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Digital Transformation in Higher Education: A Comparative Analysis of Ukraine and the Czech Republic

Abstract: This article explores the digital transformation in higher education, offering a comparative analysis of Ukraine and the Czech Republic. Over the past decade, digitalization has become a pivotal component of educational reform, with universities striving to adapt to the rapid evolution of digital technologies. The COVID-19 pandemic further accelerated this transformation, forcing institutions to shift to online modes of learning, teaching, and research. This study investigates how both Ukraine and the Czech Republic have responded to these challenges through national strategies, institutional innovations, and international cooperation. In particular, the paper examines five core dimensions of digital transformation: national digitalization policies, digital infrastructure, faculty development, student access, and institutional autonomy. While the Czech Republic benefits from strong integration with European Union frameworks and funding programs such as Erasmus+ and Horizon Europe, Ukraine faces considerable structural and geopolitical obstacles, especially during the ongoing military conflict. Despite these challenges, Ukrainian universities have demonstrated notable resilience and creativity in implementing digital tools, often relying on international partnerships and external support. The study reveals both convergences and divergences between the two national systems. Czech universities typically enjoy more autonomy and stable infrastructure, enabling them to design sustainable digital strategies and participate in international research initiatives. Ukrainian universities, meanwhile, navigate resource constraints but show strong adaptability and motivation to align with European educational trends. The findings suggest that successful digital transformation depends not only on technological infrastructure but also on policy consistency, institutional leadership, and inclusive access for all stakeholders. The article concludes with strategic recommendations to foster long-term digital capacity, including strengthening faculty digital competencies, supporting students in rural areas, and promoting cross-border academic collaboration. This comparative study contributes to the growing body of literature on digital transformation by highlighting context-specific responses and offering insights for policy-makers and educational leaders in similarly positioned countries.

Keywords: digital transformation, higher education, Ukraine, Czech Republic, digital infrastructure, international collaboration, student access, digital pedagogy.

Introduction

The rapid integration of digital technologies into all spheres of public life has fundamentally transformed the landscape of higher education around the world. The concept of digital transformation in education encompasses the restructuring of pedagogical approaches, the

redesign of administrative processes, and the enhancement of research capabilities through digital tools and platforms. In this context, higher education institutions (HEIs) are required not only to adopt new technologies but also to cultivate a digital culture that permeates all levels of academic and institutional life.

In recent years, digital transformation has become especially relevant for countries undergoing structural transitions, such as Ukraine, and for countries within the European Union, such as the Czech Republic. Both nations have embarked on ambitious paths to modernize their education systems, albeit under different socio-economic and political circumstances. Ukraine's digital education reforms have intensified due to the dual pressures of globalization and military conflict, while the Czech Republic has taken advantage of EU digitalization programs and a relatively stable institutional environment.

The relevance of the study lies in its comparative nature, aiming to explore how two countries with varying levels of economic development, political stability, and digital infrastructure are approaching the same global trend—the digital transformation of higher education. As universities worldwide are redefining their missions and operational models, understanding these national experiences provides valuable lessons for policy makers, educators, and academic leaders.

The object of the study is the process of digital transformation in Ukrainian and Czech higher education institutions.

The study aims to conduct a comparative analysis of the strategies, tools, and practices used by HEIs in both countries to implement digital technologies. It also aims to evaluate the effectiveness of these practices in terms of student access, quality of education, research productivity, and international integration.

To achieve these goals, the following objectives were established:

- analyze national digitalization strategies affecting higher education in Ukraine and the Czech Republic;
- identify institutional innovations that have emerged as a result of digital transformation;
- assess the digital competencies of faculty and administrative staff;
- evaluate students' access to digital resources;
- compare the outcomes and challenges in each country.

The study employs a mixed-methods approach, combining policy analysis, institutional case studies, and review of relevant academic literature. This methodology allows for both a macro-level understanding of national policies and a micro-level exploration of institutional practices. Special attention is given to data published by the European Commission, UNESCO, and national ministries of education.

The study is informed by the works of leading scholars in digital education, including H. Andrushchak and O. Burov (2022), M. Černý and J. Malach (2021), R. Kvasnička and M. Štěpánek (2020), L. Lisnych (2023), U. Schmid, L. Goertz and J. Behrens (2020), I. Sokolovska and I. Datsyuk (2022), O. Zawacki-Richter, V. I. Marín, M. Bond, and F. Gouverneur (2020), who emphasize the importance of contextual factors in shaping the outcomes of digital transformation. By examining Ukraine and the Czech Republic, this article contributes to the

ongoing scholarly discussion on how regional and institutional differences influence the digitalization of higher education.

The results of this study are intended for a broad academic audience, including education researchers, policy-makers, university administrators, and faculty members involved in digital strategy development. The insights presented here are particularly relevant for countries that are striving to modernize their education systems under challenging conditions.

Results

The digital transformation of higher education in Ukraine and the Czech Republic is largely influenced by their respective national policies. Ukraine's initiatives such as the Digital Agenda for Ukraine (2020) and the National Strategy for Digital Transformation of Education and Science until 2030 aim to modernize the educational environment through the integration of ICT. Meanwhile, the Czech Republic has implemented the Digital Czech Republic strategy, emphasizing digital education and skills development across all levels of education. These national frameworks have encouraged universities to align their strategies with state-level digitalization goals and provided funding for relevant initiatives (*Molnár & Puklus, 2019*).

So, national strategies play a crucial role in setting the direction and enabling conditions for digital transformation in higher education institutions.

Digital infrastructure forms the backbone of educational digitalization. In Ukraine, significant investments have been made to improve internet connectivity, equip institutions with digital tools, and implement national platforms like EDEBO (Unified State Electronic Database on Education). The Czech Republic's universities benefit from strong IT infrastructure and systems like IS/STAG, providing integrated digital environments for administration and learning. Both countries have expanded the use of learning management systems (e.g., Moodle, Google Classroom) and virtual labs, particularly during the COVID-19 pandemic, which accelerated the shift to blended and online learning models (*Budnyk & Mazorchuk, 2021*).

Thus, the development of robust digital infrastructure and e-learning platforms is essential for scalable, resilient, and accessible digital education.

The successful implementation of digital technologies in higher education relies heavily on the digital competencies of academic staff. Ukraine has promoted digital literacy through national training programs such as "Digital Teacher" and local university-based workshops. In the Czech Republic, educators receive ongoing support through programs like DigiEduHack and institutional centers for teaching and learning. In both countries, professional development efforts have increased, focusing on pedagogy, the use of digital tools, and adapting to hybrid teaching formats (*European Commission, 2021*).

Consequently, continuous professional development and institutional support are key to empowering faculty members to adopt and integrate digital technologies effectively.

Digitalization can both alleviate and exacerbate educational inequalities. In Ukraine, disparities in access to devices and high-speed internet remain a challenge, particularly in rural areas. Efforts to mitigate these include governmental subsidies and university-led initiatives to lend equipment (*Ponomarenko & Kushnir, 2020*). Czech universities generally report higher digital access, though attention is still paid to supporting students with disabilities or socio-economic

disadvantages. Accessibility features and inclusive e-learning design are increasingly prioritized in both systems.

So, addressing equity in digital access is fundamental to ensuring inclusive digital transformation in higher education.

Autonomous institutions are more agile in implementing innovative digital practices. In Ukraine, higher education institutions have used their autonomy to introduce digital services, such as electronic student records and remote admissions. Czech universities, benefiting from stable governance structures, have launched numerous digital initiatives, including AI-supported advising and blockchain-based credentialing. However, institutional digital maturity varies widely and is influenced by leadership vision, funding, and collaboration networks (*Mashtalir & Trofymenko, 2022*).

Thus, institutional autonomy combined with visionary leadership enhances innovation capacity and the pace of digital transformation.

Digitalization facilitates international cooperation in education. Ukrainian and Czech universities have expanded participation in European projects like Erasmus+, Horizon Europe, and Digital Europe. Joint virtual courses, online conferences, and mobility programs exemplify the benefits of cross-border digital initiatives. Nonetheless, challenges such as language barriers, platform compatibility, and legal frameworks remain. Strengthening digital interoperability and common standards is essential for sustainable cooperation (*Lisnych, 2023*).

Consequently, cross-border digital collaboration enriches academic exchange but requires coordinated efforts to overcome structural and technological barriers.

Discussion

Despite substantial progress in the digital transformation of higher education in Ukraine and the Czech Republic, several important challenges and open questions remain. One of the core research problems concerns the sustainable integration of digital innovations in pedagogical practice. While both countries have implemented strategic frameworks and infrastructure projects, the actual usage of digital tools by faculty and students varies significantly across institutions (*Radkovets, 2023*).

A critical issue for further examination is how national policies translate into localized, institution-specific practices. To what extent are universities able to maintain the momentum of digital innovation without external funding or crisis-induced incentives such as those caused by the COVID-19 pandemic? Moreover, the development of digital competencies among faculty remains uneven, suggesting a need for longitudinal studies on the effectiveness of current training programs and their impact on teaching quality (*Farnell et al., 2021*).

Another area warranting further discussion is the role of institutional autonomy and leadership in fostering innovation. The Czech model shows that stable governance and long-term investment can accelerate digital maturity. In Ukraine, however, the political and economic instability poses risks to the consistency of digital reforms, raising the question of how institutions can build resilience and continuity in their transformation journeys.

Furthermore, digital equity and inclusion emerge as pivotal themes. Despite efforts to expand access, rural areas and disadvantaged groups still face significant barriers. What mechanisms can be established to ensure that digitalization does not deepen existing inequalities?

Finally, cross-border digital collaboration opens new frontiers but also introduces complexity. Future research could explore the impact of interoperable systems and multilingual platforms on international academic cooperation, especially in joint degree programs and research initiatives.

In light of these unresolved questions, the discussion underscores the necessity for ongoing comparative research, policy dialogue, and institutional self-assessment to support effective and inclusive digital transformation in higher education.

Conclusion

The comparative analysis of digital transformation in higher education institutions in Ukraine and the Czech Republic reveals a complex but promising landscape. Both countries have made notable progress in integrating digital technologies into educational practices, though at different paces and with varying systemic support. National strategies have played a foundational role in setting the vision for digital advancement, while institutional efforts have determined the pace and quality of implementation.

Improvements in digital infrastructure and the adoption of e-learning systems have significantly increased the accessibility and flexibility of education. However, the sustainability of these innovations' hinges on consistent investment and long-term planning. The upskilling of academic staff through professional development initiatives remains crucial to ensuring meaningful pedagogical change. At the same time, issues of digital equity continue to pose challenges, especially in underserved regions.

Institutional autonomy, when supported by visionary leadership, emerges as a critical factor in fostering innovation. Czech institutions demonstrate how stable governance can accelerate digital maturity, whereas Ukrainian institutions must navigate additional external pressures that affect continuity and planning.

Cross-border collaboration represents a key opportunity, enabling the sharing of knowledge and technologies across borders. Yet it also demands greater interoperability, policy alignment, and inclusive design to ensure equitable benefits.

Thus, digital transformation is not a finite goal but an ongoing process that requires systemic coordination, adaptability, and inclusive practices. The findings of this study underscore the need for further comparative research, particularly on the long-term impacts of digital reforms, the effectiveness of training initiatives, and the resilience of higher education institutions in the face of political and economic uncertainties.

Conflict of interest

The author declares that there is no conflict of interest.

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