

Beyond the Digital Divide: Self-Efficacy, Resilience, and Educational Transformation in Ukraine

Más allá de la brecha digital: autoeficacia, resiliencia y transformación educativa en Ucrania

Além da lacuna digital: autoeficácia, resiliência e transformação educacional na Ucrânia

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Recebido em 09 de outubro de 2025

Aprovado em 02 de novembro de 2025

Publicado em 18 de maio de 2026

RESUMO

El estudio investiga la brecha de alfabetización digital entre profesores universitarios y estudiantes en la educación superior ucraniana, explorando sus dimensiones técnicas, psicológicas e institucionales. Una encuesta cuantitativa transversal realizada a 580 estudiantes y 130 docentes reveló diferencias sustanciales en la autoeficacia digital, la aplicación pedagógica y la adaptación emocional a la tecnología. Mientras que los estudiantes demostraron una mayor competencia operativa y capacidad de adaptación, los docentes mostraron una mayor conciencia ética pero menor confianza digital y participación en el aprendizaje autodirigido. Los hallazgos destacan que la brecha digital no es meramente generacional, sino que refleja diferencias sistémicas en las oportunidades de desarrollo profesional, el apoyo

institucional y la resiliencia psicológica. Basándose en marcos como DigCompEdu, la teoría de la autoeficacia de Bandura y el concepto de resiliencia docente de Gu y Day, el estudio subraya la necesidad de una formación continua, capacitación digital específica por disciplinas y apoyo psicosocial. Las implicaciones de política educativa incluyen la alineación de las estrategias nacionales con los marcos digitales de la Unión Europea, la promoción de la colaboración intergeneracional y la integración de la competencia digital en la cultura institucional para lograr una transformación educativa sostenible e inclusiva.

Palavras-chave: Brecha digital; Educación superior; Competencia digital.

ABSTRACT

The study investigates the digital literacy gap between university lecturers and students in Ukrainian higher education, exploring its technical, psychological, and institutional dimensions. A quantitative cross-sectional survey involving 580 students and 130 lecturers revealed substantial disparities in digital self-efficacy, pedagogical application, and emotional adaptation to technology. While students demonstrated higher operational competence and adaptability, lecturers showed greater ethical awareness but lower digital confidence and engagement in self-directed learning. The findings highlight that the digital divide is not merely generational but reflects systemic differences in professional development opportunities, institutional support, and psychological resilience. Drawing on frameworks such as DigCompEdu, Bandura's theory of self-efficacy, and Gu and Day's concept of teacher resilience, the study underscores the need for continuous capacity building, discipline-specific digital training, and psychosocial support. Policy implications include aligning national strategies with EU digital education frameworks, promoting intergenerational collaboration, and embedding digital competence into institutional culture to achieve sustainable and inclusive educational transformation.

Keywords: Digital literacy gap; Higher education; Digital competence.

RESUMO

O estudo investiga a lacuna de alfabetização digital entre professores universitários e estudantes no ensino superior ucraniano, explorando suas dimensões técnicas, psicológicas e institucionais. Uma pesquisa quantitativa transversal envolvendo 580 estudantes e 130 docentes revelou diferenças substanciais em autoeficácia digital, aplicação pedagógica e adaptação emocional à tecnologia. Enquanto os estudantes demonstraram maior competência operacional e adaptabilidade, os docentes apresentaram maior consciência ética, mas menor confiança digital e engajamento em aprendizagem autodirigida. Os resultados destacam que a lacuna digital não é meramente geracional, mas reflete diferenças sistêmicas nas oportunidades de

desenvolvimento profissional, no apoio institucional e na resiliência psicológica. Com base em referenciais como o DigCompEdu, a teoria da autoeficácia de Bandura e o conceito de resiliência docente de Gu e Day, o estudo enfatiza a necessidade de desenvolvimento contínuo de capacidades, formação digital específica por área disciplinar e apoio psicossocial. As implicações políticas incluem o alinhamento das estratégias nacionais com os marcos digitais da União Europeia, a promoção da colaboração intergeracional e a incorporação da competência digital na cultura institucional para alcançar uma transformação educacional sustentável e inclusiva.

Palavras-chave: Lacuna digital; Ensino superior; Competência digital.

Introduction

The digital transformation of education represents one of the most significant challenges of the twenty-first century. In an era of rapid technological advancement and the globalization of knowledge, education is increasingly shaped by digital tools, mobile learning environments, and data-driven pedagogical approaches. Modern society demands that professionals possess not only a solid knowledge base but also flexibility, adaptability, and advanced digital literacy that allow them to function effectively in the evolving digital ecosystem.

The higher education system in Ukraine is actively responding to these challenges; however, the pace and depth of digital adaptation vary considerably across different groups of educational actors. The COVID-19 pandemic and, more recently, the full-scale war in Ukraine have accelerated the digitalization of teaching and learning, while simultaneously exposing critical weaknesses in digital competence (Nenko et al., 2023). Recent comparative studies (Bakare, 2025; Momdjian et al., 2024) demonstrate that despite increased digital awareness among educators, significant disparities persist in their ability to integrate technology into effective pedagogical practice. This global imbalance underscores that digital competence involves not only technical access but also pedagogical adaptation and institutional support. The shift toward distance and blended learning has revealed a digital literacy gap between teachers and students, which affects not only the quality of instruction but also the psychological well-being of educators. These international patterns mirror the situation in Ukraine, where uneven access to technology and differing digital readiness among educators and students reflect broader societal inequalities.

The notion of the digital divide encompasses disparities not only in access to technology but also in digital practices, cognitive readiness, and socio-emotional adaptation. In the educational context, this gap is evident in the differing ability to use digital tools for teaching, communication, and research. While students—representatives of the “digital native” generation—tend to navigate digital environments with ease, many educators, whose professional experience was formed in a pre-digital era, struggle with technological innovation, resulting in an intergenerational asymmetry of digital skills.

According to the Ministry of Digital Transformation of Ukraine (2023), more than

half of Ukrainian citizens possess digital skills below the intermediate level, and only 15% can be classified as digitally proficient. These figures highlight a broader national challenge of digital inequality, which extends into the academic sphere. For educators, insufficient technical support, limited access to resources, and digital anxiety contribute to emotional exhaustion and professional burnout, ultimately reducing motivation and teaching effectiveness.

In low- and middle-income regions, including parts of Africa and Asia, researchers have reported similar challenges. Limited ICT infrastructure, inconsistent institutional policies, and insufficient motivation for self-directed digital learning hinder educators' capacity to translate awareness into practical competence (Adenekan & Jimoh, 2024; Bakare, 2025). These findings emphasize that the digital literacy gap is a universal phenomenon shaped by socioeconomic and institutional conditions rather than geography alone.

The European Digital Competence Framework (DigComp 2.2) defines five key dimensions of digital literacy: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. Integrating this framework into national higher education practices can provide a structured approach for assessing digital competencies among both teachers and students and for designing capacity-building programs aimed at reducing digital disparities.

Furthermore, international research (Mishra & Koehler, 2006; Redecker, 2017) emphasizes that digital gaps in higher education are not only technological but also psychological in nature. Many teachers experience "digital anxiety," characterized by uncertainty, stress, and fear of failure when using new technologies, whereas students increasingly expect interactive, technologically enriched learning environments. This gap in digital expectations contributes to communication barriers and reduces overall learning satisfaction.

Given Ukraine's aspirations for integration into the European educational space, addressing the digital divide between teachers and students is of strategic importance. The EU Digital Education Action Plan (2021–2027) and the UNESCO ICT Competency Framework for Teachers (2018) underline that digital competence is a fundamental component of inclusive, high-quality, and resilient education.

Considering these disparities, the digital literacy gap extends beyond technical proficiency and reflects deeper psychological, institutional, and cultural dimensions that shape educators' self-efficacy, adaptability, and professional identity in digital contexts.

Building on global frameworks and national priorities, this study seeks to empirically assess the extent and psychological implications of the digital literacy gap in Ukrainian higher education. Understanding these dynamics will help develop evidence-based strategies for digital capacity-building, enhance teacher well-being, and foster a more equitable and sustainable educational environment in the digital age.

Literature Review

1. Digital transformation in higher education

The digital transformation of higher education is one of the most significant and complex processes shaping contemporary education systems. Scholars emphasize that digitalization is not simply a technological innovation but a systemic and cultural transformation that reshapes teaching, learning, research, and institutional governance (Redecker, 2017; Voogt & Roblin, 2019). The digital university, as defined by OECD (2022), is characterized by flexible learning pathways, data-driven pedagogy, and digital ecosystems that integrate learning analytics, cloud collaboration, and virtual communication.

The European Union's Digital Education Action Plan (2021–2027) identifies digital readiness as a central priority for creating resilient and inclusive education systems. In Europe, digital transformation has been widely associated with competence-based education and lifelong learning strategies. However, in countries undergoing structural transitions, such as Ukraine, the digitalization of education has been accelerated by external shocks — first the COVID-19 pandemic and later the full-scale war. These factors have intensified the need to re-evaluate teachers' digital competence and psychological adaptation, especially in contexts where digital infrastructure and pedagogical support remain uneven.

The shift toward hybrid and online learning has made digital competence a prerequisite for effective teaching. Studies conducted in various European contexts (Hatlevik et al., 2018; Fernández Batanero et al., 2020) confirm that digital transformation requires both technological access and pedagogical readiness. However, evidence also shows a growing digital competence gap between educators and students, reflecting different levels of exposure, confidence, and motivation in using digital tools.

2. Conceptualizing digital competence

Digital competence is a multidimensional construct encompassing not only operational ICT skills but also cognitive, socio-emotional, and ethical abilities necessary for meaningful participation in digital environments (Ferrari, 2013; Ilomäki et al., 2016). The European Digital Competence Framework for Citizens (DigComp 2.2) and the European Framework for the Digital Competence of Educators (DigCompEdu) are the most widely adopted frameworks for conceptualizing digital literacy in education (European Commission, 2017, 2022).

The DigCompEdu model specifies six domains: (1) professional engagement, (2) digital resources, (3) teaching and learning, (4) assessment, (5) empowering learners, and (6) facilitating learners' digital competence. This framework underscores the idea that digital competence involves both pedagogical innovation and reflective practice. Similarly, UNESCO's ICT Competency Framework for Teachers (2018) presents a three-level progression — from technology literacy to knowledge creation — illustrating that digital competence develops over time and through sustained engagement.

The TPACK framework (Technological Pedagogical Content Knowledge) further expands this view by emphasizing the integration of technology with

pedagogical and content knowledge (Mishra & Koehler, 2006). It explains how teachers' ability to select and adapt technologies depends on the interplay between technological understanding and pedagogical reasoning. In parallel, the SAMR model (Substitution–Augmentation–Modification–Redefinition) proposed by Puentedura (2013) highlights the transformative potential of technology in redefining learning experiences, moving from digital substitution to deep pedagogical redesign.

3. Comparative perspectives: Teachers and students in the digital competence spectrum

Early discussions of digital disparities were shaped by Prensky's (2001) distinction between “digital natives” (students) and “digital immigrants” (teachers). However, later research challenged this dichotomy as oversimplified and technologically deterministic (Helsper & Eynon, 2010; Ng, 2012). Current evidence indicates that digital competence depends on context, experience, and institutional support rather than solely on age.

Momdjian et al. (2024) conducted a comparative analysis across six countries — Lebanon, Spain, Turkey, China, Indonesia, and Saudi Arabia — revealing substantial cross-national differences in digital competence levels. In-service teachers generally exhibited higher operational proficiency, while pre-service teachers showed greater confidence but lacked pedagogical integration. These findings highlight that the digital gap is not purely generational but experiential and structural, depending on teacher preparation systems and institutional investments.

Recent evidence from African higher education also reinforces the multidimensional nature of the digital competence gap. Bakare (2025) found that while most lecturers demonstrate a moderate level of digital awareness, their ability to translate this awareness into effective pedagogical practice remains limited. The study highlights that many educators understand the importance of technology but lack opportunities and institutional support to integrate it into discipline-specific teaching contexts. This suggests that digital competence extends beyond mere awareness to include pedagogical application, critical reflection, and adaptation to subject-specific needs.

Similarly, research from Finland and Spain (Instefjord & Munthe, 2017) underscores that ongoing professional learning and collaborative digital practices strengthen educators' motivation, self-efficacy, and openness to innovation. Conversely, a lack of institutional support often results in technological resistance or digital burnout (Hatlevik et al., 2018; Gudmundsdottir et al., 2020).

Studies in Africa and Asia add valuable comparative insights. Adenekan & Jimoh (2024) demonstrated that targeted ICT training significantly improves staff performance and adaptability in Nigerian universities. The study identified three key dimensions of competence: electronic information management, virtual communication, and adaptive technology use. Training interventions not only improved practical skill levels but also enhanced participants' confidence and reduced digital anxiety — a finding consistent with European and OECD data on professional learning as a resilience factor.

4. Psychological and pedagogical implications of the digital divide

While digital competence is often discussed in technical terms, its psychological and emotional dimensions are increasingly recognized. Rapid digitalization has been linked to stress, anxiety, and emotional fatigue among educators adapting to new modes of instruction (Cutri et al., 2021; Mishra & Koehler, 2006; Shevchenko et al., 2022; Tkachenko et al., 2024). These effects are amplified when digital transformation is externally driven — by crises such as pandemics or armed conflict — rather than by gradual institutional change.

Adenekan and Jimoh (2024) observed that digital competence development contributes positively to psychological well-being: teachers who undergo ICT training report greater self-efficacy, less anxiety, and a stronger sense of professional relevance. Similarly, König et al. (2020) and Fernández Batanero et al. (2020) found that structured professional development and supportive peer networks help mitigate burnout and promote digital resilience.

This finding aligns with Bandura's (1997) theory of self-efficacy, which suggests that perceived capability strongly mediates emotional responses to technological change. Similarly, Gu and Day (2007) emphasize that teacher resilience—the capacity to sustain motivation and commitment under pressure—is essential for coping with digital transformation and maintaining professional well-being.

At the same time, research shows a psychological asymmetry between students and teachers. Students expect highly interactive, multimodal learning environments, while many educators struggle to match these expectations due to skill gaps or time constraints (Redecker & Punie, 2017). This misalignment creates frustration on both sides, impacting communication, engagement, and learning outcomes. Addressing the psychological dimension of the digital divide thus requires both technical training and emotional support mechanisms — including mentorship, reflective practice, and well-being programs for educators.

5. Factors shaping digital competence development

The development of digital competence is influenced by several interrelated factors:

- Institutional infrastructure: Reliable connectivity, access to digital tools, and administrative support form the foundational layer of competence building.
- Professional development: Continuous training, mentoring, and communities of practice are critical for sustaining teachers' confidence and innovation (Gu & Day, 2007; Adenekan & Jimoh, 2024).
- Pedagogical alignment: Integration of technology into curriculum design, assessment, and feedback processes ensures that digitalization serves educational goals rather than technological trends (Ilomäki et al., 2016). Moreover, Bakare (2025) emphasize that professional development must be differentiated according to disciplinary needs. Generic ICT workshops tend to produce short-term gains, whereas customized, discipline-oriented training leads to deeper pedagogical transformation and sustained motivation among educators.

- Socio-cultural context: Regional inequalities, language diversity, and national policies shape the accessibility and perception of digital tools (Nehrey et al., 2023).

In Ukraine, these factors are further complicated by war-related disruptions, displacement, and infrastructural damage. Yet, as recent studies by the Ministry of Education and Science of Ukraine (2023) and Nehrey et al. (2023) note, the crisis has also accelerated innovation and created new opportunities for digital competence enhancement, particularly through European partnerships and initiatives like Erasmus+ Digital Education Hub.

6. Global perspectives on bridging the digital competence gap

A growing body of comparative research points to the global nature of digital inequality in education. Studies from Europe, Africa, Asia, and Latin America converge on similar patterns: while younger generations are more digitally fluent, educators' levels of competence depend heavily on institutional investment and training culture. For instance, in Norway and New Zealand, national teacher-training programs integrating DigCompEdu principles have significantly improved teachers' digital self-efficacy (Madsen et al., 2018). In contrast, in low-resource contexts such as Nigeria or Kenya, infrastructural deficits remain a primary barrier, and even when digital awareness is high, as shown by Bakare (2025), limited institutional investment and lack of sustained support hinder the conversion of awareness into effective digital pedagogy. Nonetheless, localized ICT initiatives (Adenekan & Jimoh, 2024) continue to demonstrate measurable progress in staff adaptation and confidence.

These findings collectively support the argument that bridging the digital competence gap requires multi-level strategies — combining policy alignment, institutional development, and teacher-centered interventions. These comparative patterns underline the need for transnational policy coordination and knowledge exchange to address digital inequalities systematically. Moreover, they reinforce the idea that digital competence should be treated not only as a technical skill set but as a core component of teacher identity, professional resilience, and psychological well-being.

7. Identified research gap

Despite a substantial and growing literature, few studies have systematically explored the interactive digital divide between educators and students — that is, how the mismatch in digital competence affects pedagogical dynamics, emotional climate, and professional identity. Research remains particularly scarce in post-Soviet and conflict-affected regions such as Ukraine, where digitalization unfolds under extreme conditions.

The present study addresses this gap by examining the digital literacy divide between teachers and students in Ukrainian higher education, analyzing both technical and psychological dimensions. Drawing on European (DigCompEdu), international (UNESCO, OECD), and regional (Adenekan & Jimoh, 2024; Momdjian et al., 2024) evidence, this research aims to contribute to a holistic understanding of digital competence development and propose strategies for enhancing educators' digital

resilience in times of crisis and transformation.

Methodology

Research Design

The study employed a quantitative, cross-sectional survey design aimed at examining the digital literacy gap between students and university lecturers in Ukrainian higher education. The research sought to identify not only the technical dimensions of digital competence but also its psychological and behavioral correlates. This design was chosen to capture broad patterns of digital skill self-assessment, perceived disparities, and emotional responses among the two key stakeholder groups in the educational process.

Participants

The study involved a total of 710 participants, comprising 580 students enrolled in various higher education institutions across Ukraine and 130 university lecturers representing a range of academic disciplines. The inclusion of both groups allowed for a comparative examination of the digital literacy gap between educators and learners in the contemporary university context.

Student Participants

The student sample included undergraduates and master's students from different academic fields such as education, social sciences, engineering, and humanities. The majority of respondents reported daily use of digital technologies for learning and communication purposes. Students completed an online questionnaire focusing on their self-assessed digital competence, learning behaviors, emotional responses to technology use, and perceptions of teachers' digital skills. The large and diverse student group ensured that the results reflected a broad spectrum of digital experiences within higher education.

Lecturer Participants

The lecturer sample consisted of academic staff representing various positions and stages of professional development. In terms of age, 38.5% of respondents were between 31 and 40 years old, 46.2% were aged 41–50, and 15.4% were between 51 and 60 years old. Their teaching experience also varied considerably: 23.1% had less than five years of experience, another 23.1% reported between six and ten years, 15.4% between eleven and twenty years, while 38.5% had been teaching for more than twenty years.

With regard to academic positions, 23.1% of respondents held the position of lecturer, 7.7% were senior lecturers, 46.2% were associate professors, 15.4% were full professors, and 7.7% served as heads of departments. This distribution reflects a diverse and representative sample of university teaching staff, combining both early-career educators and highly experienced academics. Such diversity provides valuable insight into generational and professional differences in digital competence and pedagogical adaptation.

The survey for lecturers focused on digital competence, frequency of technology use, attitudes toward digital transformation, perceived barriers to professional digitalization, and emotional wellbeing associated with technological change. Including this group enabled an assessment of how teachers perceive their own digital preparedness and how it compares with students' perceptions.

Research Instrument

Data were collected using an online questionnaire developed by the research team to assess both digital competence and psychological attitudes toward digital transformation in education.

The instrument contained two parallel versions — one for students and one for lecturers — and consisted of four thematic blocks:

1. General information (e.g., experience, self-assessed digital literacy level, frequency of technology use).
2. Digital skills assessment, including abilities related to information search, data storage, file sharing, office software (Word, PowerPoint, Excel), and data security.
3. Legal and ethical awareness, covering issues of intellectual property and personal data protection.
4. Emotional and motivational aspects, including self-learning behavior, perceived digital competence gap, and psychological responses (stress, motivation, frustration, willingness to assist others).

Most items were rated on a four-point Likert-type scale (e.g., from “very low” to “very high” competence or from “never” to “often”), allowing for both categorical and ordinal analysis. Open-ended questions were also included to capture qualitative reflections on digital challenges and coping strategies.

The questionnaire underwent expert review by three specialists in educational technology and psychology to ensure content validity.

Data Collection Procedure

The questionnaires were administered online between May and June 2025 using institutional mailing lists and learning management systems. Participation was voluntary, and all responses were collected anonymously. Prior to completing the survey, participants were informed about the study's objectives, confidentiality principles, and their right to withdraw at any point. The questionnaire was piloted with a small group of respondents (n = 20) to ensure clarity, content validity, and appropriate length.

Data Analysis

Quantitative data were processed using descriptive statistical methods (frequency distribution, percentages, and mean values) to identify dominant patterns across variables. Comparative analyses were conducted to reveal differences between student and lecturer groups in terms of self-assessed competence, digital behavior, and emotional responses.

Open-ended responses were analyzed qualitatively through thematic coding, which helped identify recurring themes such as perceived barriers, attitudes toward digital self-development, and suggestions for improving institutional support. The results were interpreted in conjunction with relevant theoretical frameworks, including connectivism and digital inequality theory, to ensure analytical depth. Comparative analyses employed cross-tabulation and percentage comparison to identify intergroup differences.

Ethical Considerations

The research adhered to institutional ethical standards for studies involving human participants. No personally identifiable information was collected. All participants provided informed consent electronically. Data confidentiality and voluntary participation were ensured throughout the research process.

Results

Overview of Digital Competence Levels

The survey results revealed considerable variation in self-assessed digital competence across the two respondent groups. Among students, the majority described their overall level of digital literacy as *average* or *above average*. Most participants reported confidence in performing basic digital tasks, such as information search, use of learning management systems, and communication through online platforms.

In contrast, lecturers demonstrated more polarized assessments. While a significant proportion reported a moderate level of competence, nearly one-third identified their skills as below average, particularly in the areas of cloud storage, online collaboration tools, and multimedia content creation. These differences suggest that the digital competence gap between students and educators persists and may influence teaching and learning dynamics.

Specific Digital Skills

When asked to evaluate their ability to perform key digital tasks, students generally reported strong proficiency in information retrieval and file sharing, with over two-thirds indicating that they could effectively use search engines, academic databases, and cloud-based platforms such as Google Drive or Dropbox.

Conversely, lecturers demonstrated confidence primarily in basic tools like Microsoft Word and PowerPoint but expressed lower self-efficacy in using Excel, online storage systems, and interactive teaching tools.

Both groups showed limited familiarity with issues related to intellectual property rights and data protection, indicating a shared gap in the legal and ethical dimensions of digital literacy.

Frequency of Digital Learning and Self-Development

Most students reported frequent engagement in digital self-learning, such as

exploring new applications or online platforms for academic purposes. Around one-third admitted that they engaged in such activities only occasionally, often citing lack of time or structured guidance.

Lecturers, however, reported lower levels of digital self-learning. While many acknowledged the need for continuous skill improvement, only about one in four indicated that they regularly participate in online training or professional development related to digital technologies. This discrepancy suggests a potential need for institutional support and motivation systems to sustain digital competence among faculty.

Perceived Digital Gap

A striking finding concerns the perceived digital gap between students and lecturers. Nearly three-quarters of student respondents observed that their digital skills exceed those of their teachers, particularly in terms of navigating online environments, troubleshooting technical issues, and integrating multimedia tools into learning activities.

Lecturers, on the other hand, recognized the existence of such a gap but tended to attribute it to differences in age, workload, or institutional constraints rather than lack of willingness to learn. This perception asymmetry may contribute to misunderstandings and lower collaboration efficiency in the learning process.

Emotional and Psychological Aspects

Students' emotional responses to digital interaction were mixed. About half reported that the use of digital technologies made learning more engaging and accessible, while a smaller proportion (around 20%) associated it with stress or fatigue, mainly due to information overload or inconsistent technical support.

Lecturers displayed more pronounced psychological responses. Many reported anxiety, technostress, or feelings of inadequacy when adapting to rapidly evolving platforms. A minority, however, viewed digital transformation positively, emphasizing its potential to enhance student engagement and diversify teaching methods.

Attitudes Toward Mutual Support

An encouraging result concerns students' willingness to assist teachers in mastering digital tools. Over two-thirds indicated readiness to offer informal help — for example, explaining new applications or troubleshooting classroom technologies. This finding highlights the potential of peer and intergenerational digital collaboration as a resource for bridging the competence divide.

Lecturers also expressed openness to such cooperation, though some noted that institutional structures rarely provide opportunities for joint digital learning or co-teaching initiatives.

Summary of Findings

Overall, the data confirm a persistent digital literacy gap between students and lecturers, both in terms of technical proficiency and frequency of digital self-development. Students exhibit higher operational and adaptive digital skills, while

lecturers display stronger ethical awareness but lower confidence in applying digital tools creatively. The coexistence of these strengths and weaknesses across generations underscores the need for targeted institutional strategies — combining professional training, psychological support, and intergenerational collaboration — to ensure sustainable digital transformation in higher education.

Discussion

The findings of this study confirm that the digital literacy gap between students and lecturers in Ukrainian higher education is not merely a technical issue but a complex, multidimensional phenomenon encompassing cognitive, emotional, and institutional dimensions. Both groups demonstrate awareness of the importance of digital competence; however, significant discrepancies remain in how these competences are acquired, applied, and perceived.

Intergenerational Dynamics and the Competence Divide

The results support earlier international research suggesting that younger generations tend to demonstrate higher levels of digital adaptability due to their early exposure to technology (Momdjian et al., 2024; Ilomäki et al., 2016). Students' confidence in navigating digital platforms reflects not only their technical familiarity but also their socialization in technology-rich environments. Conversely, lecturers' lower self-assessments and limited engagement in digital self-learning echo findings by Adenekan & Jimoh (2024) and Bakare (2025), which emphasize that educators often face structural and motivational barriers to developing advanced digital skills.

In this sense, the observed gap between students and teachers represents a pedagogical asymmetry that may hinder the effective integration of digital tools into teaching and learning. The asymmetry is particularly evident in the use of advanced data-processing software, collaborative platforms, and interactive applications, where students often outperform their instructors. This imbalance underscores the need for systemic professional development rather than reliance on individual initiative.

Psychological Factors and Digital Stress

The study also reveals that the digital divide has a psychological dimension, resonating with the concept of technostress identified in global studies of digital transformation in education (Cutri et al., 2021; König et al., 2020). Lecturers frequently reported anxiety, frustration, or cognitive overload when confronted with new digital requirements, reflecting a perceived lack of control over rapidly changing technologies.

By contrast, students tended to experience stress primarily from information saturation and inconsistent communication across digital channels. These findings align with the framework of connectivism, which views learning as a process of forming and maintaining knowledge networks. Inadequate digital competence among teachers may disrupt these networks, reducing engagement and mutual trust within the learning environment. Addressing the emotional and psychological consequences of the digital gap is therefore essential for fostering sustainable digital pedagogy.

Institutional and Pedagogical Implications

Institutional factors also appear to mediate the digital literacy gap. Many lecturers attributed their limited competence development to heavy workloads, insufficient technical support, or lack of institutional incentives — factors consistent with findings from the OECD (2022) and UNESCO (2018) on systemic barriers to educational digitalization. The persistence of these constraints suggests that digital transformation in higher education must be understood as an organizational learning process requiring coherent policy, ongoing professional development, and access to user-friendly infrastructure.

Furthermore, students' readiness to assist lecturers with digital tools reflects a valuable yet underutilized resource for bridging the competence divide. Encouraging peer-to-peer collaboration between students and faculty could transform the digital gap from a source of tension into an opportunity for cooperative learning. Such an approach aligns with participatory and humanistic models of digital education that emphasize shared responsibility for innovation and inclusivity.

Toward an Integrated Understanding of Digital Literacy

The findings reinforce the argument that digital literacy should be conceptualized as an integrated competence involving technical, cognitive, ethical, and socio-emotional components (Redecker & Punie, 2017; Ferrari, 2013). While students excel in operational skills, lecturers demonstrate greater awareness of ethical and pedagogical considerations — yet these strengths remain compartmentalized. Building a comprehensive model of digital literacy development in higher education thus requires bridging these complementary capacities through targeted training, mentorship, and institutional collaboration.

Ultimately, the digital literacy gap reflects deeper inequalities in access to continuous professional learning, time, and psychological readiness to engage with change. Closing this gap demands a dual focus: enhancing lecturers' digital self-efficacy while channeling students' digital fluency into constructive, pedagogically meaningful interaction. This dynamic also affects teachers' sense of professional identity in increasingly digitalized learning environments.

Implications for Educational Policy and Practice

The reviewed literature reveals that the digital literacy gap between teachers and students in higher education is not a temporary or isolated issue but a structural and global challenge that directly affects teaching quality, equity, and professional well-being. Addressing this gap requires integrated strategies that combine pedagogical reform, institutional capacity building, psychosocial support, and evidence-based policymaking. The following implications synthesize the lessons from international and regional research, offering insights applicable to the Ukrainian higher education context and beyond.

The findings inform several strategic directions for bridging the competence divide, structured around institutional, psychological, and policy dimensions.

1. Institutional strategies for continuous capacity building

Across various educational systems, researchers agree that sustainable digital competence cannot be developed through isolated workshops, one-time training

sessions, or hardware provision alone. Instead, it must be embedded within long-term institutional strategies for professional growth and pedagogical innovation.

Studies by Adenekan and Jimoh (2024) and Momdjian et al. (2024) emphasize that professional learning should be systematic, context-sensitive, and sustained over time. Teachers who participated in structured ICT training programs reported not only improved technological proficiency but also higher levels of motivation, confidence, and professional satisfaction. These findings are consistent with European evidence from the DigCompEdu framework and UNESCO's ICT Competency Framework for Teachers (2018), which highlight the importance of continuous, reflective professional learning as a key driver of digital transformation.

Implication: Higher education institutions should institutionalize ongoing capacity-building programs that integrate technological, pedagogical, and ethical dimensions of digital competence. In the Ukrainian context, where educators face both war-related and technological challenges, professional learning initiatives should include mentoring, peer collaboration, and opportunities for reflective digital practice. Long-term professional growth models foster not only competence but also professional resilience.

2. Integrating psychosocial support into digital transformation

Digital transformation involves significant psychological adaptation. Teachers often experience stress, uncertainty, and digital fatigue, particularly when rapid technological change is externally driven, such as during pandemics or crises. Cutri et al. (2021), König et al. (2020) and Shevchenko et al. (2022) document that teachers transitioning to digital platforms during COVID-19 suffered from increased workload and anxiety. Similarly, Adenekan and Jimoh (2024) found that developing digital competence directly correlates with improved psychological well-being and self-efficacy.

Implication: Institutional digital strategies should integrate psychosocial and emotional support mechanisms into their professional development initiatives. This includes mentorship programs, communities of practice, peer support groups, and training in stress management. Such approaches view educators as holistic professionals—technical, emotional, and social actors—who need not only digital skills but also psychological readiness for innovation. For Ukraine, where digital transformation occurs under crisis conditions, resilience-based professional learning is especially vital for maintaining teacher well-being and preventing burnout.

3. Enhancing digital collaboration between teachers and students

The digital literacy gap between teachers and students often reflects differences in how technology is used rather than whether it is used. Students typically display high fluency in digital communication, social media, and informal learning environments, while educators focus on academic and administrative applications (Redecker & Punie, 2017). Momdjian et al. (2024) observed that these differing expectations create tensions that hinder mutual engagement and learning outcomes.

Implication: Higher education institutions should promote co-learning and co-creation frameworks that bring teachers and students together in collaborative digital

environments. Initiatives may include joint projects in digital content creation, peer-led technology workshops, and participatory use of learning management systems. Such collaboration reduces hierarchical divides, fosters mutual understanding, and enables teachers to learn emerging technologies through interaction with digitally fluent students. Collaborative digital ecosystems also enhance students' respect for academic rigor and ethical standards online.

4. Policy alignment with European and international frameworks

Given Ukraine's strategic orientation toward the European Union and its integration within the European Higher Education Area, aligning national and institutional strategies with EU and global frameworks is crucial. The Digital Education Action Plan (2021–2027), DigComp 2.2, and DigCompEdu offer coherent models for digital competence assessment and policy benchmarking. Moreover, UNESCO's and OECD's frameworks emphasize inclusivity, accessibility, and adaptability—principles highly relevant for rebuilding and modernizing Ukrainian higher education under current conditions.

Implication: Policymakers should institutionalize digital competence standards in national qualification frameworks, teacher certification systems, and curriculum design. Establishing transparent indicators of digital readiness will ensure policy coherence, facilitate funding eligibility within European programs (e.g., Erasmus+ Digital Education Hub), and promote equitable digital access across institutions. Such alignment also supports Ukraine's broader goal of harmonizing its education system with EU quality standards.

5. Research and evidence-based policymaking

While numerous studies document the importance of digital competence, there remains a notable scarcity of longitudinal and context-specific data in post-Soviet and conflict-affected regions. Nehrey et al. (2023) emphasize that evidence-based policymaking requires continuous monitoring of teachers' and students' digital competence and attitudes toward technology. Without empirical data, reforms risk being reactive or fragmented.

Implication: Future research should adopt mixed-methods approaches—combining surveys, focus groups, and performance-based digital assessments—to provide a nuanced understanding of competence development. Universities should also collaborate through national observatories of digital transformation to share insights and best practices. In the Ukrainian case, such monitoring can help identify regional inequalities, inform targeted interventions, and evaluate the impact of digitalization on teaching quality and psychological well-being.

6. Differentiated and discipline-specific training

The study by Bakare (2025) revealed that many lecturers possess basic digital awareness but lack the competence to apply technology effectively within their disciplinary teaching contexts. Generic ICT workshops often fail to meet educators' practical needs, leading to superficial skill acquisition without pedagogical impact.

Implication: Digital competence training should be differentiated and discipline-specific, recognizing that teaching with technology looks different in engineering,

medicine, humanities, and the social sciences. For example, simulation tools may enhance practical learning in STEM fields, while collaborative data platforms or digital storytelling tools could better serve social and language sciences. Tailored programs not only improve pedagogical integration but also foster motivation and relevance by showing direct benefits to educators' subject areas.

7. Institutional incentives and recognition

A recurring challenge identified across multiple contexts, including Bakare (2025), is the lack of institutional incentives for digital engagement. Educators who invest time and effort in developing digital pedagogy often receive little formal recognition, discouraging long-term innovation.

Implication: Universities should embed digital innovation metrics into promotion and evaluation systems. Recognizing digital pedagogy as part of academic excellence—through awards, grant opportunities, and advancement criteria—encourages sustained engagement. Institutions could also establish “digital champions” or “innovation fellows” programs to mentor peers and build communities of digitally confident educators. In Ukraine’s modernization context, linking digital competence to career advancement would significantly strengthen motivation and accountability.

8. Addressing infrastructural inequities

Technological competence cannot develop in isolation from material conditions. Studies from both African (Adenekan & Jimoh, 2024; Bakare, 2025) and European contexts highlight the persistent challenge of unequal access to ICT resources, technical support, and stable internet connectivity. In Ukraine, war-related disruptions further exacerbate infrastructural disparities between regions and institutions.

Implication: National and institutional policies must address infrastructural inequities alongside professional training. This entails investing in reliable digital infrastructure, ensuring device accessibility for faculty and students, and maintaining technical support systems. Public–private partnerships and collaboration with international donors can play a crucial role in ensuring equitable digital access, particularly for displaced universities and marginalized communities.

9. Fostering digital culture and institutional transformation

Beyond individual skills, digital competence must be embedded within the organizational culture of higher education. Studies by Redecker (2017) and OECD (2022) highlight that true digital transformation occurs when institutions cultivate shared values of openness, collaboration, and innovation. A digital culture encourages experimentation, risk-taking, and peer learning—elements essential for educational modernization.

Implication: Ukrainian universities should frame digital competence as a collective institutional goal rather than a personal responsibility. This can be achieved through leadership development, cross-departmental collaboration, and inclusive decision-making processes that engage both faculty and students. Institutional digital maturity assessments could also help universities map their progress and set achievable digital transformation milestones.

10. Building international partnerships for resilience

Finally, the literature emphasizes that international collaboration plays a critical role in sustaining educational systems during crises. Partnerships between universities, international organizations, and donor agencies can enhance digital resilience and knowledge sharing. Momdjian et al. (2024) and Adenekan & Jimoh (2024) both point to the effectiveness of cross-border initiatives that combine teacher training, open educational resources, and technological support.

Implication: Ukraine's higher education sector can benefit from joining regional and international digital learning alliances, participating in EU capacity-building programs, and co-developing open-access learning platforms. Such initiatives not only bridge competence gaps but also promote intercultural dialogue, institutional solidarity, and innovation in pedagogy.

Conclusion of Implications Section

In sum, bridging the digital literacy gap between teachers and students requires more than improving technical proficiency—it demands rethinking education as a digitally mediated, socially embedded, and emotionally sustainable process. The reviewed evidence shows that success depends on comprehensive strategies that integrate training, infrastructure, policy alignment, and psychosocial well-being. For Ukraine, embedding these principles into higher education reform can strengthen both individual educator resilience and institutional capacity, aligning national transformation with global standards for inclusive, digitally competent, and future-ready education.

Conclusion

This study provides empirical evidence of a persistent digital literacy gap between teachers and students in Ukrainian higher education, demonstrating that the issue extends beyond technical proficiency to encompass psychological, institutional, and cultural dimensions. Students generally display higher operational digital skills, while teachers exhibit stronger ethical awareness yet lower confidence and adaptability in applying digital tools. These asymmetries influence not only pedagogical efficiency but also the emotional climate of teaching and learning.

The findings highlight the importance of systemic, continuous professional development, psychosocial support, and intergenerational collaboration to bridge this gap. Integrating frameworks such as DigCompEdu and UNESCO's ICT Competency Standards can guide both institutional and national strategies.

Future research should employ mixed-method and longitudinal designs to examine the evolution of digital competence over time and evaluate the impact of resilience-based interventions. In the broader European context, Ukraine's commitment to aligning with EU digital education standards represents an opportunity to transform digital inequality into a catalyst for innovation, inclusion, and sustainable educational reform.

Originality / Value

ISSN: 1984-6444 | <http://dx.doi.org/10.5902/19846444.94020>

This research provides one of the first empirical analyses of the teacher–student digital literacy gap in a post-Soviet and conflict-affected context, highlighting its psychological and institutional dimensions. By integrating international digital competence frameworks with empirical evidence from Ukraine, the study contributes to the global discourse on equitable digital transformation and educational resilience in times of crisis.

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