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INFORMATION TECHNOLOGIES IN ENSURING THE QUALITY OF HIGHER EDUCATION: APPROACHES, CHALLENGES AND PROSPECTS

Abstract. The ongoing digital transformation has fundamentally changed higher education by integrating advanced information technologies (IT) into educational and administrative processes. The article explores the integration of information technologies into the educational process to enhance the quality of higher education, identifies the advantages and barriers to their implementation, and develops recommendations for optimizing the use of IT in learning. The study employs a mixed approach, including statistical analysis, surveys, and comparative data review from Ukraine and the European Union. It was found that the satisfaction indicators regarding the quality of the educational process, according to the ACSI methodology, are high (ranging from 75 to 85 points). Students, teachers, and employers shared their views, highlighting the positive effects of IT integration, such as personalized learning pathways, enhanced access to educational resources, and increased flexibility. The results of the positive assessment of IT provision (83–100%) were determined based on a survey of students from selected higher education institutions in Lviv. However, challenges in implementing information technologies in the educational process remain, particularly insufficient funding, low levels of digital literacy among stakeholders, and infrastructure gaps. The research findings emphasize the need to develop comprehensive digitalization strategies for higher education institutions. Key recommendations include modernizing IT infrastructure, developing digital competencies among teachers and students, and ensuring data security. A set of measures has been proposed targeting key stakeholders in the higher education sector: for academic staff (the provision of methodological support and access to advanced content creation tools); for students (the expansion of access to accredited online courses); and for university leadership (the implementation of mechanisms for monitoring the effectiveness of IT solutions and ensuring robust data protection frameworks). Future research could focus on the impact of specific IT solutions and the development of government strategies for sustainable digitalization of higher education.

Keywords: information technologies; quality of higher education; sociological research; digitalization; educational process.

1. INTRODUCTION

The problem statement. The transformation of educational space in the 21st century is marked by fundamental changes driven by the digital revolution. Digitalization has become a driver of transformations in the higher education system, radically changing traditional approaches to the learning process. Digital tools and solutions have organically integrated into the educational environment, creating a fundamentally new paradigm of interaction between teachers and students. Thanks to technological innovations, the educational process has gained unprecedented flexibility and adaptability, allowing for the implementation of individual learning trajectories and ensuring high-quality educational services regardless of the geographical location of participants.

Modern information technologies represent a complex ecosystem of tools and methods for working with data, encompassing all aspects of information management – from collection and analysis to storage and dissemination. Learning management systems facilitate course administration, content delivery, and student engagement. Video conferencing tools enable both synchronous and asynchronous communication, supporting remote learning and collaborative projects. Adaptive learning platforms personalize the educational process by adjusting the complexity and pace of instruction according to the individual progress of each student. In the educational context, these tools serve as a powerful catalyst for modernizing the learning process, optimizing both teaching activities and administrative processes. At the same time, the effectiveness of technologies is largely influenced by the specific context of their implementation, including factors such as institutional resources, teacher training, pedagogical approaches, and the needs of different student groups. Given the comprehensive digitalization of society, where digital technologies have become an integral element of professional activities, everyday life, and social interaction, their integration into the educational process is not just a desirable option but a critical necessity for ensuring the competitiveness of modern education and its compliance with the demands of our time.

Analysis of recent studies and publications. The modern scientific community pays significant attention to researching the implementation of digital technologies in the educational process and their impact on learning outcomes in higher education. Some researchers emphasize the inconsistency between the traditional educational model and the requirements of the dynamic modern world. Research highlights the need to bridge the gap between technological capabilities and organizational change in universities, particularly through the implementation of the concept of «digital maturity», which involves process optimization, strategic planning, and the transformation of institutional business models [1] – [3]. An equally important aspect is the role of digitalization in achieving the Sustainable Development Goals (SDGs), specifically the goal of ensuring access to quality education based on innovation [3].

Modern higher education institutions worldwide are actively implementing advanced technological solutions for learning, including educational process management systems [4], intelligent chat systems [5], and other innovative tools. The success of e-learning is determined by the interaction of key participants in the process: learners, teaching staff, government bodies, educational content developers, accreditation agencies, and labor market representatives [6].

The technological arsenal of modern education includes AI-based systems, various devices for information processing, network equipment, communication systems, and specialized software. Information technologies are applied in numerous educational domains, such as the creation of digital learning environments, development of pedagogical software, research activities, project-based learning, implementation of multimedia and distance learning

formats, automation of educational institution management, creation of methodological materials, professional development organization, development of web resources, and quality assurance monitoring systems [7].

The implementation of information and communication technologies is critically important for achieving high standards of educational quality [8]. Recent publications identify electronic monitoring of education quality as a key tool for data analysis, results visualization, and managerial decision-making. Automated systems ensure transparency and communication among stakeholders, thereby contributing to the improvement of educational standards [9].

The integration of information technologies into educational quality monitoring creates a wide range of tools for optimizing administrative processes, processing information, and facilitating communication among stakeholders in the educational environment. Such an approach fosters transparent and effective mechanisms that enhance educational standards and maximize the success of all parties involved [9].

Digital modernization entails a radical renewal of the educational environment, methods of managing the learning process, pedagogical tools, and the administrative system of higher education institutions [10]. The primary goal of the United Nations Sustainable Development Goals program by 2030 [11] is to address systemic global issues to create a more prosperous, equitable, sustainable, and inclusive world. It is worth emphasizing that this goal aligns with SDG 4, which focuses on ensuring quality education. The fourth goal highlights the importance of providing equitable access to quality education at all levels and creating conditions for lifelong learning [12]. Achieving these ambitious goals is impossible without the active implementation of digital transformation by educational institutions [13].

The digital maturity (DM) level of a university increases through the implementation of three key elements. First, digital initiatives (DI) refer to technological solutions for optimizing operational processes aimed at reducing costs and improving efficiency. Second, the adoption of advanced IT management practices enhances strategic planning in the field of information technology. Third, digital transformation initiatives (DTI) involve creating innovative business processes using modern digital technologies, delivering added value to all stakeholders and necessitating comprehensive organizational changes. To incrementally enhance digital maturity, higher education institutions must work on all these areas. However, for rapid progress, efforts should focus on DTI. The primary mission of higher education institutions is to provide students with high-quality and competitive educational services. Educational activities remain a priority for universities, with the implementation of digital innovations and the development of strategic approaches in this domain offering additional advantages to enhance the digital competence of educational institutions. All these aspects require comprehensive integration and alignment with the overall university strategy [14]. The integration of sustainable development concepts and digital maturity remains a key vector for the global educational community [12] – [14].

The main theoretical framework underpinning this study is the concept of integrated quality management, which combines technological, pedagogical, and organizational dimensions. This approach makes it possible to consider not only quantitative indicators (such as the number of users or the level of engagement in the learning process) but also qualitative characteristics (such as the improvement of digital competence among both instructors and students). Such a comprehensive approach contributes not only to an in-depth analysis of the current state of digitalization but also to the development of strategies aimed at further enhancing the effective use of IT in ensuring the quality of higher education.

The implementation of electronic educational platforms, interactive methodologies, automated assessment systems, and other digital solutions forms an adaptive, personalized, and effective educational environment. This significantly improves the quality of educational

services and ensures the preparation of competitive specialists according to modern labor market demands.

Given this, research on the impact of information technologies on the quality of higher education remains a priority direction of scientific inquiry, requiring comprehensive analysis of the role of digital tools in improving the effectiveness of the educational process.

This article aims to explore modern approaches to the integration of information technologies into the higher education system to enhance the quality of the educational process, identify key advantages and barriers to their implementation, and develop recommendations for optimizing the use of IT in the educational process of higher education institutions.

2. RESEARCH METHODS

The study employed a combined approach that included both theoretical and empirical methods. To achieve the research results, general scientific and specialized methods were utilized, including a systematic approach, methods of analysis and synthesis, comparative analysis, descriptive statistics, multifactor statistical analysis, and graphical methods. These methods enabled an assessment of the impact of information technologies on the quality of higher education through the analysis of key indicators and the identification of barriers and advantages in implementing IT in higher education institutions. The research included surveys, statistical analysis of responses from students, educators, and employers, as well as a comparative analysis of data from Ukraine and the EU.

The research procedure comprised several stages:

1. Analysis of scientific sources and regulatory documents regarding the use of information technologies in ensuring the quality of higher education.
2. Collection and analysis of statistical data on the implementation of information technologies in higher education institutions, particularly in the European University Alliance and Ukraine.
3. Surveys of key stakeholders (educators, students, and employers) about the benefits and challenges of using information technologies in ensuring the quality of higher education.

The sociological study involved the following participants from Ukraine: 100 students and 100 educators from higher education institutions (NTU "KhPI"). Additionally, 184 employers from the Kharkiv, Poltava, Sumy regions, and Ukrainian-controlled parts of the Donetsk and Luhansk regions were surveyed. The analysis also incorporates open data from surveys conducted at selected higher education institutions in the Lviv region. The study also utilized available EU statistical data on citizens' digital skills and educational indicators.

The sample for the surveys ensured representativeness across specialties, education levels, and experience with IT. Data collection was conducted using electronic questionnaires created with Google Forms, which included questions on a five-point scale to assess satisfaction with IT access, as well as open-ended questions to gather qualitative data.

3. THE RESULTS AND DISCUSSION

Digital technologies have become a defining factor shaping the quality standards of modern higher education. The use of advanced technological tools opens new opportunities for universities to optimize the learning process, improve performance monitoring systems, and create comprehensive access to educational materials.

Monitoring the satisfaction levels of participants in the educational process reveals consistently high indicators, ranging between 75 and 85 points. According to the American

Customer Satisfaction Index (ACSI) methodology, this range is classified as a positive outcome (see Fig. 1). Such stability indicates the effectiveness of the implemented educational strategies and teaching organization methods. In alignment with the Sustainable Development Goals, it is planned to reach a minimum satisfaction index score of 80 points across all categories of educational stakeholders in higher education institutions by 2030 [15]. Current data suggest that this target is realistically attainable, despite existing regional disparities and the complications caused by ongoing military conflict. It is worth noting that educational institutions continue to demonstrate successful adaptation to the challenges posed by martial law. The resilience of the educational system and its capacity to adjust are reflected in the positive dynamics of satisfaction indicators. The measurement of the satisfaction index serves as a reliable information base for making evidence-based managerial decisions aimed at improving the quality of the educational process.

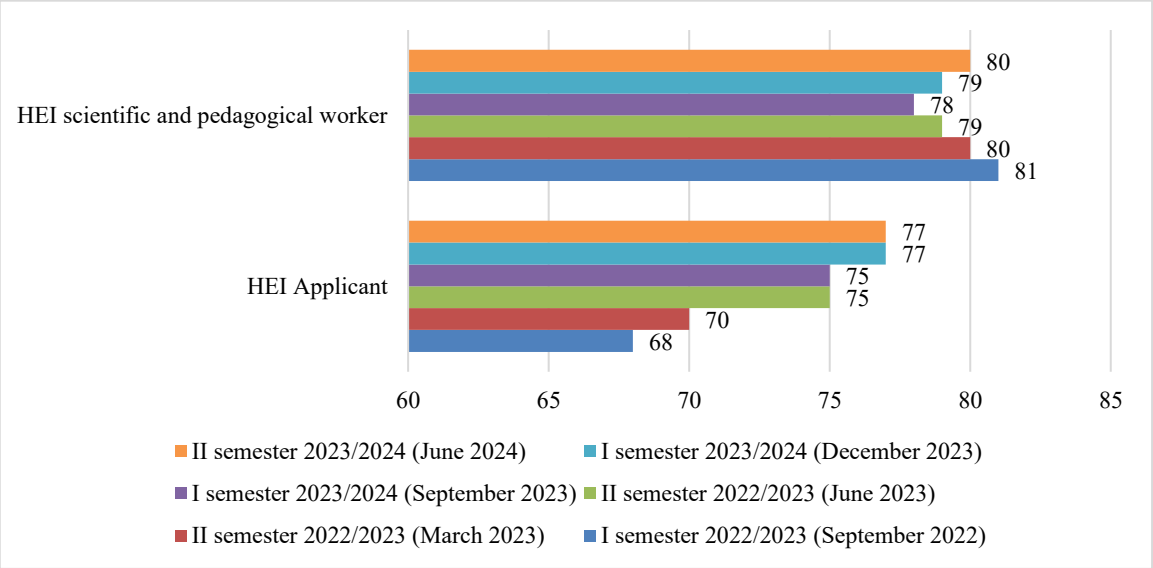

Figure 1. Dynamics of indicators of the level (index) of satisfaction of participants in the educational process (martial law period) [15]

Statistics from 2023 reveal that 56% of European Union residents aged 16–74 have at least basic digital skills, with the Netherlands (83%) and Finland (82%) leading the rankings. The study identified a significant correlation between education level and digital skills: 80% of individuals with higher education demonstrate basic digital competencies, compared to only 34% among those with low or no education [16].

In the current context of digital transformation in education, information technologies have become a key factor in ensuring its quality. A comparative analysis of digital indicators reveals that Ukraine, despite significantly lower public spending on higher education, demonstrates strong performance across several key indicators (Table 1). In particular, participation in online education is among the highest in the region, while the e-participation index (1.0) and the level of e-service provision (0.9759) reflect the effective implementation of digital services (notably, the "Diia" system). These services have the potential to be scaled up within the higher education sector, facilitating both educational quality enhancement and the engagement of learners in decision-making processes. This situation also provides a favorable foundation for the integration of innovative educational technologies – such as adaptive learning platforms, cloud services, big data analytics, and artificial intelligence – into quality assurance processes in education. However, a lower ICT Development Index (81.0) and limited

access to digital infrastructure present challenges for the sustainable development of a robust digital educational ecosystem.

Table 1

Comparative Analysis of Digital Transformation and Online Education in Ukraine and Central and Eastern European Countries [17-22]

Indicator	Ukraine	Poland	Romania	Slovakia	Czechia	Lithuania
ICT Development Index (IDI)	81,0	95,8	87,6	87,1	88,0	94,2
Participation in online education, %	27,28	15,81	9,19	27,27	26,81	28,85
Government expenditure per tertiary student, % of GDP per capita	12,22	23,2	18,35	26,77	26,39	19,84
Level of basic digital skills	59,60	42,93	27,82	55,18	59,69	48,84

The data indicate that, despite lower levels of educational funding and a generally weaker ICT index compared to Central and Eastern European countries, Ukraine demonstrates strong performance in the areas of digital civic participation, the development of e-services, and engagement in online education. These trends reflect an ongoing and active digital transformation, even under martial law conditions. At the same time, sustaining the current achievements and advancing further integration into the European digital space will require enhanced institutional support, increased public investment in higher education, and the development of EdTech platforms and digital infrastructure.

The implementation of information systems to enhance the quality of higher education is based on technologies that integrate information databases, tools, and methods for their synthesis into a unified digital integrated space to meet the informational needs of higher education institutions. This approach establishes a unified digital platform for the educational institution, enabling the creation of universal tools and methods for information interaction to reflect the dynamics of the informational environment (Fig. 2).

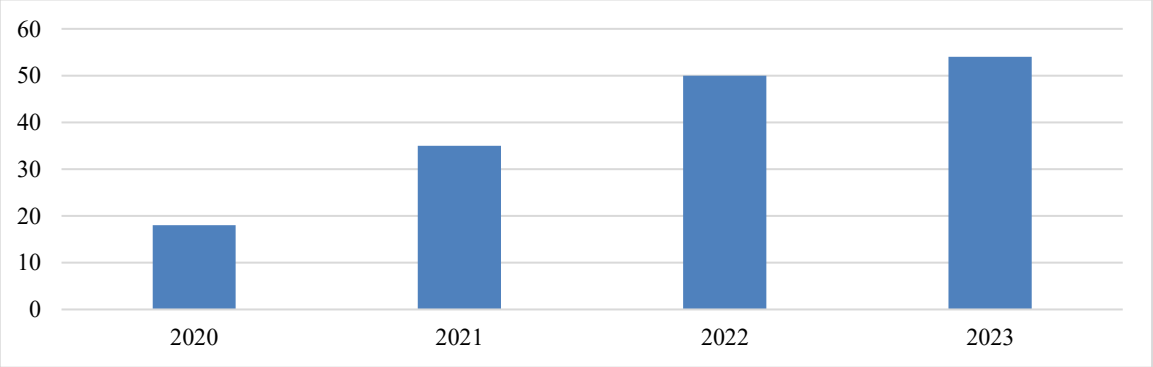

Figure 2. The Use of Information Systems in Higher Education in Ukraine, % [23]

A comprehensive sociological study was conducted to assess the current state of the quality of higher education in Ukraine. The survey gathered the opinions of 184 business representatives and organizations from five regions: Kharkiv, Poltava, Sumy, as well as the territories of Donetsk and Luhansk regions under Ukrainian control. The analysis results (Fig. 3) showed that employers highly value the level of preparation of university graduates.

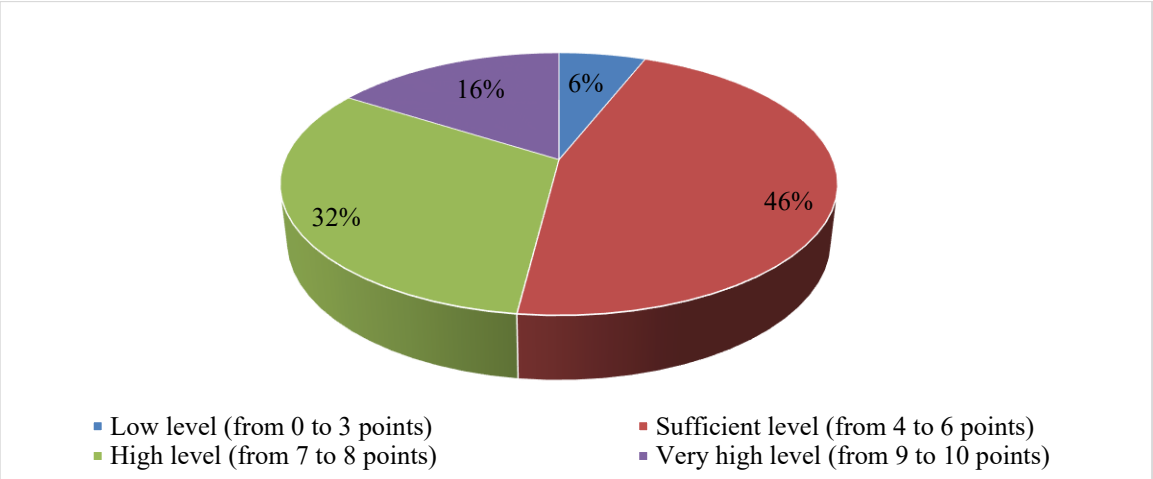

Figure 3. Quality of Education at NTU "KhPI" (based on the results of the employer survey) [24]

As part of a comprehensive sociological study, a survey was conducted among the faculty and students regarding the specifics of the implementation of digital technologies at the National Technical University "Kharkiv Polytechnic Institute" (Kharkiv). When evaluating the level of satisfaction with various aspects of the information and technological infrastructure at NTU "KhPI," the teaching staff particularly noted the modernity of approaches, the quality of video communications, and the flexibility of working hours. Among the most developed elements of the university's IT system are the possibilities for prompt access to current information, the use of Internet resources, establishing communication with the administration on organizational matters, and supporting professional interaction between staff members [24]. However, despite these aspects receiving the highest ratings, the faculty still tends to provide negative assessments of these areas. Notably, members of the management staff demonstrate a more positive perception of the university's information technologies compared to regular faculty members (Fig. 4).

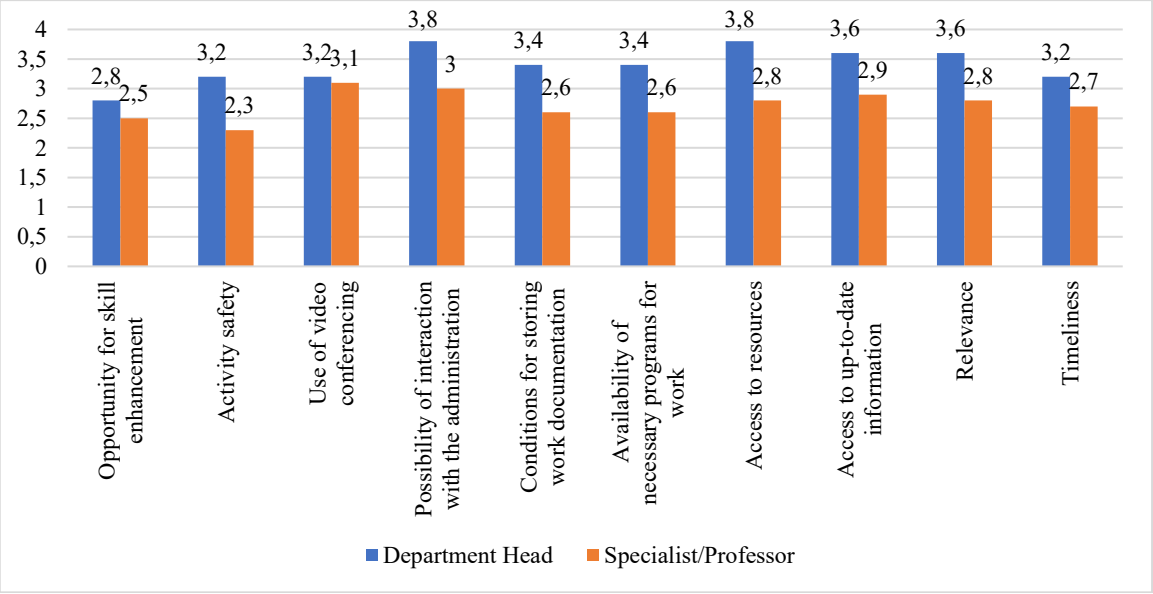

Figure 4. University faculty's assessment of their level of satisfaction with the features of information management technologies at NTU "KhPI", where 1 – difficult to answer, 2 – completely dissatisfied, 3 – rather dissatisfied, 4 – rather satisfied, 5 – fully satisfied [24]

According to the survey, most students at NTU "KhPI" positively evaluate the technological infrastructure of the university. Respondents expressed approval of the current software, seamless access to the Internet, stable operation of server equipment, and the internal network. Students are also satisfied with the functioning of the electronic library, the system for storing learning materials, video conferencing capabilities, and digital communication with the teaching staff. Interestingly, first- and second-year students show a more positive attitude towards the quality of information technologies compared to faculty members. As seen in Fig. 5, senior students display less enthusiasm in their assessments. However, it is worth noting that the availability of modern software received unanimously high marks from the entire student body.

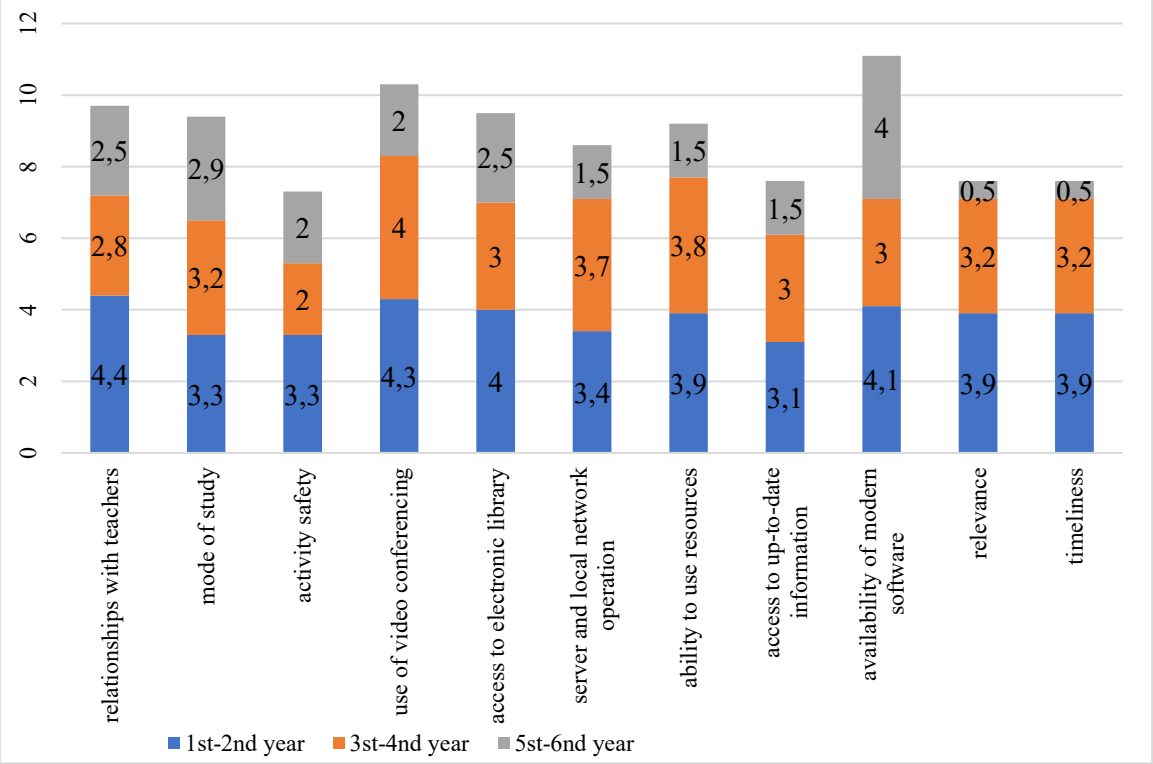

Figure 5. Assessment by students of NTU "KhPI" of their level of satisfaction with the features of information management technologies at NTU "KhPI," where 1 – difficult to answer, 2 – not satisfied at all, 3 – rather not satisfied, 4 – rather satisfied, 5 – fully satisfied [24]

To broaden the data analysis by incorporating information from other higher education institutions, open data from selected universities in Lviv region with varying levels of digital maturity were analyzed in terms of student satisfaction with computer equipment (Table 2).

Table 2

The satisfaction of students with the computer equipment of higher education institutions, % [25-27]

Level of satisfaction	Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies of Lviv	Lviv Polytechnic National University	Lviv University of Trade and Economics
Fully satisfies	33	62,07	88,9
Mostly satisfies	53	20,69	11,1
Partially satisfies	10	10,34	0
Does not satisfy	1	6,9	0
Hard to answer	3	0	0

Distance learning allowed the continuation of the educational process during the spread of the Covid-19 pandemic and ensured the continuity of higher education acquisition under conditions of military aggression against Ukraine. This format opens up broad opportunities for learners who are unable to attend institutions in person and also contributes to the realization of the concept of lifelong, continuous professional development. However, the quality level of e-learning varies significantly, and despite the growing role of educational online platforms, universal criteria for evaluating the effectiveness of distance higher education are still lacking. The Online Learning Rankings 2024 presents the first systematic approach to global assessment of online education quality. The ranking methodology is based on the analysis of 17 indicators distributed across four key categories. Three Ukrainian universities are included in the list of leading global institutions for the quality of distance learning [28] (Table 3).

Table 3

Results of the Global Ranking of the Best Ukrainian Universities for Online Learning [28]

Institution	Resource Assessment	Engagement Assessment	Outcome Assessment	Environment Assessment
NTU "KhPI"	44,8	53,3	61,9	42,6
Sumy State University	44,6	45,7	84,4	49,4
V.N. Karazin Kharkiv National University	21,3	50,7	29,3	29,0

The responses of NTU "KhPI" faculty revealed a skeptical attitude towards the use of innovations, considering it as one of the factors that likely reduce their productivity and motivation. This is confirmed by negative evaluations of IT implementation (Fig. 4). Meanwhile, the survey of NTU "KhPI" students (Fig. 5) showed a positive assessment of software for distance learning, acknowledging the relevance and convenience of these technologies. However, prolonged use of remote formats may lead to psychological exhaustion due to excessive interaction with technology ("digital fatigue").

The discrepancies between students' and educators' responses indicate that the effectiveness of digital integration depends on targeted support and educators' digital skills. These findings align with the concept that successful digital transformation requires not only consideration of technological investment metrics but also the presence of a comprehensive strategy aimed at integrating technological, pedagogical, and organizational-management aspects to address the challenge of adaptation to new digital environments [3], [10].

One of the key findings of the study is the existence of a certain threshold beyond which further implementation of IT tools has a less significant impact on the quality of education due to technology saturation ("digital adaptation threshold"). For instance, in countries with well-developed infrastructure where Moodle is already a standard, additional innovations require substantial resources without necessarily guaranteeing proportional improvements in outcomes. In contrast, the introduction of basic systems (LMS, video conferencing) in Ukrainian higher education institutions, where digital transformation is still ongoing, can significantly enhance the quality of education, as confirmed by employer evaluations.

The development of digital competences goes beyond basic IT skills and encompasses a wide range of abilities that are crucial for success in the digital age. This includes information literacy, digital communication, critical thinking and problem-solving in digital environments, and digital content creation. It is also essential to consider the development of digital competence among educators, enabling them to effectively integrate technologies into their teaching practices and design modern and innovative online learning processes. Ensuring equitable access to technology and digital literacy is of paramount importance, as disparities in resources and skills can exacerbate existing inequalities among students. Accessibility for students with disabilities requires careful consideration in the design and implementation of digital tools and platforms. The increasing use of data-driven technologies also raises

challenges related to student privacy, data security, and algorithmic bias in assessment and learning analytics. This requires an individualized approach to the development of digital strategies, emphasizing the need for continuous assessment of the impact of advanced IT tools on educational processes to foster a culture of lifelong learning.

Therefore, educational institutions that systematically implement digital technologies and solutions achieve better results in student learning, the development of their technological competencies, and overall satisfaction with the learning process, which also increases their competitiveness in the educational services market. It is important to note the presence of social risks associated with distance learning, particularly the tendency toward reduced social interaction among students, leading to the formation of "digital alienation.

The analysis demonstrated the key positive effects of integrating information technologies into the higher education quality assurance system: expanding the accessibility of educational materials; optimizing the management of the educational process through the implementation of automated systems for data collection and processing to monitor quality; creating individual learning paths based on analytics; providing access to quality educational content through specialized management systems; improving communication between faculty and students through integrating services, online consultations, implementing interactive methods, gamification, and multimedia tools in flexible blended learning formats; applying interactive approaches; and optimizing communication and assessment processes.

However, there are certain barriers to the successful implementation of information technologies: limited funding for digital transformation; insufficient technological infrastructure; the need for continuous development of digital competencies; inadequate levels of digital literacy among some participants; technical issues and lack of proper support; lack of experience among teachers in applying innovative technologies; a shortage of software adapted to curricula; psychological resistance to change, technical failures, and the absence of standardized digital tool usage protocols.

Given the significant advantages of using advanced IT solutions to ensure the quality of higher education, an important task for higher education institutions is the development of a comprehensive digitalization strategy for the educational process. Such a strategy should include:

- modernization of the IT infrastructure of higher education institutions to implement the necessary software and hardware solutions;
- systematic training and qualification improvement for academic staff on effective IT usage;
- development and periodic review of educational programs to integrate modern IT tools;
- involvement of external experts, representatives of the IT industry, and employers in the digitalization processes;
- ensuring data protection and information security when using digital solutions.

Based on the results obtained, the following recommendations can be formulated for the effective implementation of information technologies in higher education:

- invest in the development of the IT infrastructure of higher education institutions (computer labs, high-speed internet, cloud data storage, etc.);
- implement IT solutions gradually, considering the specifics of academic disciplines and student needs;
- provide effective technical support and timely software updates;
- continuously monitor and assess the effectiveness of IT use in the educational process.

Separate recommendations should be provided for specific categories of users (lecturers, students, administration). Considering the key role of lecturers as primary agents of digital change for future activities, the following measures are proposed: continuous training on the use of modern platforms, interactive learning tools, and artificial intelligence in the educational

process; methodological assistance in implementing blended learning, gamification methods, and adaptive learning; funding access to tools for creating multimedia content (interactive simulations, virtual laboratories). For educational service users, it is advisable to use systems that take into account the student's level of preparation and individual learning paths; expand access to certified online courses; confirm digital skills based on international certifications. The leadership of higher education institutions should develop strategic plans for digital transformation, monitor the effectiveness of IT solutions, and ensure data protection.

The implementation of a comprehensive digitalization strategy and the proposed recommendations will allow higher education institutions to fully utilize the potential of information technologies to enhance the quality of educational services, strengthen the competitiveness of graduates in the labor market, and promote the development of scientific and educational activities.

The results obtained indicate that information technologies can positively influence the quality of higher education, contributing to better knowledge acquisition by students, increasing their motivation and engagement in the learning process. However, to effectively implement IT solutions, a number of issues related to the technical preparation of educators, ensuring information security, and the continuous updating of technologies used must be addressed.

Authors' personal contribution

Volodymyr Moroz – problem statement on the implementation of IT initiatives in the higher education system and overall article concept, writing the introduction, reviewing recent publications, conducting sociological research, analyzing and interpreting results, overall research coordination, formulating conclusions and prospects for further research, approval of the final version for publication; Anton Tereshchenko – development of questionnaires, data collection for sociological research, problem statement of the study, analysis of the current state of information technology implementation, approval of the final version for publication; Stanislav Buka – development of methodology, justification of the research relevance, analysis of distance learning systems and the level of individual digital skills in EU countries, analysis and interpretation of results, formulation of recommendations, approval of the final version for publication; Vitalii Kruhlov – development of the article concept, general literature review, preparation of graphical materials, analysis and comparison of results, formulation of conclusions, overall article editing and preparation for printing, and approval of the final version for publication; Svitlana Moroz – organization of surveys, development of methodology, conducting sociological research, data collection, analysis and interpretation of results, writing the abstract, approval of the final version for publication.

4. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

The use of a combined approach made it possible to analyze the experience of digital transformation from both European and national perspectives in the field of higher education quality assurance. The study of digital transformation in higher education allowed for conclusions that demonstrate significant changes in the organization of the learning process, quality assurance, and higher education institution management.

1. Digitalization, beyond the primary task of modernizing tools, fundamentally transforms educational paradigms. The implementation of learning management systems and digital tools facilitates a shift in traditional approaches to the learning process, expands access to educational resources, personalizes learning trajectories, enhances student motivation, and creates an interactive, flexible environment that aligns with the needs of the global labor market.

2. The optimal model for IT implementation involves a balanced development of three key components: infrastructural (technological provision), competency-based (digital skills of participants in the educational process), and methodological (adaptation of pedagogical

approaches to the capabilities of digital tools). In higher education institutions where an imbalance between these components is observed, technological innovations have a limited impact on educational quality indicators.

3. An asymmetry in IT perception has been identified. Most students of NTU "KhPI" gave a positive assessment of the software, noting its convenience and relevance. The results of the assessment show that students from certain higher education institutions in Lviv provided positive evaluations regarding the availability of IT resources. At the same time, lecturers at NTU "KhPI" gave more negative evaluations. This discrepancy may indicate a redistribution of roles in education, where the teacher becomes not only a knowledge bearer but also an administrator of digital systems.

4. The implementation of information technologies enhances the efficiency of educational process monitoring, optimizes management systems, and produces outcomes that go beyond traditional modernization concepts. In Ukraine, the indicators of satisfaction with the quality of the educational process, according to the ACSI methodology, are high (ranging from 75 to 85 points). Empirical data show that junior students at NTU "KhPI" assess IT tools more positively than senior students. These findings may suggest a gradual adaptation to technology and a decline in its motivational effect over time.

5. The impact of IT implementation in higher education varies depending on the context. According to employer assessments, the introduction of IT tools at NTU "KhPI" has a positive impact on the quality of specialist training. The example of EU countries with developed digital infrastructure demonstrates that, given the already high level of technology integration, further IT implementation has a less noticeable effect. In contrast, the use of IT tools in Ukraine significantly improves education quality, particularly by increasing flexibility in learning formats and enhancing access to educational resources. Despite lower levels of funding, Ukrainian universities demonstrate high levels of e-participation and the implementation of online education. This highlights the need to develop adaptive digitalization strategies that take into account local specificities, ensure systemic support for educators, and foster the continuous development of digital competencies.

6. Distance learning may reduce social interaction among students (state of digital alienation), potentially affecting skills essential for graduates' competitiveness, which employers highly value. At the same time, faculty members emphasize the increased workload due to the constant use of IT, necessitating discussions on the universality of online formats as a full-fledged replacement for traditional approaches.

Further research will focus on the impact of specific IT solutions and the development of national strategies for sustainable digitalization of higher education.

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ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ У ЗАБЕЗПЕЧЕННІ ЯКОСТІ ВИЩОЇ ОСВІТИ: ПІДХОДИ, ВИКЛИКИ ТА ПЕРСПЕКТИВИ

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Анотація. Цифрова трансформація, що триває, докорінно змінила вищу освіту, інтегрувавши передові інформаційні технології (ІТ) у навчальні та адміністративні процеси. У статті досліджено інтеграцію інформаційних технологій в освітній процес для підвищення якості вищої освіти, визначено переваги і бар'єри впровадження та розроблено рекомендації щодо оптимізації використання ІТ у навчанні. У дослідженні застосовано змішаний підхід, що передбачає статистичний аналіз, опитування та порівняльний огляд даних з України та Європейського Союзу. Виявлено, що показники задоволеності якістю навчального процесу

за методикою ACSI є високими (від 75 до 85 балів). Студенти, викладачі та роботодавці висловили свої думки, підкреслюючи позитивні наслідки інтеграції ІТ, такі як персоналізовані навчальні траєкторії, розширений доступ до освітніх ресурсів та підвищена гнучкість. Результати позитивної оцінки ІТ-забезпечення (83–100%) визначено за результатами опитування студентів обраних вищих навчальних закладів Львова. Однак проблеми реалізації інформаційних технологій у навчальному процесі залишаються, зокрема недостатнє фінансування, низький рівень цифрової грамотності серед зацікавлених сторін та інфраструктурні прогалини. Результати дослідження підкреслюють необхідність розробки комплексних стратегій цифровізації для закладів вищої освіти. Основні рекомендації пропонують модернізацію ІТ-інфраструктури, розвиток цифрових компетенцій серед викладачів та студентів, а також забезпечення безпеки даних. Запропоновано комплекс заходів, спрямованих на ключових стейкхолдерів у секторі вищої освіти: для викладачів (надання методологічної підтримки та доступу до передових інструментів створення контенту); для студентів (розширення доступу до акредитованих онлайн-курсів); для керівництва університету (впровадження механізмів моніторингу ефективності ІТ-рішень та забезпечення надійних інфраструктур захисту даних). Майбутні дослідження можуть бути зосереджені на впливі конкретних ІТ-рішень та розробці державних стратегій для сталої цифровізації вищої освіти.

Ключові слова: інформаційні технології; якість вищої освіти; соціологічні дослідження; цифровізація; навчальний процес.