

Internationalization Policy and Digital Support for Higher Education

Internationalization Policy, Opportunities, and Digital Support for Higher Education: Perspectives on Ukraine

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Abstract

Background. The article discusses the unique aspects of internationalization processes in Ukrainian educational institutions under the current martial law. The article aims to identify internationalization opportunities and challenges for the Ukrainian education and academic system and define the needs that can be addressed through digital support.

Methods. To achieve this, the study employs a mixed-methods approach, including the analysis of a survey regarding the use of digital tools by 94 Ukrainian educators and PhD students. The research is guided by the "Crisis-Informed Digital Internationalization" (CIDI) conceptual framework to evaluate digital infrastructure and agency.

Findings. During the research, it was discovered that internationalization today depends on the digitalisation of educational institutions and, therefore, opens new opportunities and prospects for creating conditions for students and teachers. The findings demonstrated that the most frequently used digital tools by students are Google Drive, Google Classroom, and Google Meet. Conversely, applications such as Zoom, Microsoft Word, Excel, and PowerPoint are utilised less frequently for routine tasks. Statistical analysis further revealed a strong correlation between self-reported digital competence and the effective integration of AI tools for international research collaboration.

Conclusions and Recommendations. Thus, based on the results obtained, the authors present their vision of digital support for internationalization processes in higher education institutions. The study implies that Ukrainian HEIs should prioritize virtual mobility and AI-driven support to maintain global academic presence. The paper concludes that digital resilience serves as a foundational mechanism for maintaining academic continuity during geopolitical crises.

Keywords: HEIs, internationalization policy, sustainability, digital support.

Introduction

Internationalization and sustainability have emerged as pivotal missions for higher education institutions (HEIs) worldwide. These initiatives strive to cultivate a robust, high-quality academic system that is interconnected and responsive to the pressing global challenges of our time. By embracing these objectives, HEIs are better equipped to meet the diverse training needs of an evolving generation of students, preparing them to navigate and thrive in an increasingly complex world. This commitment to fostering a comprehensive educational framework reflects a dedication to creating a more sustainable and globally aware academic community. To achieve this goal, educational institutions need to prioritise developing their academic, managerial, and administrative staff by enhancing their skills in strategic planning and formulating comprehensive action plans that emphasise internationalization and sustainability.

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Investing in professional development for teachers is essential, providing them with innovative teaching strategies and advanced digital tools for effective virtual instruction. By developing these skills, educators will enhance their capacity to participate in international collaborations, which is vital for Ukraine's aspirations for European Union accession. Such initiatives will enrich the educational landscape and empower educators and institutions to contribute meaningfully to a global academic community.

With the onset of Russia's large-scale invasion of Ukraine, European universities opened their doors to Ukrainian students, creating new spots and offering scholarships, free tuition, and housing for those who were forced to flee their homes. According to the Office of the UN High Commissioner for Refugees (UNHCR), as of December 20, 2022, more than 16.6 million people had fled Ukraine since February 24, 2022. Additionally, according to the Prosecutor General's Office of Ukraine, as of December 24, 2022, 450 children had been killed and 867 wounded since the beginning of the war. This data does not include figures from areas where active hostilities occur. As of December 23, 2022, 2,619 educational institutions had been damaged by bombing and shelling, with another 406 destroyed. The experience of organising training during the war in Ukraine has highlighted the need for broader measures that address not only educational institutions but also the protection of infrastructure. In light of the high risks of massive rocket attacks, universities should be permitted to conduct classes

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remotely. Online education facilitates more regular attendance than in-person classes, is safer for staff and students, and allows participation from abroad. It also helps maintain connections within the diaspora; many Ukrainian academics continue to teach at their universities while residing outside the country. In similar situations, numerous students persevere in their studies, hoping to complete their programs. Moreover, this online approach should enable some of the 80,000 international students in Ukrainian higher education institutions to continue their studies and potentially graduate.

Most international students have left Ukraine for neighbouring or other European countries. Some of them have been repatriated to their home countries, uncertain whether and how they can continue their studies and whether their study periods at Ukrainian institutions will be recognised abroad. It should be noted that many of these students came to study in Ukraine as they could not access study programs in their home countries. In the emergency plan starting on 15 March 2022, the Ministry of Education and Science (MoES) of Ukraine strongly emphasises post-war needs and plans for the education and science fields, which will require restoration and rebuilding. The physical destruction of the universities' infrastructure caused by the war will be a challenge for the reconstruction of Ukraine. One significant issue is the brain drain caused by individuals leaving Ukraine, including both academics and students.

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The MoES of Ukraine supports approaches allowing students to study in Ukraine and earn degrees. It promotes joint and double degree partnerships with foreign universities and non-formal education providers. Grant schemes may require students to return to their home institutions or focus on joint programs that award Ukrainian diplomas. European higher education systems have developed effective practices for student support, often through programs like Erasmus+. These practices should be shared and adapted to meet the needs of citizens and residents arriving from Ukraine. As a member of the European Higher Education Area (EHEA) and a signatory to the Lisbon Recognition Convention, Ukraine is facing challenges related to the Bologna principles, particularly in the recognition of studies and student mobility. Support measures should primarily focus on building the capacity of Ukraine's higher education institutions, especially focused on the ongoing crisis and the need for reconstruction following the war. Establishing partnerships between universities can provide essential support and facilitate recovery, including the development of collaborative study programs.

This paper contributes to the global debate on crisis-informed internationalization. Ukraine's experience provides a valuable insight into how digital tools can help maintain a nation's "intellectual sovereignty" during a total war. This perspective shifts the conversation from "brain drain" to "digital brain circulation." In this model, researchers remain in their home country while staying connected to the global scientific community through virtual channels.

Literature Review

The concept of internationalization of higher education is grounded in several theoretical perspectives. Globalisation theories (e.g., Giddens (1990), Castells (2009)) explain internationalization as part of broader global knowledge and economic networks, while human capital theory (Becker (1993); Schultz (1961)) views international education as an investment in skills and competitiveness. In international education research, Knight (2004) and de Wit (2011) provide widely cited definitions, conceptualising internationalization as the integration of international and intercultural dimensions into teaching, research, and institutional strategies. Institutional theory (DiMaggio & Powell, 1983) explains the diffusion of international practices among universities, and critical scholars such as Altbach (2004) and Slaughter & Rhoades (2004) highlight issues of inequality, academic capitalism, and power asymmetries in global higher education.

J. Knight (2004) defines the internationalization of higher education as the deliberate process of integrating an international, intercultural, or global dimension into the purpose, function (teaching, research, service), and delivery of postsecondary education. Her more recent definition of the internationalization concept describes it as the process of integrating an international, intercultural or global dimension into the purpose, functions or delivery of post-secondary education. She emphasises that the international aspect of higher education is becoming more significant, intricate, and challenging. She highlights the impact

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of policies, funding, programs, and regulatory frameworks on this international dimension, both at institutional and national or sector levels.

These foundational definitions highlight that internationalization is a complex, strategic process that must adapt to evolving global standards and regional policies. The 2015 European Parliament conducted an international study, “Internationalization of Higher Education”. This study showed that internationalization is a strategic priority for most European educational institutions, but current strategies are often focused on mobility and economic visibility rather than curriculum development and learning outcomes. Based on comparative analysis of 17 national reports (10 European and 7 non-European countries), the study recommends more inclusive, academically driven internationalization strategies that integrate global perspectives into curricula, strengthen digital and blended learning, and align with broader quality and employability policies (European Parliament, 2015). This study became key for many countries in developing internationalization policies in higher education; it set a framework for university teachers and directed the scientific community to clarify the main approaches to internationalization processes.

Building on these strategic frameworks, scholars have further analyzed how internationalization shifts from simple activities to comprehensive institutional processes.

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The main trends in internationalization over the past 30 years are analysed in the study by de Wit (2020). De Wit (2020) understands internationalization as the mobility of curricula, academics, and students; branding and reputation (locally and internationally); and a shift from collaboration to competitiveness. A historical overview of views on internationalization was provided by de Wit and Jones (2022). It is emphasised that in the 1970s, internationalization was perceived as a separate activity, and in the 2000s – comprehensively, as a process. The study (de Wit & Jones, 2022) argues that despite all efforts, internationalization on the contrary, deepens inequality in global societies. A team of scientists (de Wit, Hunter, Egron-Polak and Howard) analysed European reports, digital learning, and the results of two surveys (de Wit et al., 2015). The research (de Wit et al., 2015) is devoted to understanding the internationalization of higher education in the European context.

Internationalization as a response to globalisation is explored by Van der Wende (Van der Wende, 2001). Van der Wende outlines two paradigms of internationalization: cooperation and competition. The differences between the concepts of “internationalization” and “globalisation” are outlined in the work of Hamidifar, Yusoff and Ebrahimi (2023). These concepts were either analysed in the study (Tight, 2019) or are a basis for further research in higher education.

The transition from physical cooperation to digital interaction became especially critical during global disruptions, forcing a rethink of traditional

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mobility-based models. Bahtilla investigated the online learning experiences of exchange students, the impact of online learning on internationalization, and their connections to the COVID-19 pandemic (Bahtilla et al., 2022). The academic community (Lehmann et al., 2022) described a complex, three-part short-term study abroad program. In response to the pandemic, academic leaders and program administrators collaborated to adopt entrepreneurial and innovative thinking to transition the program to an online digital format. In conclusion, the COVID-19 pandemic prompted the enhanced role of digitalization in the internationalization process of higher education. Virtual mobility has become significantly widespread during the COVID-19 pandemic (Gryshchenko et al., 2020). The issue of the COVID-19 pandemic's impact on the internationalization of higher education is also revealed in the study (Huang et al., 2022), as well as institutional and national internationalization policies.

This pandemic-driven shift paved the way for "internationalization at home" and the integration of advanced digital tools to maintain academic continuity.

The problem of internationalization at home is addressed in the work of Gross, Vieten and Reher (2024). The proposed solution to the problem is the translation of course material for foreign students using the artificial intelligence service "DeepL" (Gross et al., 2024). In this case, two ways of translation were proposed: a completely English-language course or a mixed course (in which only lectures were taught in German, and educational materials and assignments were given in

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English). The study (Ovcharuk et al., 2024) is devoted to the problem of developing critical thinking in students in the context of sustainable development and internationalization when using ICT by teachers, in particular, tools and services with elements of artificial intelligence. However, in the Ukrainian context, these digital transformations are not merely an option but a necessity driven by the ongoing crisis and war.

When conducting a literature review, it was important to understand the connections between the process of internationalization, the digital transformation of education, and the crisis conditions of higher education. This allows us to clarify the context of the internationalization process in Ukraine, which is taking place in difficult crisis conditions. Internationalization in Ukraine is understood as the main feature of the competitiveness of higher education institutions (Lunhu et al., 2024).

According to the results of the TEMPUS Project "E-Internationalization for Collaborative Learning" in Ukraine, within the framework of research, the scientists pay significant attention to the virtual internationalisation of education (Education et al., n.d.). Internationalization at the university level is related to (Education et al., n.d.): issues of HEI management, issues of accreditation and assessment, students, teaching staff, and curricula. The Concept of Virtual Internationalization of Higher Education in Ukraine presents a model and tools for the virtual internationalization of higher education. Bruhn-Zass (2022) developed

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and presented the concept of virtual internationalization in higher education, which refers to the internationalization achieved through the use of ICT. Virtual internationalization is related to the context of inclusiveness of international experience and external challenges of internationalization.

To address the specific barriers identified in the Ukrainian academic landscape, various analytical tools and specialized studies have been proposed. Verbovska, Stepaniuk, and Kushlyk (2019) propose using SWOT analysis to develop a strategy for the internationalization of a higher education institution. International models and mechanisms of internationalization in higher education were analysed by Anisimova (2019). Bebko considers cooperation and internationalization of higher education as tools of interaction that have the potential for intercultural learning at the international level (Bebko, 2021). B. Leask emphasizes that the internationalization of the education curriculum has the potential to align broader institutional goals focused on internationalization with student learning (Leask (2016). Zaiachuk (2020) understands internationalization as an international activity that encompasses the concepts of academic mobility, international initiatives and programs, international consortia, projects and communities. Despite the abundance of research on these separate elements, there remains a gap in understanding them as a unified, crisis-responsive system.

The study (Bergamaschi et al. 2021) analysed in detail the recent publications devoted to the interrelationship of internationalization and digitalisation (the

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analysis included the presence of keywords and the number of articles). It was found that internationalization and digitalisation were not studied as part of a cyclical process in any of the analysed works (Bergamaschi et al. 2021). In response to this gap, this paper proposes a synthesis of internationalization, digitalization, and resilience within a new conceptual model. To synthesize the diverse perspectives on internationalization and digitalization, this study adopts the "Crisis-Informed Digital Internationalization" (CIDI) framework. This model posits that during periods of geopolitical instability (such as the war in Ukraine), traditional internationalization (physical mobility) is replaced by digital-centric strategies. Within this framework, digitalization is not merely a supportive tool but a foundational mechanism for maintaining academic continuity. Our analysis is guided by three interconnected dimensions of this model: (1) Digital Infrastructure (the availability of tools), (2) Digital Agency (the skills of PhD students to use these tools), and (3) Institutional Adaptation (how universities support virtual cooperation in a crisis).

Materials & Methods

The following research methods were used: theoretical, in particular, analysis, generalization, systematization of scientific and scientific-methodological sources on the research problem, Internet resources, and empirical: diagnostic (targeted pedagogical observations, questionnaires, testing; analysis of teachers' work experience according to the main provisions of the study) to identify the state of

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the research problem. Data analysis was performed using descriptive statistics, cross-tabulation, and Spearman's correlation analysis to identify patterns in digital tool adoption.

Data Collection and Participants. The study employed a purposive sampling strategy, targeting individuals directly involved in the doctoral training system in Ukraine. A total of 94 respondents participated in the survey. The questionnaire was distributed electronically to the official email addresses of target higher education institutions and research centers. The survey was active from October 16 to November 11, 2024.

Instrument. The primary research tool was a structured questionnaire developed specifically for this study by the authors. The instrument was designed to assess the intersection of three key domains: sustainable development, internationalization strategies, and digital support in doctoral education.

The questionnaire consisted of four thematic blocks:

Demographic and Institutional Profile: Information on the respondents' region, institution, position, and age.

Sustainable Development (SD): Questions regarding the awareness and implementation of SD principles and the Sustainable Development Goals (SDGs) within educational programmes and institutional initiatives.

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Internationalization: Items focusing on international cooperation programmes, institutional support for PhD students' mobility, and the perceived impact of internationalization on research quality.

Digital Tools and Competencies: Assessment of the digital tools used for research and communication (e.g., Zoom, Google Docs, AI tools like ChatGPT/Gemini, and academic databases like ResearchGate or Mendeley), and the self-reported level of digital proficiency.

The instrument utilized a mix of closed-ended questions, multiple-choice options, and Likert-type scales. To ensure content validity, the questionnaire underwent internal peer review by the research team to align the questions with the study's objectives and the specific context of the Ukrainian higher education landscape during the wartime period.

Validation and Reliability. The survey instrument's content validity was ensured through a two-stage expert review process involving three specialists in digital education and internationalization. To assess internal consistency, a pilot study was conducted with a small sample ($n=5$) of PhD students, resulting in minor adjustments to question phrasing for greater clarity.

Data Analysis. The study employed a mixed-methods approach. Quantitative data were processed using descriptive statistics (frequencies and percentages) and cross-tabulation to identify correlations between digital competence and tool

adoption. Qualitative data from open-ended questions were analyzed using thematic coding to identify recurring barriers and drivers of internationalization.

Limitations of the Study. Several limitations must be acknowledged. First, the sample bias: 84% of respondents were from the Kyiv region, which, despite being the educational hub, may not fully reflect the challenges faced by universities in frontline or occupied territories. Second, the timing: the survey was conducted during a period of intense infrastructure attacks, which might have influenced the low response rate from certain regions and skewed the data toward those with better current access to electricity and the internet.

Results

Institutional support of the internationalization processes in Ukraine and European universities: the basics of the survey implementation

Analysis of Ukrainian legislation has revealed that, in recent years, Ukraine has developed numerous strategic documents aimed at supporting the internationalization of higher education. In particular, the Strategy for the Development of Higher Education in Ukraine for 2022-2032 (Cabinet of Ministers of Ukraine, 2022) defines internationalization as one of the five strategic goals for the development of the higher education system, namely in the areas of harmonizing the structure of higher education following the obligations of the member states of the European Higher Education Area, creating conditions for the recognition of Ukrainian educational qualifications at the international

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level, and simplifying the procedures for recognizing diplomas and certificates obtained abroad.

The "Strategic Pyramid for the Development of Higher Education in Ukraine for 2022-2032" (Ministry of Education and Science of Ukraine, 2022) was also created, which defines internationalization as one of the key areas of international development in the context of integration into the European educational environment.

The authors of the present study agree with the conceptual approaches to grouping the components of the internationalization process that were used during the implementation of the "Erasmus+ Project "Sustainability and Internationalization Capacities to Promote Modernisation of Newcomers Higher Education in Neighbourhood East Countries" (SIN-NEC)", namely the following.

The Internationalization of Management includes the following components:

1. Strategic Planning: This is integrated into the university's mission and includes goals and indicators to measure achievements.
2. Legal Frameworks for Internationalization: A set of legal documents regulates areas such as: management of international partnerships; arrangements for foreign business trips; hosting foreign staff, students, and delegations; development and implementation of international projects.

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3. Methodological Support: This includes training conducted by the International Relations Office (IRO), guides for staff on various topics, and websites aimed at students.

Considering the insights from scientists Akbar Zolfaghari, Mohhamad Sabran Shatar, and Ali Zolfaghari from the University of Putra in Malaysia, we will discuss the key components of internationalization in higher education. These components can be categorized into several main categories. (Zolfaghari et al., 2009):

1. Policy and Strategy. National and institutional internationalization strategies are documents that define the goals and mechanisms of internationalization.

Funding: grants, scholarships, mobility programs for students and teachers.

University partnerships: bilateral and multilateral agreements between educational institutions.

2. Academic mobility. Student mobility: exchange programs (Erasmus+, Fulbright, etc.). Mobility of teachers and researchers: internships, teaching abroad, joint research projects. International double degree programs: joint educational programs between universities in different countries.

3. Educational content and methods. Integration of the international component into curricula: use of the global context in courses. Teaching in foreign languages: development of programs in English or other languages. Application of digital

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technologies: virtual mobilities, collaborative online learning (COIL – Collaborative Online International Learning).

4. Research and innovation. International cooperation in science: participation in international research consortia. Publications in international journals: dissemination of research results in the global scientific community. Grants and international financial programs: raising funds for scientific projects.

5. Cultural aspect and community development. Internationalization of campuses: the creation of a multicultural environment for learning. International student associations: promotion of social integration of foreign students. Intercultural competence: development of communication and cooperation skills in a global environment.

6. Institutional development and management. International rankings and accreditation: compliance with international educational standards. International cooperation centers are specialised units in universities that coordinate international relations. Legal and administrative aspects: adaptation of the education management system to international norms.

Teachers' and students' abilities to use digital tools and virtual exchanges for the internationalization of educational activities: 2025 survey results

The Institute for Digitalisation of Education of the NAES of Ukraine conducted a study on the internationalization process within the doctoral training system (PhD students). The sample size consisted of 94 respondents. The survey

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was carried out from October 16, 2024, to November 11, 2024. While the study covered all regions of Ukraine, the vast majority of respondents (84%) represented the Kyiv region. The questionnaire was distributed to the official addresses of the target institutions involved in doctoral education.

To provide a clear context for the research findings, Table 1 summarizes the demographic characteristics of the respondents involved in the study. This overview is essential for interpreting the correlations between age, professional roles, and digital tool adoption.

Table 1.

Demographic Profile of Survey Respondents (n=94)

Characteristic	Category	Number	%
Professional Role	PhD Students / Researchers	53	56.4%
	University Faculty / Teaching Staff	41	43.6%
Age Group	18–25	11	11.7%
	26–35	42	44.7%
	36–45	22	23.4%
	46–55	14	14.9%
	>55	5	5/3%

Internationalization of education in the context of digitalization is becoming increasingly important for developing higher education in Ukraine. Modern digital technologies expand the possibilities of academic mobility, international cooperation, and access to high-quality educational resources. At the same time,

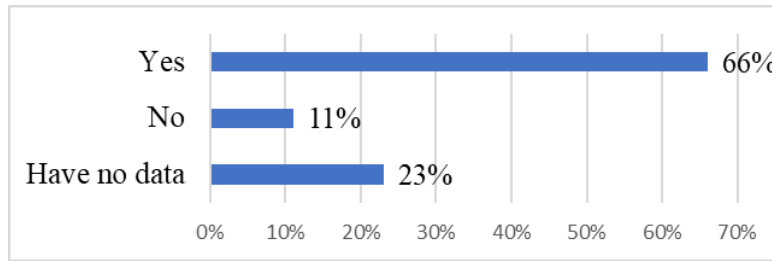
globalization and digital transformation present new challenges for educational institutions. They require the adaptation of curricula, enhancement of digital infrastructure, and the development of competencies for both teachers and students.

An important aspect of this process is the analysis of students' and teachers' opinions regarding internationalization. Analysing the results of the survey of students and teachers, it was found that 66% of respondents are aware of additional training programs or courses on the development of digital competence organised by higher education institutions, but almost 23.4% do not have such information, and 10.6% noted that higher education institutions do not take care of this issue (Figure 1). This means that more than half of the respondents are aware of programs for the development of digital competence; however, there are institutions that do not support such programs or support them only partially. At the same time, some of the respondents are not interested in those programs that exist. This means that the issue of digitalisation of higher education institutions remains on the agenda even for graduates who have chosen doctoral programs.

Figure 1

The respondents' awareness of the additional courses and curricula regarding digital competence development (authors' survey, 2024)

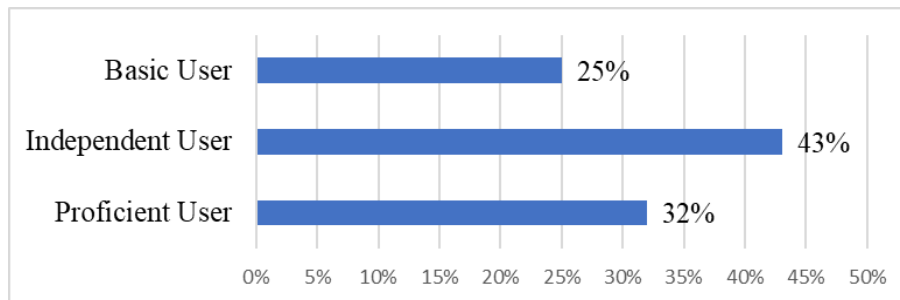
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However, only 31.9% of respondents assess their level of competence as professional and 42.6% as average, as detailed in Figure 2. A fairly high percentage, namely 25.5% of respondents, indicated that they have only basic digital skills.

Figure 2

The level of the digital competence of Ukrainian respondents (authors' survey, 2024)



In assessing the demand for digital tools used in educational or scientific activities, respondents reported that they most frequently use Google Drive,

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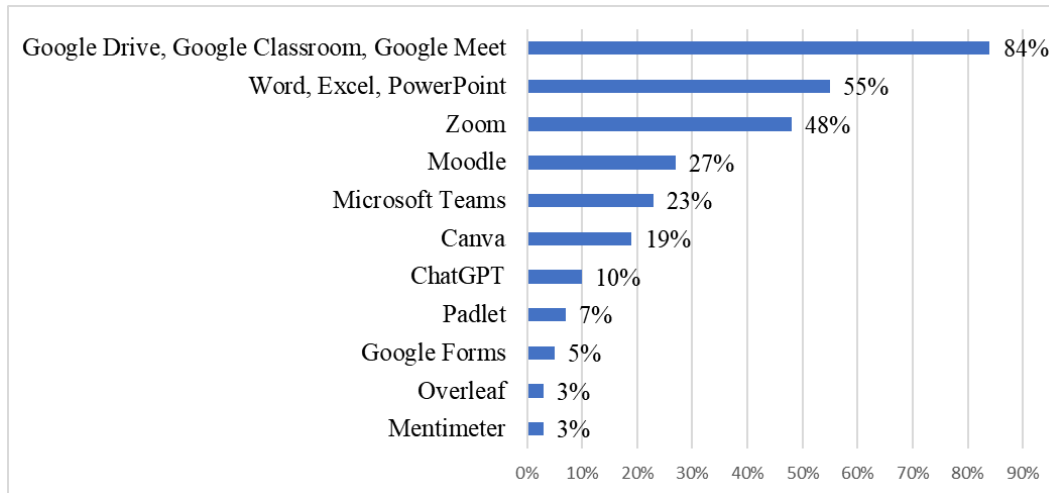
Google Classroom, and Google Meet. They indicated that other digital services, such as Zoom, Word, Excel, PowerPoint (both Google and MS Office), and the Learning Management System Moodle, are less commonly used for their daily work. Other services, presented in Figure 3, meet the individual needs of respondents and are not intended for widespread use.

The low adoption of Moodle, when compared to the high usage rates of Google Workspace (84%) and Zoom, can be attributed to several factors. Firstly, there is the issue of accessibility/ Cloud-based tools offer superior mobile compatibility and lower bandwidth requirements, which is especially important during power outages or unstable internet connections that can occur due to the war. Secondly, institutional support plays a role. While Moodle requires centralized server maintenance, Google tools allow individual researchers more autonomy and "ready-to-use" collaborative environments for international projects. This functionality eliminates the need for complex institutional permissions.

Figure 3

The respondents' demand for digital tools for educational/teaching or scientific activities (authors' survey, 2024)

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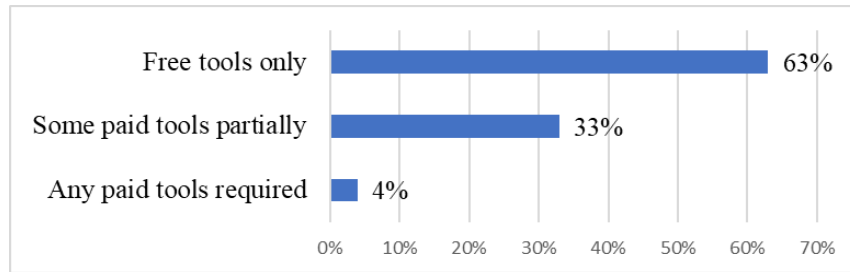


We analyzed previous results and found that not all digital tools are available in HEIs. Thus, 62.8% indicated that they use free services, 33% are partially paid, and only 4.3% use paid services (Figure 4). This suggests that a significant number of respondents use only those services that are available and freely accessible, which limits both their development of digital competence and opportunities for international exchanges.

Figure 4

Accessibility of digital tools to teachers, students, and scholars (authors' survey, 2024)

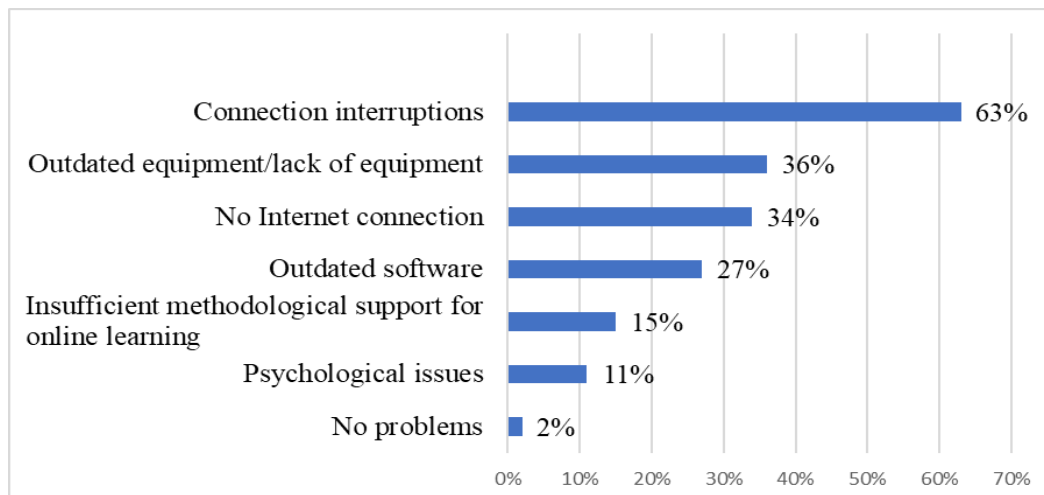
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Restrictions on the use of digital tools and unstable access to the Internet create certain difficulties during online learning and teaching (Figure 5). Among the major problems during online learning, respondents noted: communication interruptions (62.8%), outdated equipment (36.2%), outdated software (26.6%), lack of Internet (34%), and insufficient scientific and methodological support for online learning (14.9%).

Figure 5

Difficulties and restrictions during online learning/teaching/scientific communication (authors' survey, 2024)



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To explore the connection between researchers' digital proficiency and their use of modern research tools, a cross-tabulation analysis was conducted (see Table 2). The significance of the differences observed between groups with high and basic/intermediate competence was verified using the Chi-square test, with the resulting p-values integrated into Table 2. The results demonstrate a strong positive trend: respondents with high digital competence are significantly more likely to integrate AI-driven tools and cloud-based collaborative platforms in their international research activities compared to those with basic or intermediate skills.

Table 2.

Relationship between Self-Reported Digital Competence and Research Tool

Usage (n=94)

Research Tools & Practices	High Digital Competence Group (%)	Basic/Intermediate Competence Group (%)	Statistical Significance (approx.)
AI Integration (ChatGPT, Gemini, etc.)	92%	34%	p<0.01
Cloud Collaboration (Google Workspace)	88%	52%	p<0.05
Academic Networking	76%	41%	p<0.05

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Research Tools & Practices	High Digital Competence Group (%)	Basic/Intermediate Competence Group (%)	Statistical Significance (approx.)
(ResearchGate, Mendeley) Data Visualisation Tools (Canva, Tableau)	64%	28%	p<0.01

A cross-tabulation analysis was performed to identify the relationship between digital proficiency and the practical application of research tools. The analysis revealed a significant positive correlation between self-reported digital competence and the frequency of AI tool integration (e.g., ChatGPT, Gemini) in academic activities. Specifically, 92% of respondents with high digital literacy utilize AI for data synthesis, compared to only 34% in the lower-competence group. Furthermore, a moderate negative correlation (Spearman's $\rho = -0.42$) was found between age and the adoption of cloud-based collaborative tools (e.g., Google Workspace), suggesting that younger researchers are more inclined to use digital platforms for international research collaboration.

Virtual exchanges are essential tools for the digitalisation of education and contribute significantly to its internationalization. Virtual Exchange (VE) is an educational practice that uses technology to bring together students from different countries or cultural backgrounds for interaction and collaboration under the guidance of educators or expert facilitators. VE combines intercultural

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communication with digital technologies and online pedagogy to create inclusive and accessible online learning programs (O'Dowd, 2021; O'Dowd, 2020).

Virtual exchanges open up new opportunities for cooperation between educational institutions, teachers, and students, eliminating geographical and financial barriers. Thanks to such exchanges, the educational process becomes more accessible, mobile, and integrated into the international context. The exchanges provide fast and effective communication between participants in the educational process, reducing the time for transferring information and expanding access to global academic and scientific resources; creating conditions for involving foreign teachers, which improves the quality of education and contributes to the introduction of international experience. Through virtual exchanges, joint educational programs, projects, and research can be organized, facilitating a continuous professional dialogue among scientists, students, and representatives of international organizations. They play an essential role in developing academic mobility, as they allow taking courses and participating in conferences and scientific events without needing physical presence.

It should be noted that such types of virtual exchanges as summer schools, online schools, and digital or thematic educational marathons have become positive practices in Ukraine. An essential aspect in the implementation of virtual exchanges is the careful selection of digital services to support various forms of learning that we offered to our audience, namely Zoom, Microsoft Teams, Google

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Meet (organization and conduct of video conferences); Moodle, Coursera, EdX, Canvas (educational platforms with educational resources and courses); Miro, Padlet (interactive boards for discussions, debates, and idea generation); Google Workspace, Microsoft 365 (cloud-oriented environments and services for collaboration); and Labster, PhET (virtual laboratories). Thus, virtual educational exchanges have become an essential tool for integrating digital technologies into the educational process, contributing to the globalisation of education and the development of participants' competencies in the digital society.

Within the framework of the international project "Sustainability and Internationalization Capacities to Promote Modernisation of Newcomers' Higher Education in Neighbourhood East Countries" (SIN-NEC), Grant Agreement No. 101129029, several digital tools were tested to ensure effective communication and learning during virtual exchanges. To the tools listed above, foreign colleagues added international exchange networks, in particular:

- IVEC: Explore resources provided by the International Virtual Exchange Conference, which includes guides, case studies, and best practices for implementing VE programs;
- COILconnect: Access resources and community support offered by COILconnect, an online platform dedicated to supporting institutions and connecting educators participating in COIL;

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– Unicollaboration: Use tools, and resources available on the Unicollaboration platform, which supports remote collaboration and VE initiatives.

Unicollaboration has a LinkedIn page;

– European Hub for Virtual Exchange/COIL: Use resources provided by the European Hub, which supports the integration of VE in higher education institutions across Europe;

– Global Case Study Challenge (GCSC): Educators can join an 8-week virtual exchange hosted by GCSC and gain practical experience and understanding of a pre-designed and expert-led virtual exchange program. Access to online blogs and resources provided on the Virtual Exchange and the GCSC LinkedIn page (O’Dowd, 2021; O’Dowd, 2020);

– The International Virtual Exchange Consortium (IVEC) (<https://iveconference.org>) is a global, inclusive community of virtual exchange practitioners, researchers, and professionals that provides a forum for dialogue and growth. The community aims to advance pedagogy and research in virtual exchange through networking, hosting an annual conference, sharing best practices, and supporting professional development. IVEC is shaped by a range of stakeholders engaged in virtual exchange, from thought leaders to emerging voices;

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- COIL connect (<https://coilconnect.org/>) - a resource with access to a directory of higher education institutions that practice Collaborative Online International Learning and virtual exchanges;
- Global Case Study Challenge (GCSC) (<https://www.globalcasestudychallenge.com/>) – an international educational initiative aimed at developing skills in working in global virtual teams, intercultural communication, and digital leadership among students and young professionals;
- UNI Collaboration (<https://unicollaboration.org/>) is a non-profit association organised and existing under the laws of the Kingdom of Belgium. It is a structured association with a Management Board and a General Council, led by administrative staff and academics based mainly in Europe, but also worldwide. Organisation promoting the development and integration of Virtual exchange across ALL disciplines and interest areas in formal and non-formal educational settings, including Higher education;
- UNICollaboration includes four specialized groups responsible for specific areas of research and practical implementation (<https://unicollaboration.org/index.php/sigs/>);
- European Hub for Virtual Exchange/COIL aims to develop and support virtual exchanges and Collaborative Online International Learning (COIL) among European higher education institutions. The hub aims to create a platform for

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networking, sharing experiences, and developing joint educational projects that contribute to the internationalization of curricula and the development of intercultural competencies of students;

– The Graduate Student SIG is a specialized group of UNICollaboration that brings together PhD students and researchers in the field of virtual exchanges.

Primary and Secondary Teacher SIG is a group for educators who practice or are interested in virtual exchanges in school education, including participants of the VALIANT network (2021-2024);

– Teacher Professional Development SIG is focused on supporting teachers and students of pedagogical specialities who are involved in professional development through virtual exchanges.

Overall, virtual exchanges contribute to the formation of a global educational space where students and teachers can seamlessly collaborate, exchange knowledge and experience, and participate in international initiatives, expanding the horizons of learning and research.

Discussion

The findings of this study align with broader European trends in doctoral education, specifically the shift towards "Digital Internationalization." While European initiatives, in particular the Digital Education Action Plan (2021-2027) emphasize the systemic integration of AI and cloud technologies, our results demonstrate a unique "adaptive resilience" within the Ukrainian PhD system.

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Unlike many EU-based studies that focus on internationalization through physical mobility (Erasmus+), our data (84% respondents from the Kyiv region) highlights a pivot toward virtual internationalization. This serves as a critical case study for other regions facing geopolitical instability or crises, showing how digital tools (AI, academic networks like ResearchGate) can compensate for restricted physical mobility. Furthermore, the correlation between digital competence and tool usage found in this study mirrors findings in recent Polish and Baltic studies, confirming that digital literacy remains the primary gatekeeper to global research integration regardless of the geographical context.

The concentration of respondents in the Kyiv region (84%) may lead to an overestimation of the overall digital readiness of Ukrainian PhD students. Kyiv, as a major educational hub, often possesses superior digital infrastructure and institutional support compared to frontline or heavily occupied territories. Consequently, while our findings reflect a high level of adaptive resilience, they may represent an "optimistic baseline" rather than the national average, particularly in regions where internet stability and access to devices are significantly more constrained.

Recommendations.

The recommendations are drawn from the research conducted and the results of the survey. Respondents provided several suggestions to enhance internationalization processes within the context of digital education. Based on the

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CIDI framework, the authors propose the following high-level strategic recommendations for Ukrainian HEIs:

1. **Developing Digital Infrastructure for Academic Continuity and Mobility.** To remove barriers to international education and support remote academic mobility, institutions should prioritize the integration of LMS (Moodle, Canvas), MOOCs (Coursera, edX), and open digital ecosystems. This includes the harmonization of digital standards and the use of digital knowledge passports to facilitate the transition between universities regardless of the student's physical location.

2. **Enhancing Global Research Collaboration through Open Science and Cloud Environments.** To increase the citation index and simplify access to international grants, researchers should utilize open scientific libraries (Scopus, Web of Science, Zenodo) and shared cloud services (Google Drive, Dropbox, OneDrive) for real-time teamwork. Integrating tools for analyzing scientific literature (Zotero, Mendeley) and professional platforms (ResearchGate, LinkedIn) creates an international digital space for collective scientific projects.

3. **Optimizing Communication and Knowledge Transfer via AI and Real-Time Tools.** Institutions should reduce information transfer time by integrating instant messengers (Slack, Telegram) and video conferencing platforms (Zoom, Microsoft Teams) for guest online lectures. The use of artificial intelligence (ChatGPT, DeepL) for automatic translation and collaborative editing (Google

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Docs, Notion) ensures the effective involvement of foreign teachers and researchers in the educational process.

4. Ensuring Inclusiveness and Global Accessibility of Educational Resources. Digitalization must be used as a tool to support students with special needs and ensure equal access to education regardless of place of residence. This involves providing global accessibility to educational materials, open repositories, and international forums, ensuring that internationalization remains inclusive and resilient during crisis periods.

Policy Implications. For Ukrainian HEIs, the findings suggest a need to formalise "virtual mobility" as a legitimate component of doctoral training. International partners should focus on "digital integration" grants—providing access to high-cost academic databases and AI-powered research platforms rather than only traditional physical exchange programs.

Crisis-Informed Internationalization. Comparing Ukraine's experience with other conflict-affected regions (e.g., Syria or Afghanistan), a distinct pattern of "digital resilience" emerges. While research in other regions often faced complete stagnation, Ukrainian PhD students demonstrate proactive adaptation through AI tools and digital networking, suggesting that a pre-existing digital infrastructure is the primary factor in maintaining academic continuity during a crisis.

Conclusion

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During the research, it became clear that Ukraine's quarantine period and wartime increasingly prompted Ukrainian teachers to incorporate digital tools into their teaching practices. Universities have become more digitalised and have begun offering more distance courses for students, including those in multicultural settings. However, this is not enough, the study found, not all digital tools are accessible and free for teachers and students, especially in the crisis conditions in which Ukrainian universities operate today. The survey reveals that, despite the widespread use of digital tools in universities today, there is a significant demand for new software, equipment, and didactic and psychological support for students and teachers. An important aspect of Ukrainian education today is fostering interactions and establishing partnerships with European universities. These collaborations create conditions for internationalization and enable the implementation of student and teacher mobility principles within the educational process. Opportunities include participation in European educational projects, particularly under the Erasmus programs, which help bridge gaps between European higher education institutions and enhance communication among students and teachers.

Additionally, the ability to learn common languages, such as English, an internationally recognised language for educational internationalization, plays a crucial role. The adoption of internationalization strategies by higher education institutions is a key initial step towards further education development and

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integration of the Ukrainian higher education into the European and world educational community. In particular, the experiences of the authors and various higher education institutions in Ukraine have shown that internationalization strategies allow institutional administrations, teachers, and students to effectively organise activities focused on the international exchange of experiences and knowledge. This, in its turn, accelerates the processes of educational internationalization. Digital support for internationalization is crucial for Ukraine and other countries to facilitate rapid professional exchanges across borders.

From a policy perspective, Ukrainian HEIs should institutionalise virtual mobility, invest in systematic digital competence development, and integrate AI-driven research tools into doctoral training as core components of their internationalization strategies. At the same time, international partners are encouraged to prioritise digital integration support – such as shared access to academic databases, AI platforms, and joint virtual research infrastructures – alongside traditional mobility programs.

The forthcoming initiatives will evaluate the long-term effects of internationalization within Ukrainian universities and scientific institutions. Specifically, the further investigations will focus on implementing advanced digital technologies, including augmented reality (AR), virtual reality (VR), and artificial intelligence (AI) tools, to enhance virtual exchanges between educators and students.

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Conflict-of-interest statement

None of the co-authors has a conflict of interest to disclose.

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