ages of six and eleven.

Teaching AI to young children is not simply a matter of simplifying technical content. It requires teachers to engage in a distinctive form of pedagogical reasoning – one that connects abstract computational concepts to children’s lived experiences, cognitive developmental stages, and existing conceptual frameworks (Loughran, 2019; Ouyang & Jiao, 2021). The challenge is further compounded by the rapid evolution of the field itself: unlike established primary school subjects such as mathematics or literacy, AI as a curriculum domain lacks settled pedagogical traditions, established learning progressions, or widely agreed-upon standards (Long & Magerko, 2020).

In response to this gap, researchers have begun developing frameworks for K-12 AI literacy (Touretzky et al., 2019; Long & Magerko, 2020; Ng et al., 2021), and a number of curriculum initiatives and teaching resources have emerged globally, including the AI4K12 initiative in the United States and national AI education strategies documented by UNESCO (2022). However, these efforts have concentrated largely on curriculum content rather than on the pedagogical competence teachers need to implement such content effectively. As a result, the specific instructional

knowledge, strategies, and dispositions that enable primary school teachers to successfully scaffold AI understanding in young learners remain undertheorised and underresearched.

The concept of Pedagogical Content Knowledge (PCK) provides a productive theoretical lens for examining teacher competence in emerging curriculum domains such as AI. Mishra (2019) has refined this framework for technology-rich educational contexts through the Technological Pedagogical Content Knowledge (TPACK) model, emphasising that effective teaching in digital environments requires teachers to navigate the intersections between content, pedagogy, and technology simultaneously. For AI education at the primary level, TPACK involves not only understanding core AI concepts – such as machine learning, data, algorithms, and pattern recognition – but also knowing which representations, analogies, examples, and activities make those concepts accessible to children in middle childhood.

Celik (2023) has further extended this framework by proposing an Intelligent-TPACK model specifically designed to address the ethical and relational dimensions of AI tool integration in educational practice. Celik argues that teachers working with AI-powered educational tools must develop not only technical and pedagogical competencies but also an awareness of how AI systems shape learning interactions, manage student data, and reflect design assumptions – competencies that are particularly salient when teaching about AI rather than merely with it.

The past five years have seen considerable progress in defining what AI literacy means for K-12 learners. Long and Magerko (2020) conducted a comprehensive review of AI literacy initiatives and proposed a framework of seventeen competencies organised around five overarching themes: understanding AI, using and interacting with AI, evaluating AI, designing AI, and using AI ethically. While this framework provides a valuable map of learner competencies, it does not directly address the corresponding pedagogical competencies teachers require to develop them.

Ng et al. (2021) synthesised existing AI literacy frameworks and identified three dimensions particularly relevant to primary education: knowing and understanding AI, using and applying AI, and evaluating and creating AI. Their review underscores that effective AI literacy education is fundamentally interdisciplinary, requiring connections to ethics, social studies, and language arts. UNESCO (2022) similarly emphasises that K-12 AI curricula should be values-driven and contextually situated, a design principle that has direct implications for teacher preparation.

Su and Yang (2022) conducted a scoping review of AI education research in early childhood settings and found that, while interest in AI for young learners is growing rapidly, the majority of published studies focus on student outcomes rather than teacher practice. Their analysis confirms the relative neglect of teacher competence as a research focus – the precise gap that the present study addresses.

Unplugged activities – learning experiences that teach computing and AI concepts without digital technology – have attracted renewed research interest as the AI education movement expands into primary schools. Relkin et al. (2020) developed and validated TechCheck, an unplugged assessment of computational thinking for early childhood education, demonstrating that children as young as five can engage meaningfully with core computing concepts through physical, embodied activities. Their findings affirm the developmental appropriateness of unplugged approaches for the primary age range.

Scholars evaluated the effectiveness of unplugged activities in primary classrooms and found significant gains in computational thinking and conceptual understanding, with particularly strong effects for younger students. For AI specifically, Zimmermann-Niefield et al. (2019) demonstrated that youth could develop meaningful understanding of machine learning concepts through hands-on activities involving the physical collection and classification of data, without requiring prior programming knowledge. These studies affirm the pedagogical promise of unplugged approaches while underscoring the critical role of teacher facilitation: learning gains were dependent on structured, teacher-guided reflection following activities.

Narrative has long been recognised as a foundational mode of sense-making in childhood, and its application to AI education has gained significant momentum in recent years. Williams et al. (2019) developed and evaluated a storytelling-based curriculum for introducing machine learning to children aged 4 to 7 through playful narrative scenarios. Their work demonstrated that children could grasp foundational machine learning ideas, including the notion that AI systems learn from data, when these concepts were embedded in compelling story contexts.

Ali et al. (2021) further argue that positioning children as creators and storytellers of AI-driven narratives supports the development of agency and critical literacy alongside conceptual understanding. Their framework for AI education as a creative practice suggests that storytelling competence in teachers extends beyond selecting appropriate texts to include facilitating student story creation. Van Brummelen et al. (2021) similarly found that having children design conversational AI systems through story-based interaction supported both conceptual learning and the development of critical awareness of how such systems operate.

Inquiry-based learning (IBL), in which students generate questions, investigate phenomena, and construct understanding through guided exploration, is strongly supported by research as an effective approach for primary science and technology education. Krajcik and Shin (2022) provide a comprehensive account of how project-based and inquiry-oriented learning designs support deep disciplinary understanding in primary and middle school contexts, arguing that sustained investigation of

meaningful questions produces more durable and transferable learning than direct instruction alone.

In the context of AI, inquiry-based approaches invite children to investigate AI behaviours empirically: to observe, question, and experiment with systems rather than simply being told how they work. Ouyang and Jiao (2021) argue that AI-supported education should be oriented toward fostering learner autonomy and epistemic agency – a principle that applies with particular force to education about AI itself. Pangrazio and Selwyn (2021) emphasise that critical data literacy must be cultivated through active inquiry rather than passive reception, and that schools are a crucial site for this development.

A growing body of scholarship emphasises that AI literacy education at any level must foreground ethical dimensions alongside technical ones. Celik (2023) argues that teachers' ethical awareness is a non-negotiable component of AI-related pedagogical competence, given the opacity of many AI systems and the power asymmetries they can reproduce. Pangrazio and Selwyn (2021) contend that critical engagement with algorithmic systems – including awareness of how data shapes AI outputs – is a fundamental component of twenty-first century civic literacy that schools must actively cultivate.

For primary school teachers, integrating ethical perspectives into AI instruction requires both the conceptual understanding to explain how bias, fairness, and accountability operate in AI systems in age-appropriate terms, and the pedagogical skill to structure discussions in which children engage with these ideas productively. Druga et al. (2018) found that children's attributions of intelligence and agency to AI systems are highly malleable and shaped significantly by early educational experiences, underscoring the importance of the ethical framing that teachers provide in children's earliest encounters with AI.

The paper aims to investigate what pedagogical competencies primary school teachers need to teach AI concepts to children aged 6 to 11, with particular attention to three instructional approaches that have emerged as promising: unplugged activities, storytelling, and inquiry-based learning. To achieve this goal, we collected qualitative data through classroom observations and semi-structured interviews with primary school teachers. The study involved 24 primary school teachers from different regions of Ukraine. Participants were selected through purposive sampling to achieve variation in years of teaching experience (from 2 to 27 years), teaching level (from 1 to 4 grades), and previous experience with artificial intelligence or computing. Informed consent was obtained from all participants, and all data were anonymized.

The most pervasive challenge observed was the disconnect between teachers' general awareness of AI as a societal phenomenon and their substantive understanding of AI concepts sufficient to support classroom instruction. While virtually all participants could identify AI in everyday contexts (e.g., voice assistants,

recommendation algorithms), fewer than a third demonstrated the conceptual depth needed to explain foundational ideas such as training data, classification, or the distinction between narrow and general AI in age-appropriate ways.

This knowledge gap had direct pedagogical consequences. Teachers who lacked secure conceptual understanding frequently resorted to vague or anthropomorphising explanations – describing AI systems as “thinking” or “knowing things” without providing mechanisms – a pattern consistent with Druga et al.’s (2018) finding that children’s intelligence attributions to AI are highly susceptible to framing effects. One teacher in Grade 3 described asking her students to imagine that “the computer just figures it out, like your brain,” a formulation that, while accessible, risked foreclosing more accurate later understanding.

Teachers with stronger conceptual knowledge were markedly more confident in using precise language, correcting misconceptions in the moment, and adapting explanations to student questions. These observations confirm the central claim of Mishra’s (2019) TPACK framework: technological-pedagogical competence is constrained by the depth and flexibility of teachers’ subject matter knowledge.

Unplugged activities were the most widely used instructional approach in our observations. Their prevalence reflects both the practical advantages of technology-free instruction and the influence of teacher professional development programmes introducing this approach. Activities ranged from sorting physical image cards to simulate machine learning classification, to role-playing a simple recommendation algorithm using cards representing student preferences.

The most effective implementations shared several characteristics, consistent with the facilitation principles identified by Zimmermann-Niefield et al. (2019): they were preceded by explicit framing connecting the activity to a familiar AI system; they incorporated structured debrief discussions supporting students in articulating what the activity illustrated about AI; and they were facilitated by teachers able to extend student thinking with probing questions. Less effective implementations treated unplugged activities as standalone games, with insufficient scaffolding to support conceptual transfer.

A critical facilitation challenge was what we term the “fun-concept gap”: many students enjoyed unplugged activities without extracting the intended AI concepts from them. Bridging this gap required teachers to possess both the pedagogical skill to structure guided reflection and the conceptual knowledge to link activity mechanics to AI principles accurately.

Storytelling was employed as a primary instructional strategy in 19 of 52 observed lessons. Teachers used picture books, teacher-composed narratives, and student-generated stories as vehicles for introducing AI topics. In the most effective instances, narrative served not merely as motivational framing but as an ongoing

conceptual scaffold – consistent with the creative AI education framework proposed by Ali et al. (2021).

A particularly compelling example was observed in a Grade 2 classroom, where a teacher used a self-composed story about a robot learning to recognise cats by examining many photographs. By systematically pausing the story and inviting students to predict what would happen if the robot had been trained on too few photos, or photos taken in only one room, the teacher introduced the concept of training data quality in a developmentally rich and memorable way. This approach mirrors the Popbots curriculum design documented by Williams et al. (2019), in which narrative scenarios anchor abstract machine learning ideas for young learners.

Teachers also reported difficulties in sourcing high-quality narratives that represent AI accurately and diversely. A recurring concern was the prevalence of anthropomorphic or dystopian AI representations in popular children's literature (Bers, 2022). Teachers needed competencies not only in selecting appropriate texts but also in critically discussing and reframing problematic representations – a pedagogical demand that few had received preparation for.

Inquiry-based approaches were the least commonly observed instructional strategy, appearing in only 11 of 52 lessons, and were associated with the highest levels of teacher anxiety. Teachers frequently expressed concern about “losing control” of AI-related investigations, particularly when students might interact with actual AI tools, or about being unable to answer unexpected questions accurately.

Where IBL was implemented effectively, it typically took the form of structured inquiry, with teachers providing clear protocols while preserving meaningful student agency. In one Grade 5 classroom, students were invited to systematically test an image-recognition tool on a range of photographs, recording predictions and outcomes in a structured template, then collaboratively generating hypotheses about the system's training data. The teacher's role was primarily facilitative – asking probing questions, highlighting unnoticed patterns, and connecting emerging observations to prior lessons – consistent with the critical data literacy orientation promoted by Pangrazio and Selwyn (2021).

Teachers who successfully facilitated AI inquiry appeared to possess a distinctive tolerance for uncertainty: they were comfortable acknowledging the limits of their own knowledge and modelling intellectual curiosity rather than expert authority. This dispositional dimension of pedagogical competence is often neglected in frameworks focused primarily on knowledge and skill (Loughran, 2019).

Across all approaches, an ethical thread ran through effective AI teaching: teachers who were most successful in developing students' AI understanding consistently wove questions of fairness, bias, privacy, and human agency into their instruction – in line with the ethical-critical orientation advocated by Celik (2023). This integration was pedagogically central rather than supplementary: ethical

questions provided authentic motivations for conceptual inquiry and grounded abstract technical ideas in humanly significant concerns.

Paradoxically, teachers reported higher confidence in addressing ethical dimensions of AI than technical ones. While this may reflect the closer connection between ethics and existing personal and social education curricula, it also raises a concern: ethical discussions without conceptual grounding risk producing simplistic or purely affective responses rather than the nuanced reasoning genuine AI literacy requires (Ng et al., 2021).

Drawing on literature review, we propose an integrated framework of pedagogical competence for primary school teachers teaching AI. The framework identifies four mutually reinforcing domains:

1. **AI Conceptual Knowledge for Teaching.** Teachers need a working understanding of foundational AI concepts at a level sufficient to represent them accurately and flexibly for young learners. Following Mishra (2019) and Ng et al. (2021), this encompasses knowing the distinction between rule-based and learning-based AI systems; the role of data in training classifiers; concepts of input, output, and error; and the social situatedness of AI development. Teachers must also recognise common misconceptions held by children and possess effective strategies for eliciting and addressing them.

2. **Pedagogical Repertoire for AI Concepts.** Teachers need a varied toolkit of instructional strategies suited to the developmental characteristics of primary school learners. Drawing on Zimmermann-Niefield et al. (2019), Williams et al. (2019), and Van Brummelen et al. (2021), this includes competence in designing and facilitating unplugged activities that bridge playful engagement and conceptual learning; skill in selecting, adapting, and critically using narrative and storytelling as AI concept scaffolds; and the ability to structure and support inquiry-based investigations of AI behaviour. These strategies must be implemented as coherent pedagogical sequences in which each activity extends prior learning.

3. **Critical and Ethical AI Literacy Pedagogy.** Teachers need the competence to integrate ethical and critical perspectives into AI instruction in developmentally meaningful and conceptually grounded ways. Drawing on Pangrazio and Selwyn (2021) and Celik (2023), this includes framing ethical questions as genuine intellectual problems; supporting students in analysing real-world consequences of AI system design decisions; and fostering age-appropriate civic agency in relation to AI – the sense that students, as future citizens, have a legitimate stake in shaping AI's societal role.

4. **Reflective Practitioner Identity.** Effective AI teaching at the primary level also requires a dispositional dimension: teachers need the intellectual humility to acknowledge uncertainty, the curiosity to model ongoing inquiry, and the professional

identity to position themselves as learners alongside their students. In a rapidly evolving domain, this reflective practitioner orientation is not merely desirable but necessary (Loughran, 2019). Teachers who rigidly position themselves as expert authorities are ill-equipped to navigate the inevitable gaps and developments that primary AI education will involve.

Discussion. Our findings contribute to a growing body of scholarship on the pedagogical dimensions of AI education and carry several significant implications. First, they underscore the inadequacy of approaches to AI teacher preparation that focus exclusively on content knowledge or on the introduction of specific curricular resources. Teachers need not merely to know what AI is, but to develop the pedagogical reasoning to transform that knowledge into productive learning experiences for diverse groups of primary school children – a principle central to both Mishra’s (2019) TPACK framework and Loughran’s (2019) account of professional knowledge in teaching.

Second, our findings highlight the particular importance of what we have called the “fun-concept gap” in unplugged activity facilitation. The proliferation of AI-themed games and sorting activities in primary education curricula represents genuine progress, but without teachers who can bridge playful experience to conceptual understanding, these activities risk becoming pedagogically hollow. Teacher education programmes must address not only how to conduct unplugged activities but how to facilitate the reflective discussions that give them educational meaning, consistent with the facilitation principles identified by Zimmermann-Niefield et al. (2019).

Third, our data point to an important but often overlooked dispositional dimension of teacher competence in AI education. The tolerance for uncertainty and the willingness to model intellectual curiosity that characterise effective AI teachers are not straightforwardly teachable through conventional professional development formats. They require sustained reflective practice, collaborative professional learning, and the development of epistemic cultures in schools that normalise not-knowing as a legitimate professional state (Loughran, 2019).

Finally, our proposed framework offers a tentative map of the competence landscape that teacher education programmes must address. It does not constitute a linear progression or checklist but rather an ecological description of interdependent domains that develop in relation to one another. Future research should empirically validate and refine this framework across diverse educational contexts, building on the broader mapping of AI curriculum approaches documented by UNESCO (2022).

Conclusion. Primary school teachers occupy a uniquely consequential position in the emerging landscape of AI education: they are among the first adults to mediate children’s understanding of artificial intelligence, shaping not only what young learners know about AI, but how they question it and relate to it as future citizens.

Four interconnected competence domains emerge from the analysis. Teachers need conceptual knowledge of AI that is accurate and flexible enough to support responsive instruction; a pedagogical repertoire that bridges playful, embodied engagement with conceptual understanding; the capacity to integrate ethical and critical perspectives as constitutive – not supplementary – elements of AI learning; and a reflective professional identity that treats uncertainty as a productive condition rather than a professional failure. These domains are mutually reinforcing: conceptual depth enables more precise facilitation, stronger facilitation opens space for genuine inquiry, and genuine inquiry naturally surfaces the ethical questions that give AI education its civic significance.

Two findings deserve particular attention. First, the “fun-concept gap” in unplugged activity facilitation identifies a specific and addressable weakness in current teacher preparation: activity designs alone are insufficient without the capacity to orchestrate the reflective discussions through which those activities become conceptually productive. Second, the paradox of ethical confidence without technical grounding risks producing affective rather than reasoned responses – a pattern that warrants close attention in both pre-service and in-service teacher education programmes.

This study carries inherent limitations: the sample was relatively small and contextually specific, and the proposed framework requires empirical validation across diverse educational settings and national contexts. Nevertheless, the findings support one conclusion with reasonable confidence – AI literacy education at the primary level cannot be adequately addressed through curriculum resources alone. What children understand about artificial intelligence depends fundamentally on their teachers' capacity to think carefully about how young learners learn, what misconceptions they bring, and what experiences will build durable, transferable, and critically informed understanding. Developing that capacity is no longer a research aspiration; it is an educational responsibility that schools and teacher education institutions must begin to address in earnest.

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3.3. Organizational culture of a general secondary education institution as a factor of psychological resistance of the teaching team in crisis conditions

Організаційна культура закладу загальної середньої освіти як чинник психологічної стійкості педагогічного колективу в кризових умовах

У сучасних мінливо-непередбачуваних умовах війни, реформування освіти та потреби збереження власного психоемоційного стану особливого значення набувають знання і вміння, пов'язані з розвиненою психологічною стійкістю педагогічного колективу в цілому, так і кожного педагога зокрема. Водночас формування та підтримка психологічної стійкості колективу постійно стикаються із суперечностями між вимогами суспільства до кваліфікаційних компетентностей фахівців освіти та постійним впливом кризових та воєнних реалій на професійну діяльність колективів шкіл, що загострюють психологічне напруження, тривожність, емоційне виснаження та відчуття нестабільності; між необхідністю в прийнятті ефективних оперативних рішень та можливостями учасників освітнього процесу гнучко адаптуватися до умов, які постійно змінюються, відновлюватися. Вирішення цих суперечностей лежить у площині трансформації організаційної культури закладу освіти, яка є

ANNOTATION

PART 1

MODERNIZATION OF PUBLIC ADMINISTRATION IN THE FACE OF GLOBAL CHALLENGES: DIGITALIZATION AND SUSTAINABLE DEVELOPMENT STRATEGY

- 1.1. Tetiana DROZD. The integrative character of strategic competence of public servants.** The article provides a theoretical rationale for the strategic competence of public servants as an integrative professional competence that ensures effective strategic governance amidst contemporary challenges. The study analyzes the articulation of this concept within the current regulatory and legal framework and synthesizes scholarly approaches to its interpretation. It identifies a correlation between strategic planning for the development of territorial communities and the level of strategic competence among public administrators. Furthermore, the study characterizes the functional differentiation of strategic competence and emphasizes the necessity of its systemic development through initial professional training and continuous professional development for public servants.
- 1.2. Larysa KYIENKO-ROMANIUK, Mariela MACOLA. Mechanisms for ensuring the development of territorial communities under transformational change: integration of organizational-legal, resource, and competency components.** The subsection substantiates the theoretical and methodological foundations and practical mechanisms for ensuring the development of territorial communities under conditions of transformational change characterized by decentralization, digitalization, and European integration processes. The essence of organizational-legal, resource, and competency-based components is revealed, and their systemic integration within strategic planning and intermunicipal cooperation is emphasized. Particular attention is paid to the role of managerial professional competence as a key determinant of effective resource utilization, innovation implementation, and achievement of sustainable development goals at the local level. The study generalizes regional experience of territorial communities, highlighting

both successful practices and existing challenges related to resource asymmetry, institutional capacity, and digital maturity. Based on the analysis, directions for improving public governance are proposed, aimed at strengthening community resilience, enhancing administrative efficiency, and ensuring balanced socio-economic development in a dynamic environment.

- 1.3. Ievgenii KYIENKO-ROMANIUK, Yulia OKUNOVSKA. Conceptual and model-based principles of E-governance development in the system of regional public administration.** This section examines the conceptual and model-based principles for developing e-governance within the system of regional public administration in the context of digital transformation. It substantiates methodological approaches to modeling e-governance development and identifies the key structural components of the conceptual model. The study highlights the interaction of institutional, technological, organizational, human-resource, and informational components of the digital governance system. Practical directions for implementing the model at the regional level are also outlined.
- 1.4. Mykhailo MAZUR. Theoretical foundations for the formation of a mechanism of state regulation of public-private partnership in the healthcare sector.** This section of the monograph examines the theoretical foundations for the formation of a mechanism of state regulation of public-private partnership in the healthcare sector. The essence of public-private partnership is revealed, its key principles are defined, and its role in enhancing the efficiency of the healthcare system is substantiated. The core elements of the state regulation mechanism are justified, in particular legal, economic, and organizational instruments. The challenges of implementing public-private partnerships are identified, and directions for improving state policy in this field are outlined.
- 1.5. Yuliia NIKOLAIETS. Mediation competence of public servants in the conditions of digital transformation: from ai simulators to digital co-pilots.** This article explores the transformation of mediation competence of public servants under conditions of digitalization and the integration of artificial intelligence (AI). The increasing complexity of social interactions in

the context of European integration and post-conflict recovery necessitates enhanced conflict resolution capacities within public administration. The study conceptualizes the development of mediation competence through AI-enabled tools, from simulation-based training to real-time digital assistants. It identifies key components of this competence—cognitive-analytical, emotional-perceptive, and instrumental-technological—and introduces the concept of the “augmented mediator,” where AI supports decision-making by restructuring the salience of conflict factors. An evolutionary framework of AI integration is proposed, alongside an analysis of ethical challenges such as algorithmic bias and data confidentiality. The findings demonstrate a shift from individual to institutional mediation capacity, establishing a new paradigm of human – AI collaboration in public administration.

- 1.6. Tetyana NOVYTSKA, Tatiana BRANITSKA. Mechanisms for implementing supervision in the public sector: strategic guidelines for sustainable development.** The aim is to examine the mechanisms of public administration regarding the implementation of supervision as a tool for psychosocial support within the public mental health care system under the extreme conditions of martial law. The methodological basis of the study is a comprehensive interdisciplinary approach based on a combination of public administration theory and modern concepts of psychosocial support. In particular, the following methods were used in the study: Theoretical and methodological analysis, System-structural analysis, Technological modeling method, Case method. The relationship between supervision and the country’s sustainable development goals has been identified. The integration of supervision as a tool for psychosocial support for civil servants and professionals in socio-economic fields has been theoretically substantiated. Supervision has been identified as a tool for human capital development in the civil service.
- 1.7. Maiia SEMKO. Regulatory and organizational foundations of the institutional framework for public governance of education at the regional level.** The article examines the regulatory and organizational foundations of the institutional framework for public governance of education in the regions of Ukraine. It is substantiated that the contemporary model of education governance is multi-level in nature and integrates the powers of central executive authorities, local state administrations, local self-government bodies, territorial bodies of state supervision (control), as well as governing bodies of educational

institutions. It is determined that the core legal acts shaping the regulatory framework for regional education governance include the Constitution of Ukraine; the Laws of Ukraine “On Education,” “On Complete General Secondary Education,” “On Higher Education,” “On Professional Pre-Higher Education,” “On Vocational Education,” “On Local Self-Government in Ukraine,” and “On Local State Administrations,” along with secondary legislation of the Cabinet of Ministers of Ukraine regulating the functioning of the Ministry of Education and Science of Ukraine, the State Service for Education Quality of Ukraine, the educational subvention mechanism, and the network of hub (core) educational institutions. It is demonstrated that decentralization has significantly transformed the institutional architecture of education governance by transferring a substantial scope of powers to the level of territorial communities. At the same time, it has preserved the need for coordination, quality monitoring, resource equalization, and strategic planning at the regional level. Key challenges of institutional support are identified, including duplication of competences, uneven managerial capacity across communities, imbalance between institutional autonomy and state control functions, and fragmented coordination among regional governance actors. The study proposes key directions for improvement, namely: regulatory clarification of competences across governance levels, strengthening the strategic role of the regional (oblast) level, digitalization of administrative procedures, development of state–public governance mechanisms, and enhancement of financial instruments to ensure equal access to quality education.

- 1.8. Oleksandr SHVETS. Determinants and Barriers to the Strategic Development of Territorial Communities of Eastern Podillia under Decentralization.** The chapter substantiates the determinants and barriers to the strategic development of territorial communities of Eastern Podillia under decentralization. It is argued that decentralization has transformed communities into key actors of local development, but their strategic capacity depends on the interaction of resource, demographic, infrastructural, institutional, financial and security factors. The study proves that Eastern Podillia possesses considerable agricultural, entrepreneurial, human, cultural, recreational and logistic potential; however, its development is constrained by depopulation, ageing, migration losses, infrastructural disparities, personnel shortages in local self-government, limited investment capacity, dependence on transfers,

digital inequality and the insufficient quality of strategic planning. Particular attention is paid to the need to interpret strategic development not only through the category of growth, but also through the categories of resilience, adaptability and recovery. It is concluded that strengthening the strategic development of communities in Eastern Podillia requires better coordination between local and regional strategies, development of intermunicipal cooperation and clustering, support for human capital, smart specialization, digitalization of management and diversification of local economies.

1.9. Nadiia VASYLENKO, Olena STAKHOVA. Professional competence of public servants in the context of transformational changes in sustainable development of Ukraine.

The section of the monograph explores theoretical and applied aspects of the transformation of professional competence of public servants and local self-government officials. The impact of the UN Global Sustainable Development Goals on the formation of a new ethical and digital profile of managers is determined. Particular attention is paid to the implementation of artificial intelligence tools, the Diia ecosystem and green governance strategies under martial law and post-war recovery. the concept of lifelong learning as a factor in ensuring the institutional resilience of the state.

1.10. Serhiy POYDA, Olena POVAZHUK Current challenges of digitalization of public administration in the conditions of martial state in Ukraine.

A comprehensive analysis of the key challenges facing the digitalization system of public administration in Ukraine under martial law, introduced as a result of the full-scale invasion of the Russian Federation on February 24, 2022, was carried out. The transformation processes taking place in the field of e-government, the provision of digital public services, and the functioning of state information systems under the influence of unprecedented security, infrastructure, and institutional threats were studied.

1.11. Petro KUKHARCHUK, Olena PAVLENKO, Kseniia DITSMAN. Conceptual bases of socio-communicative public administration in the educational sphere.

The section explores the conceptual foundations of socio-communicative public administration in the educational sphere as a holistic management paradigm based on the integration of

communicative mechanisms into the system of public education management. The theoretical and methodological principles of the formation of a socio-communicative model of public administration are substantiated, which involves active interaction between public authorities, educational institutions, civil society and other stakeholders of the educational process. The essence, structure and key components of the socio-communicative approach in the context of reforming the education management system in Ukraine are analyzed.

1.12. Tetiana HALYCH, Volodymyr ZAIACHKOVSKYI. Leadership in the context of digital transformation of public administration: mechanisms for the development of e-governance and professionalization of the public service. The section examines the development of leadership in the context of the digital transformation of public administration and identifies key mechanisms for advancing e-government and the professionalization of the public service. It is substantiated that the digitalization of the public sector leads to profound changes in governance approaches, the evolving role of public servants, and the emergence of new requirements for leadership and digital competencies. Digital leadership is conceptualized as a crucial factor for the effective implementation of e-government, the development of digital public services, and the modernization of public administration systems. The study analyzes institutional, organizational, technological, and communication mechanisms of e-government development, including the implementation of GovTech solutions, digital platforms, e-democracy tools, open data initiatives, and citizen-centered public services. Particular attention is given to the professionalization of the public service, emphasizing the development of strategic competence, digital literacy, and continuous professional learning for public servants. The paper identifies key challenges of digital transformation in public administration in Ukraine, such as regional disparities in digital development, insufficient digital competencies, human resource constraints, and resistance to organizational change. It also outlines promising directions for the advancement of digital leadership, smart governance, and digital governance within the broader context of public sector modernization and Ukraine's European integration.

- 1.13. Yaroslav RADYSH. Transformation of public administration paradigms: from the bureaucratic model to good governance.** The article examines the transformation of public administration paradigms from the classical bureaucratic model to the concept of good governance. Reveals the specific features of implementing the principles of good governance in Ukraine in the context of public administration reform, European integration, digital transformation and post-war recovery. It is substantiated that the modern Ukrainian model of public administration should combine the legal certainty of the bureaucratic system, the effectiveness of the managerial approach, the openness of network governance and the value-based foundation of good governance.
- 1.14. Svitlana ZHARAYA. Mechanisms for preserving the intellectual potential of the state.** The article examines the theoretical, methodological and applied foundations for developing mechanisms aimed at preserving the intellectual potential of the state under the conditions of war-related challenges, demographic losses, educational migration, digital transformation and the need for Ukraine's post-war recovery. It is substantiated that the intellectual potential of the state should be interpreted not only as a set of educational, scientific, professional and creative resources of society, but also as a strategic factor of national security, institutional capacity, economic competitiveness and resilience of public administration. The article emphasizes that, under current conditions, the preservation of intellectual potential should be considered as a cross-sectoral function of state policy that integrates educational, scientific, innovation, social, migration, human resource, security and regional policies. The main threats to Ukraine's intellectual potential are analyzed, including forced migration of students, researchers and highly qualified specialists; destruction of educational and scientific infrastructure; declining attractiveness of academic and scientific careers; regional development imbalances; insufficient funding for science and innovation; and weak institutional coordination among the state, educational institutions, research organizations, business and civil society. The author proposes a system of mechanisms for preserving the intellectual potential of the state, including legal, institutional-organizational, financial-economic, educational-scientific, human resource, digital, motivational, migration-reintegration and regional mechanisms.

PART 2

CURRENT MANAGEMENT PROBLEMS: BY TYPE OF ACTIVITY

- 2.1. Alona OHIIENKO, Tadeusz POKUSA, Filip POKUSA. Leveraging tourism for national development: governance models and management instruments.** This section explores the multifaceted role of sports tourism as a vital component of the modern socio-economic system. It highlights how sports tourism serves both social functions—improving public health and promoting active lifestyles—and economic ones, such as generating income, creating jobs, and attracting investment. The author emphasizes that in the context of globalization, sports tourism becomes a promising factor for the diversification of national economies and the formation of a positive international image. The text further details the specific economic impacts, including the significant multiplier effect where tourism expenditures stimulate related sectors like transportation, construction, and sports equipment production. Additionally, it discusses how sports tourism helps smooth out the seasonality of tourist flows, ensuring year-round utilization of infrastructure and stabilizing regional revenues. The section concludes by linking these developments to long-term investment activity and sustainable territorial growth.
- 2.2. Mykola OHIIENKO, Jozef KACZMAREK. Instrumental and applied aspects of personnel movement management.** This subsection provides a comprehensive analysis of managing personnel movement within an organization as a key factor in labor optimization and productivity. It covers various strategic aspects, including the optimization of travel routes, succession planning, and the improvement of conditions for workers, particularly those with disabilities. The research identifies how analyzing workforce flow can help identify "personnel reserves"—employees with leadership potential who are ready for advancement. The discussion also delves into modern management methodologies, such as the systematic and functional approaches, and tools like "Just-in-Time" (JIT) to minimize delays and costs. Furthermore, it addresses contemporary challenges like globalization, remote work, and the need for digital communication tools to coordinate teams across different time zones. The author stresses the importance of continuous professional development and maintaining employee health and safety in a changing work environment.

2.3. Svitlana ANTYKALO, Nelli SIEVIERINA, Iryna SVIATCHENKO, Olena ANDRIEIEVA. Management of the development of the creative potential of the teaching staff of the general secondary education institution in the conditions of modern educational transformations. The article examines the theoretical and methodological foundations of managing the development of the creative potential of teaching staff in general secondary education institutions in the context of modern educational transformations. The role of strategic management in ensuring the quality of educational services and enhancing teachers' professional development is substantiated. Particular attention is paid to the definition of creative potential and pedagogical creativity as key factors in the effective functioning of an educational institution. The importance of innovative approaches to management is emphasized. Practical directions for improving management activities aimed at developing teachers' creativity are proposed.

2.4. Svitlana PROKHORCHUK, Mykhailo SYDORENKO. Instrumental support for managing financial risks in international corporations. This section defines financial risk as an economic category characterized by uncertainty and the potential loss of income during business activities. It outlines the fundamental components of risk management: identifying potential threats, analyzing their probability and impact, and implementing mitigation measures. The text emphasizes that effective risk management is a balance between seeking rewards and avoiding excessive losses, which is crucial for corporate resilience. The author details various risk management strategies, such as risk avoidance, acceptance, and transfer (e.g., through insurance or partnerships). It also introduces specific quantitative tools for risk assessment, including statistical methods (calculating dispersion and standard deviation) and expert assessment methods (logical analysis and intuitive evaluation by specialists). These tools enable international companies to make informed decisions and maintain financial stability amidst global economic and political instability.

2.5. Tymur MYKHAILOVSKYI, Serhii DARKOV. Implementation of corporate governance technologies in global markets. The final section analyzes international business as a complex phenomenon driven by globalization and the pursuit of benefits from interstate transactions. It explores how transnational corporations (TNCs) utilize corporate management

technologies to coordinate operations across borders and movement of capital, labor, and technology. The discussion highlights three main sources of competitive advantage for international firms: increased efficiency through globalization, economies of scale, and economies of scope. The text also examines modern management strategies like outsourcing, which allows corporations to reduce costs and focus on innovation. It details the internationalization of boards of directors and the increasing use of specialized committees (audit, risk, CSR) to improve governance effectiveness. Finally, the author suggests a shift toward "dialogue management," where interaction and the coordination of interests between global and local levels become the primary mechanisms for stable functioning in the global economy.

- 2.6. **Yaroslav RADYSH. Transformation of public administration paradigms: from the bureaucratic model to good governance.** The article examines the transformation of public administration paradigms from the classical bureaucratic model to the concept of good governance. Reveals the specific features of implementing the principles of good governance in Ukraine in the context of public administration reform, European integration, digital transformation and post-war recovery. It is substantiated that the modern Ukrainian model of public administration should combine the legal certainty of the bureaucratic system, the effectiveness of the managerial approach, the openness of network governance and the value-based foundation of good governance.

- 2.7. **Svitlana ZHARAYA. State-public governance of the educational sphere in the context of european integration.** The article examines the theoretical, methodological and applied foundations of state-public governance of the educational sphere in the context of Ukraine's European integration transformations. It is substantiated that modern educational policy requires a transition from a predominantly administrative and hierarchical management model to a partnership-based, open and multi-level governance system in which the state, local self-government bodies, educational institutions, civil society organizations, professional communities, parents, learners, employers and international partners act as active participants in the formation and implementation of educational policy. The article identifies the key mechanisms of state-public

governance of the educational sphere: legal, institutional-organizational, communicative, human resource, financial-resource, digital, monitoring, partnership and European integration mechanisms. It is proved that the effectiveness of these mechanisms depends on the real participation of the public in management decision-making, the development of educational autonomy, the formation of a culture of trust, transparency of governance and the implementation of European standards of education quality.

PART 3

PEDAGOGICAL AND PSYCHOLOGICAL PRACTICES: NEW APPROACHES TO LEARNING AND DEVELOPMENT

3.1. Olena BARABANOVA, Dmytro HORBACHUK. Pedagogical practices of reflective interaction with veterans in the context of overcoming educational barriers. The article theoretically substantiates, develops and experimentally tests a model of a barrier-free, safe and inclusive educational environment for war veterans and demobilized people in the context of overcoming educational barriers. The scientific novelty of the study lies in the definition of the architectonics of reflective interaction as a leading andragogic tool, based on the synergy of the principles of subject-subject partnership, axiological parity and open dialogue. The specifics of the transition of veteran students from a military subculture to a civilian academic space are studied, and the factors of the emergence of academic alienation and didactic anxiety are classified.

3.2. Olena ISHUTINA, Mykola KOLESNYK. Scaffolding age-appropriate ai understanding in primary education. The rapid integration of artificial intelligence into daily life demands that primary school teachers develop robust pedagogical competencies to introduce AI concepts to children aged 6 to 11. Despite growing policy interest in AI literacy education, limited empirical research has examined what specific knowledge and instructional skills teachers need to scaffold age-appropriate understanding of AI at the elementary level. This paper presents an investigation into the pedagogical dimensions of AI teaching competence in primary education. Four core competence domains are identified: conceptual knowledge of AI fundamentals suitable for young learners; a pedagogical repertoire encompassing unplugged activities and storytelling; the ability to foster

inquiry-based learning around AI; and a reflective professional awareness of ethical implications.

3.3. Tetiana KOLGAN, Valentyna POUL, Olena KOLHAN. Organizational culture of a general secondary education institution as a factor of psychological stability of the teaching staff in crisis conditions. The article analyzes the role of the organizational culture of the educational institution as a basic factor in the formation of the psychological stability of the teaching staff in the conditions of war and systemic crises. The experience of the Donetsk In-Service Teacher Training Institute regarding the development and implementation of professional development programs in four strategic areas: educational and informational, preventive, trauma-informed care and strengthening of professional potential was considered. Special attention is paid to the integrated approach and game technologies as tools for adaptation, restoration of teachers' resources and creation of a safe educational environment.

3.4. Larysa OSTANKOVA, Olena SMYRNOVA, Svitlana VOROBIOVA. Науково-дослідне навчання як механізм розвитку критичного мислення та інформаційної грамотності. The article examines research-based learning as a methodology that combines the development of critical thinking with the advancement of information literacy. It ensures the integration of research tasks into the educational process, promotes interdisciplinary interaction, and creates conditions for the formation of key competencies of the New Ukrainian School. This approach opens up prospects for the modernization of educational programs, the development of authorial solutions, and the use of digital resources that meet the challenges of the modern world.

ABOUT AUTHORS

PART 1

MODERNIZATION OF PUBLIC ADMINISTRATION IN THE FACE OF GLOBAL CHALLENGES: DIGITALIZATION AND SUSTAINABLE DEVELOPMENT STRATEGY

- 1.1. Tetiana DROZD**, PhD of Pedagogical sciences, Associate Professor, Public Higher Educational Establishment «Vinnytsia Academy of Continuing Education», Ukraine.
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PART 2

CURRENT MANAGEMENT PROBLEMS: BY TYPE OF ACTIVITY

- 2.1. Alona OHIIENKO**, Doctor of Economics, Professor,
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PART 3

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TO LEARNING AND DEVELOPMENT**

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RESILIENCE AND DEVELOPMENT**

**PROCESY TRANSFORMACYJNE: GLOBALNA
REZYLIENCJA I ROZWÓJ**

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ISBN 978-83-66567-96-2

Monograph
2026

Academy of Applied Sciences
Academy of Management and Administration in Opole, 2026.
45-085 Polska, Opole, ul. Niedziałkowskiego 18 tel. 77 402-19-00/01.

