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DIGITALIZATION OF EDUCATIONAL PROCESS AT MODERN UNIVERSITIES: EVALUATION OF POSITIVE AND NEGATIVE IMPACT

Annotation. This article examines the transformative impact of digital technologies on higher education as of 2026. It explores how the integration of Artificial Intelligence (AI), Extended Reality (XR), and blockchain-verified credentials has shifted universities from experimental tool adoption to the creation of sustainable, data-driven learning ecosystems. The research identifies core trends, such as personalized adaptive learning and algorithmic career pathways, while addressing persistent challenges like digital inequity and the demand for ethical AI governance.

This article examines the multidimensional nature of digital transformation within the Ukrainian higher education system as of 2026. It explores how digitalization, accelerated by the COVID-19 pandemic and subsequent military aggression, has become the primary mechanism for maintaining educational continuity. The study identifies key positive impacts, such as increased accessibility, personalization, and administrative efficiency, alongside critical negative factors including psychological burnout, technical barriers, and a decline in direct interpersonal communication. By synthesizing data from the "Concept of Digital Transformation of Education and Science up to 2026," the research provides a balanced view of the current state and prospects for university-level education in Ukraine.

Key Words and Phrases: digital transformation, Artificial Intelligence (AI), extended reality (XR), personalized learning, higher education 2026, Edtech governance, blockchain credentials, digitalization, higher education in Ukraine, distance learning, digital competence, educational continuity, wartime education, academic integrity, blended learning [1; 5].

Introduction

By 2026, the digitalization of higher education has reached an irreversible turning point. What began as an emergency response to the global pandemic has matured into a strategic necessity for institutional survival. Modern universities now operate in an environment where 92% of students utilize AI as their primary research companion. Digitalization is no longer defined by the mere presence of online courses, but by the deep integration of "agentic AI" and immersive environments that redefine the student-teacher relationship [8].

The global shift toward a digital economy has necessitated a fundamental restructuring of higher education institutions (HEIs) in Ukraine. While European trends previously guided this modernization, the onset of full-scale war in 2022 transformed digitalization from a strategic goal into an essential tool for survival. By early 2026, Ukrainian universities have integrated complex digital ecosystems involving cloud technologies, AI-driven personalized learning, and centralized management systems (Fig.1) [11].

Research Problem Statement

Despite the rapid pace of adoption – with 86% of educational organizations using generative AI by early 2025 – institutions face a significant "digital maturity gap". The core problem lies in transitioning from piecemeal technology use to a cohesive digital estate that addresses:

– Infrastructure Sustainability: High costs of upgrading legacy systems to support data-intensive AI and XR.

– Ethical Governance: The urgent need for transparent policies to prevent bias and ensure academic integrity.

– Digital Literacy: The widening skill gap among faculty who must now act as mentors in an AI-powered landscape [13;21].

Despite the rapid adoption of digital tools, the Ukrainian educational sector faces a "digital divide" characterized by uneven infrastructure access, varying levels of digital literacy among staff, and the psychological toll of prolonged remote learning in a crisis environment. There is a critical need to evaluate whether these digital solutions enhance educational quality or merely serve as

temporary substitutes for traditional pedagogy (Fig. 2).

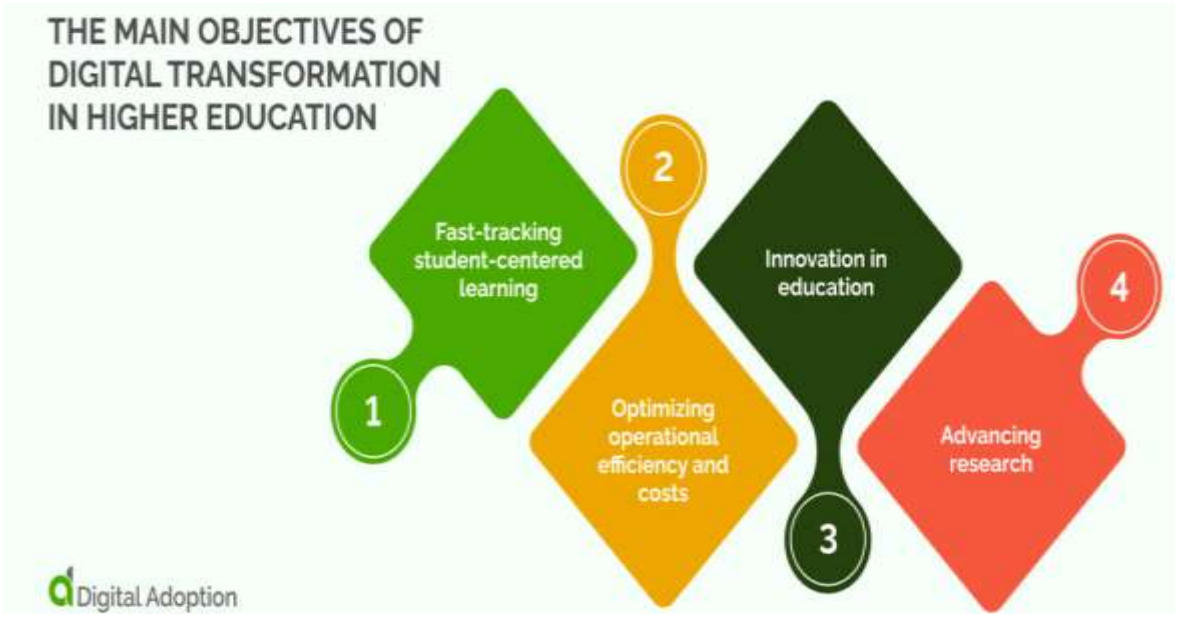

Figure 1. Main Objectives of Digital Transformations in Higher Education

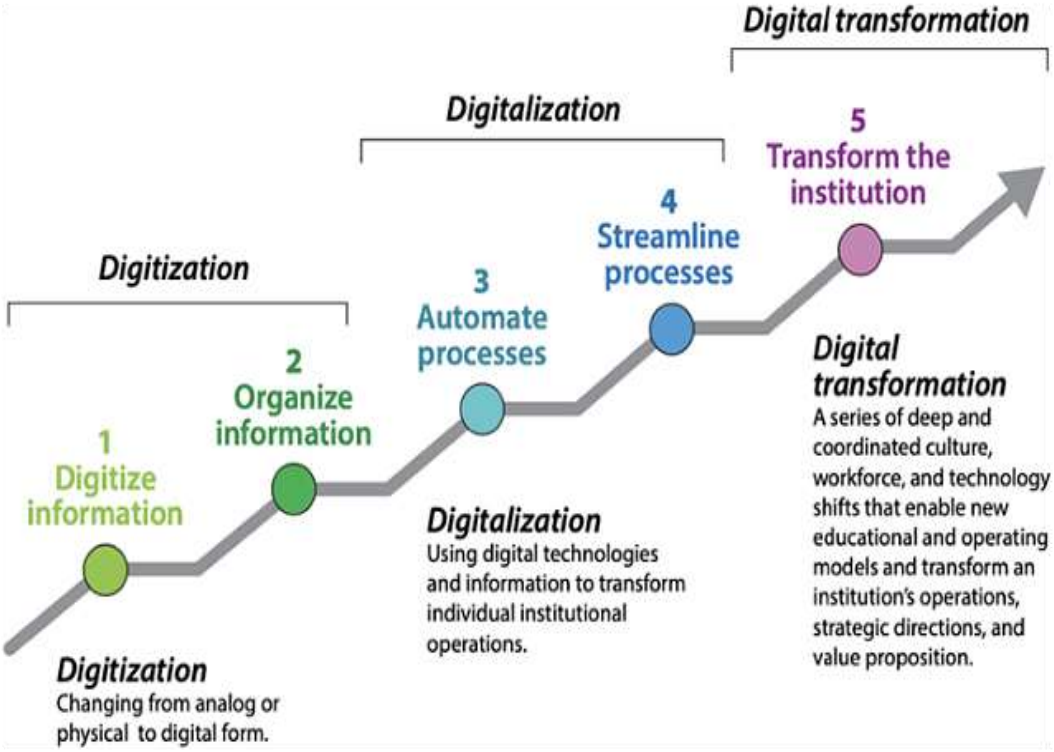

Figure 2. Outcomes of Digitalization at Modern Universities

Literature Analysis

Recent studies emphasize that 2026 represents a shift toward accountability and compliance. Research from the OECD (2026) highlights the move toward "human-centered AI," where technology serves to augment rather than replace human judgment. Key literature identifies "microlearning" and

"nanolearning" (2–5 minute units) as dominant methodologies for modern learners with decreasing attention spans. Furthermore, bibliometric analyses confirm that digital transformation is now the primary factor in shaping a university's global reputation and corporate image [10; 20; 22].

Recent scholarship emphasizes that digitalization in Ukraine has evolved through several distinct phases, from early computerization in the late 20th century to the current era of "hyper-tempo" digital spaces. Researchers like Mushka (2024) highlight the gradual formation of digital skills, while contemporary reports (2025-2026) focus on the resilience of Ukrainian HEIs using platforms like Moodle, Zoom, and Google Classroom. Studies also point to the synergistic relationship between digitalization and European integration, specifically through programs like Erasmus+ [14; 18; 21].

The Purpose of Research

This research aims to identify the dominant technological trends of 2026 and evaluate their efficacy in enhancing educational outcomes and administrative efficiency at modern universities.

The objective of this study is to identify and systematize the positive and negative effects of digitalization on the educational process in Ukrainian universities as of 2026, and to formulate evidence-based recommendations for sustainable digital development.

Research Outcomes

AI-Driven Personalization: 2026 marks the rise of "fully personalized educational paths" where AI tutors provide 24/7 feedback and predictive analytics forecast learning barriers before they occur.

Positive Impacts:

Immersive Learning: XR (Extended Reality) has become a standard element in STEM disciplines, allowing for the visual demonstration of complex concepts that were previously abstract (Fig. 3).

Figure 3. Advantages of Digital Education for Students at Modern Universities

Algorithmic Career Pathways: Degree programs are increasingly being replaced or supplemented by stackable, blockchain-verified credentials that align directly with real-time labor market shifts.

Operational Efficiency: Automated assessment and administrative workflows have freed up to 30% of faculty time, allowing for deeper student-teacher interaction.

Continuity and Resilience: Digitalization enabled universities to function despite infrastructure destruction and displacement [9; 12].

Accessibility and Personalization: Online platforms have democratized access for students in frontline regions and those who have relocated abroad. AI-driven tools now facilitate adaptive learning paths.

Administrative Efficiency: The use of systems like USEDE (Unified State Electronic Database on Education) and the Diia app has streamlined the issuance of over 25 million digital education documents (Fig. 4).

Figure 4. Benefits of Digital Transformations in Higher Education

Negative Impacts:

Psychological and Emotional Load: Both students and teachers report high levels of stress, anxiety, and burnout due to "hyper-tempo" digital interaction and social isolation [15; 19].

Technical and Infrastructural Barriers: Frequent power outages, blackouts, and limited internet access in conflict zones remain primary obstacles.

Communication Deficit: A noticeable decline in oral and social skills has been observed as the teacher's role shifts from a mentor to a technical coordinator (Fig. 5).

Discussions

The transition to a digital-first model has sparked debate regarding Digital Equity. While top-tier universities implement "smart grids" of AI, many institutions struggle with "digital isolation" and unequal access to high-cost immersive tools. Furthermore, the shift toward "algorithmic pathways" raises questions about the traditional role of a four-year degree versus skill-based micro-credentials. Educators must balance the efficiency of AI with the essential need for interpersonal relationships and social presence [3].

The transition to a digital-first model in Ukraine is unique because it occurs under martial law. While European models (e.g., Finland, Estonia) focus on optimization, the Ukrainian experience is centered on "resilience through technology". There is an ongoing debate regarding the "loss of quality" in

practical training, particularly in technical and medical fields where virtual simulations cannot fully replace laboratory experience [16].

The integration of digital technologies into modern education has fundamentally altered the pedagogical landscape as of 2026. This transition offers significant opportunities for personalized learning and administrative efficiency, yet it simultaneously introduces challenges regarding cognitive load, equity, and the erosion of traditional educational relationships.

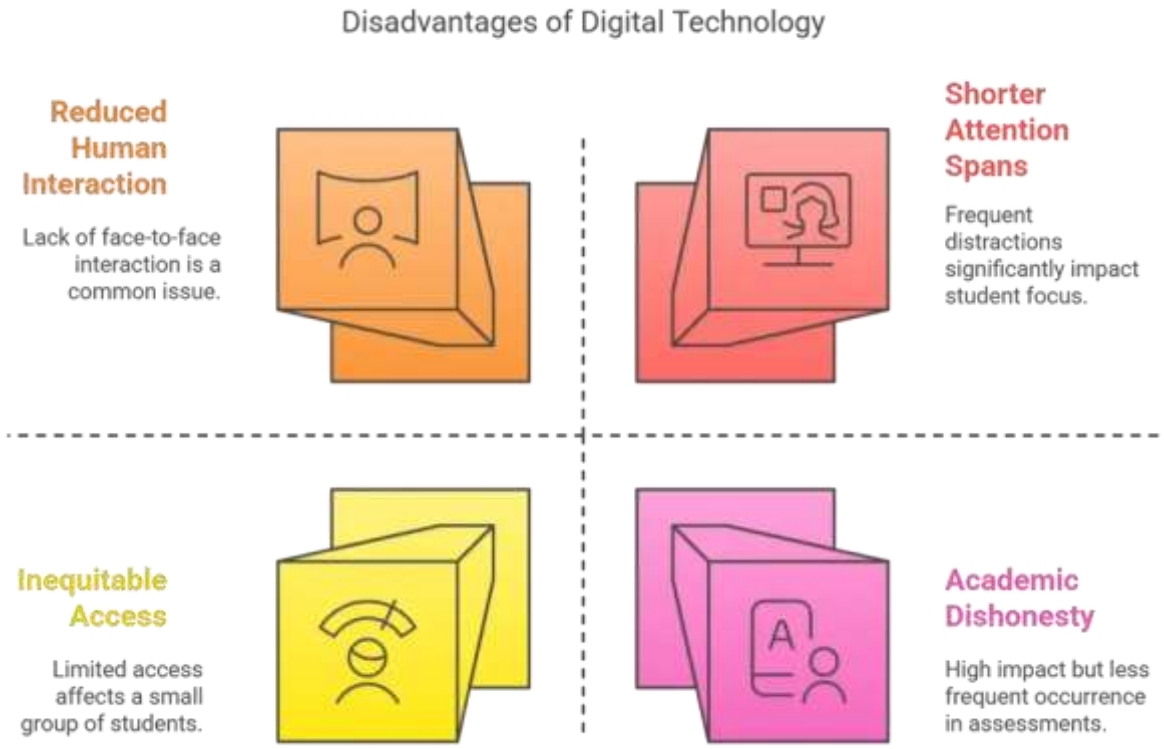

Figure 5. Drawbacks of Digital Education Implementation

1. Positive Impacts on Students

– Digital education fosters high levels of engagement and personalization. Interactive tools – including gamified platforms, extended reality simulations, and AI-driven adaptive learning – cater to diverse learning styles and allow for self-paced progress.

– Accessibility and Flexibility: Online platforms dismantle geographical barriers, enabling students in remote or underserved areas to access high-quality global resources.

– Skill Development: Regular interaction with digital tools equips students with essential digital literacy, a non-negotiable prerequisite for the 2026 workforce.

2. Negative Impacts on Students

The digital shift has introduced significant behavioral and cognitive challenges.

– Distraction and Cognitive Overload: The proximity of non-educational content (social media, gaming) often leads to decreased focus and "information overload," which can diminish deep learning outcomes.

– Social Isolation: A lack of face-to-face interaction can lead to feelings of isolation and a reduction in the development of soft skills like collaboration and empathy.

– Digital Divide: Disparities in access to high-speed internet and modern hardware continue to widen the achievement gap between students from high-income and low-income backgrounds.

3. Positive Impacts on Teachers

For educators, digital transformation serves as a primary tool for mitigating administrative burnout.

– Workload Reduction: AI-powered tools currently assist 69% of teachers in enhancing teaching methods, while 55% report that automated grading and lesson planning

provide more time for direct student interaction.

– Enhanced Instruction: Data-driven learning analytics allow teachers to identify knowledge gaps in real-time, facilitating targeted interventions rather than generalized instruction.

4. Negative Impacts on Teachers

The adoption of technology has simultaneously increased the complexity of the teaching role.

– Erosion of Trust: A notable "fracturing of trust" has emerged in 2026 due to the pervasive use of Generative AI. Teachers often suspect the authenticity of student work, while students increasingly distrust lesson plans they perceive as AI-generated without transparency.

– Increased Professional Demands: Teachers face a steeper learning curve, requiring continuous professional development to master rapidly evolving Learning Management Systems (LMS) and AI tools.

– Physical and Mental Strain: Prolonged screen time and the expectation of 24/7 availability contribute to physical fatigue and increased stress.

Conclusions and Recommendations

Conclusions:

The 2026 academic landscape is defined by "post-pandemic digital maturity". Success is no longer measured by the quantity of digital tools, but by the institutional ability to produce a "living evidence trail" of ethical AI use and data privacy.

As of early 2026, the success of digital education depends less on the technology itself and more on *thoughtful pedagogical alignment.* While digital tools offer unparalleled efficiency and global access, they require robust institutional support to mitigate the risks of social isolation, digital inequality, and the erosion of authentic educator-student relationships (Fig. 6).

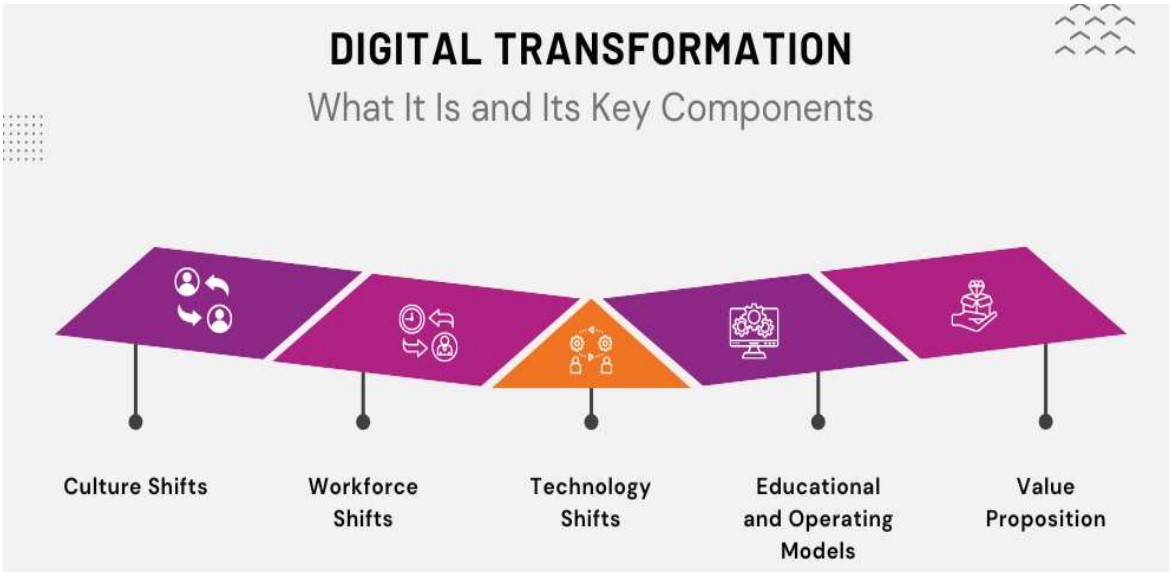

Figure 6. Key Components of Digital Transformation at Universities

Digitalization has successfully preserved the Ukrainian higher education system during unprecedented crises. However, for long-term sustainability, the focus must shift from "emergency remote teaching" to a scientifically grounded "blended learning" model [2].

Recommendations:

Prioritize AI Governance: Universities must establish clear ownership of AI decisions to mitigate risks related to accreditation and funding.

Invest in Faculty Development: Shift training from basic technical skills to advanced "AI pedagogy," focusing on how to mentor students in an AI-saturated world.

Adopt Hybrid Sustainability Frameworks: Implement flexible, blended learning models that combine the best of in-

person interaction with the accessibility of digital platforms [21; 23].

Close the Equity Gap: Use federal or institutional grants to ensure all students have access to the hardware and connectivity required for immersive and AI-driven education (Figure 7).

Figure 7. Challenges and Opportunities from Integrating Digital Education at Modern Universities

Enhance Digital Literacy: Implement mandatory professional development for faculty focusing on interactive content creation and cyber-hygiene.

Infrastructure Hardening: Prioritize the distribution of equipment and high-speed internet to frontline universities and "Build Back Better" initiatives [1; 5; 9].

Hybrid Pedagogical Models: Encourage the integration of offline "socialization hubs" to mitigate the psychological impact of isolation while maintaining digital flexibility.

Standardization: Develop unified national standards for digital management strategies to ensure seamless academic mobility and quality assurance.

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