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Digital Transformation in Higher Education: Challenges and Transformation Directions

Research Paper

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Abstract: **Research purpose.** The purpose of this paper is to analyse the challenges and transformation directions of digital transformation in higher education institutions (HEIs), with a direct focus on management processes. The paper study applies a systems-based managerial perspective to identify and systematise the main and supplementary processes directly affected by digital transformation, and to evaluate their implications for governance, institutional competitiveness, and academic performance.
Design / Methodology / Approach. The study is based on secondary sources, including legislation and policy documents, and publicly available studies. A qualitative case study and thematic content analysis were applied to examine strategic and operational documents of nine Lithuanian HEIs. Document selection followed the defined inclusion criteria of relevance, validity, and institutional scope. Coding was performed using both deductive and inductive categorisation. The study adopts a systems approach to the digitalisation of higher education, focusing on aspects such as the transformation of higher education, process transformation, and the governance of digitalisation of higher education processes.
Findings. Digitalisation is transforming the main functions of HEIs, reshaping traditional activities into new formats. At the same time, findings reveal that digitalisation is unevenly implemented across different institutional processes. Core academic functions such as study organisation, assessment, and research are more advanced, while supplementary areas like student support, administrative modernisation, and digital communication remain underdeveloped. The study identifies challenges in managing digital transformation and highlights areas where effective governance solutions are lacking to ensure a smooth and sustainable transition. Key governance challenges identified include the lack of strategic alignment, limited system capacity, and insufficient digital competencies among staff.
Originality / Value / Practical implications. This research contributes to the understanding of digital transformation in higher education by offering insights into the challenges and opportunities associated with digital transformation. It provides a systems-oriented contribution by combining managerial decisions with technological change, emphasising governance, leadership, and organisational culture. Practical recommendations are offered for HEIs, particularly for institutions with limited resources, on how to prioritise actions, enhance digital capabilities, and implement digital strategies.

Keywords: *digitisation • higher education processes • management • challenges*

JEL codes: I23, M15, O32, O33

Introduction

Higher education institutions (HEIs) in today's society are inextricably linked to the integration of technology and digital transformation processes. The growing role of information technology is encouraging universities and other HEIs to seek innovative solutions to improve the quality of teaching, resource management and increase accessibility (Kaputa et al., 2022). HEIs around the world are undergoing an intense period of digital transformation, driven by technological advances, increasing student mobility and changing labour market demands (Alenezi, 2021).

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The digital transformation of HEIs has become a key factor in their competitiveness, efficiency, and innovation. Digital transformation, if properly implemented, can help to improve the student experience, enhance the quality of research and strengthen international cooperation (Gkrimpizi & Peristeras, 2022).

However, digital transformation is not only about the introduction of individual technologies, but also a fundamental change that cuts across the entire higher education ecosystem, from the study process to research and international cooperation. The digital transformation of higher education can be seen as a complex system that depends on the interaction of different processes (Feliciano-Cestero et al., 2023). The effectiveness of this system depends not only on the application of technology but also on strategic management decisions to maximise the opportunities offered by digital innovation (Gkrimpizi & Peristeras, 2022). While technology opens new opportunities, the higher education sector faces challenges such as data protection issues, the development of digital skills for teachers and students, the modernisation of technological infrastructure and the effective implementation of a digital strategy (Hashim et al., 2022). Higher education leaders should focus on identifying the best digital transformation strategies to create a sustainable and effective academic digitisation ecosystem. Each element has its own specific elements and can be optimised and digitised to improve the quality, efficiency, and management decisions of teaching (Nita & Gutu, 2023). In higher education, there are main processes such as the organisation of studies, the development and evaluation of teaching methodologies, and additional processes that support the smooth running of the academic community. These processes include academic support, career development, faculty and administrative development, infrastructure management, and digitalisation of organisational activities (Mishra et al., 2020). Effective management of the digitalisation processes is essential to ensure the competitiveness of the HEIs and the student and faculty experience.

The introduction of digital solutions is revolutionising traditional HEIs' processes, enabling the development of innovative, data-driven strategies that respond more effectively to rapidly changing technological and social trends. By continuously improving both the main and additional processes, institutions can create adapted academic environments that meet today's challenges and foster continuous innovation and strategic development. However, institutions must ensure that digital tools are properly integrated into the higher education system and that their use is in line with the expectations and requirements of the academic community (Haleem et al., 2022). It is therefore important that higher education management not only identifies potential digitisation solutions but also ensures that staff competencies are properly updated and that new technologies are integrated. Only such a holistic approach can lead to a flexible and dynamic academic system that efficiently performs both main and additional functions, contributing to the long-term sustainability and success of the institution. Digital transformation also implies a profound cultural and organisational shift, aiming to reshape the traditional higher education model. By integrating modern information technologies into everyday activities, HEIs can create a more flexible, data-driven, and innovation-oriented environment. Such a strategy strengthens the competitiveness of the institution and allows it to respond more effectively to the challenges of a rapidly changing global higher education environment. Despite intensive digitisation processes, there are still many unresolved issues related to the management of digital transformation, changes in organisational culture and the implementation of long-term strategies. Innovation lies not only in the introduction of technology, but also in the managerial decisions that determine how institutions will be able to reorganise their activities to achieve sustainability and a high quality of teaching (Deep, 2023). The level of research on the issue shows that, while digital transformation is a topic that is increasingly being addressed, the focus is usually on technical aspects such as infrastructure, virtual learning environments or the application of artificial intelligence (AI) in higher education (Verhoef et al., 2021). However, fewer studies focus on the managerial challenges, the transformation of institutional processes and the strategic management of digital transformation. The main problem stems from the lack of a systematic approach and incomplete strategies, which are often implemented in a fragmented way, not aligned with the overall objectives of HEIs (Rego et al., 2021).

The aim of this paper is to analyse the challenges of the digital transformation of HEIs, with a focus on management processes, specifically clarifying three groups of challenges: managerial/strategic, organisational/infrastructural, and cultural/competency-related. To that end, we applied a qualitative case study and a thematic content analysis of institutional documents, using both deductive and inductive coding to ensure transparency and reliability of findings.

Literature review

Studies emphasise that digital transformation in higher education institutions (HEIs) requires alignment between institutional strategy, governance mechanisms, and leadership capabilities (Ehlers, 2020; Hashim et al., 2022). Barriers

frequently arise from fragmented decision-making and insufficient strategic coordination across faculties and services (Gkrimpizi & Peristeras, 2022). Recent work also links IT governance practices like experimentation, knowledge sharing, and staff training to behavioural outcomes that enable or halt the digital transformation (Finze et al., 2023). Frameworks of digital maturity further highlight the role of institutional processes, IT capability, and data management in supporting change (Marks et al., 2020; Mijač et al., 2024). Operational modernisation and systems integration have been associated with improved efficiency and service quality in universities (Haleem et al., 2022; Rof et al., 2023).

The cultural and human factors underlying digital transformation are equally critical. Evidence shows that digital literacy, attitudes toward technology, and resistance to change among staff and students shape adoption trajectories as well as adoption timelines (Alhubaishy & Aljuhani, 2021). Organisational culture and new work practices developed since the COVID-19 era continue to influence engagement with digital tools and routines (Rymaniak et al., 2024). Leadership that explicitly invests in competence development can mitigate these cultural barriers and sustain innovation (Ehlers, 2020).

Recent studies also highlight the growing relevance of integrative and systems-based models that view digital transformation as a multi-layered process encompassing technology, governance, and human factors (Alenezi, 2021). A 2025 study in *"Frontiers in Computer Science"* further develops this perspective by proposing a multidimensional maturity framework that assesses institutional readiness across policy, infrastructure, and leadership domains, thus extending earlier conceptualisations of digital maturity in HEIs (Bravo-Jaico et al., 2025). These models argue that digital transformation success depends on the coherence between technological infrastructure, managerial coordination, and organisational culture (Mijač et al., 2024; Hashim et al., 2022). At the same time, skill development for lecturers and students remains a cross-cutting requirement that ensures sustainable institutional change (Guangde & Zhehe, 2022).

Overall, scientific findings suggest that strategic misalignment, infrastructural limitations, and competency gaps are interrelated rather than isolated barriers. Addressing them requires coordinated managerial action, strong governance, and continuous capacity-building.

Most recent industry-driven analyses emphasise that digital transformation in higher education increasingly depends on strategic alignment, innovation management, and responsible AI adoption (Clark et al., 2025). This trend report complements academic research by highlighting how governance and financial prioritisation influence universities' ability to implement sustainable digital strategies, particularly in resource-constrained environments. Building on these insights, the present study positions itself within a systems-based managerial perspective to map how main and supplementary processes are affected by digitalisation and where governance gaps persist - an angle that is less developed in prior research.

As summarised in Table 1, the reviewed frameworks collectively demonstrate that successful digital transformation in HEIs requires the alignment of technological, managerial, and human dimensions, yet they differ in scope, methodological rigour, and empirical validation.

Research methodology

The study was carried out using a qualitative approach, which included a case study design and document-based content analysis. This method was chosen to gain in-depth insights into the impact of digital transformation on HEIs'

Table 1. Summary of Selected Frameworks for Digital Transformation in Higher Education Institutions (HEIs). (Source: Compiled by the authors).

Authors	Focus	Key Constructs	Limitations
Alenezi (2021)	Systems-based digital transformation model in HEIs	Integration of technology, governance, and human capital	Limited empirical testing
Finze et al. (2023)	IT governance and behavioural outcomes	Knowledge sharing, experimentation, training	Focuses on micro-level behaviour
Zhang (2025)	Digital leadership and data-driven transformation in HEIs	Leadership, analytics, and institutional learning	Lacks cross-country validation
Bravo-Jaico et al. (2025)	Digital maturity in higher education	Multi-dimensional maturity framework; policy and leadership alignment	Context-specific, lacks longitudinal validation
Clark et al. (2025)	Global HE transformation trends	Strategic priorities, AI-driven innovation, resource allocation	Not academically peer-reviewed

management and operational processes. The approach of this case study enabled an exploration of how HEIs interpret, plan, and implement digital transformation within both academic and administrative contexts.

The basis of the study consisted of official strategic and operational documents of nine Lithuanian state HEIs, specifically, five universities and four colleges. These institutions were selected as representative examples of the Lithuanian higher education system. The analysed materials were obtained from publicly accessible institutional websites and national education portals.

Document selection was guided by relevance, recency (2020-2024), and accessibility, ensuring that only materials directly addressing digitalisation, educational innovation, or management reform were included. The dataset included strategic plans and activity reports, curriculum descriptions and evaluation criteria, guidelines for the use of digital tools in teaching, internationalisation strategies, and internal communication documents. This publicly available information ensured methodological transparency and ethical compliance.

The collected data were analysed through directed qualitative content analysis, combining deductive coding (based on predefined themes derived from the literature) and inductive coding (emerging from the data). The coding frame included categories such as main academic processes (teaching, learning, assessment, research) and supplementary processes (academic support, infrastructure, staff development, and communication).

The content analysis was performed manually through a systematic review and interpretation of institutional documents. The analysis focused on identifying key themes and patterns related to the digital transformation of HEIs. Each document was examined to determine how digitalisation influenced academic, administrative, and support processes, as well as to reveal recurring challenges and emerging trends.

The analytical process was iterative, involving repeated comparison and refinement of the identified themes to ensure interpretive consistency. The findings were organised and synthesised into schematic representations illustrating the relationships between processes, challenges, and transformation directions, providing the basis for the figures presented in the Results section. All ethical principles of research were respected throughout the study to protect the rights and interests of institutions and individuals indirectly represented in the analysed materials. The methodological approach allowed for identifying and systematising challenges, transformation patterns, and improvement directions in HEIs' digitalisation processes. The subsequent Results section presents these findings in three analytical categories: main processes, supplementary processes, and under-researched areas, supported by schematic figures illustrating the interrelations among institutional processes, challenges, and transformation directions.

Research results

To ensure analytical transparency, the research results are organised according to three dimensions of higher education processes - main, supplementary, and under-researched areas, derived from a systematic content analysis of strategic and policy documents.

The coding process involved grouping textual segments under thematic categories that represented the main functional areas of HEIs. These categories were established based on frequency of references and contextual relevance in the analysed materials. Figures 1-3 summarise the main findings and visual relationships among identified processes and challenges, while the discussion below interprets their significance. Digital transformation inevitably reshapes the way HEIs carry out their functions: some processes are automated, some services are moved to the virtual space, and some traditional activities can be transformed into new formats. This includes both main and additional processes. Digital technologies allow for the optimisation of both main and additional processes, thus improving the quality and efficiency of teaching.

Digital technologies allow lecturers and students to interact and collaborate remotely, enabling greater flexibility in the organisation of the learning process and the ability to adapt to individual students' needs. However, distance learning can pose challenges in terms of student motivation and engagement, which is why it is important to create interactive and engaging learning environments. The integration of technology into teaching methodologies allows for the development of teaching methodologies by incorporating interactive and multimedia elements that contribute to a better understanding and assimilation of the learning material. Additional processes like academic support, career development and infrastructure management support the smooth running of the academic community. Digital technologies allow for the optimisation of both main and additional processes, thus improving the quality and efficiency of teaching and student experience. Schemes for the digitisation of HEIs' processes are presented in Figures 1 and 2.

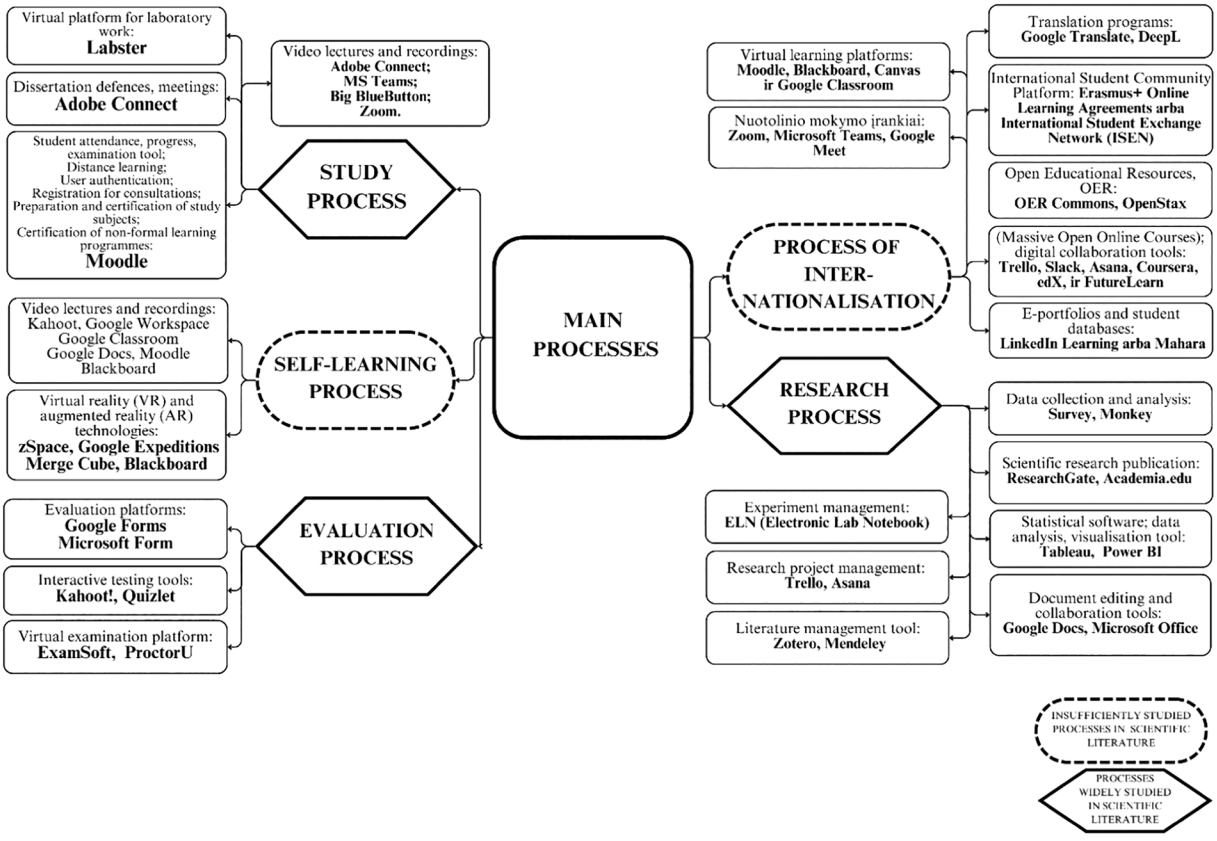

Figure 1. Main processes of HEIs. (Source: Created by the authors).

The structure and interactions of the main and supplementary processes identified through content analysis are illustrated in Figures 1 and 2. Figure 1 focuses on the digitalisation of academic processes such as teaching, learning, assessment, and research, while Figure 2 presents the digitalisation of supplementary services, including academic support, administrative modernisation, and infrastructure management. These diagrams visualise the relational structure between the processes and highlight the areas where digital transformation is most advanced and where it remains fragmented.

The diagrams visualise how digital technologies are applied in the various processes of HEIs. The scope of research on the digitisation of higher education processes is not uniform: some core processes are extensively analysed, while others remain underexplored. The most researched processes include assessment and research organisation, as they have a direct impact on student achievement and institutional efficiency. These areas have attracted significant attention due to the rapid integration of technology and its demonstrated impact on educational quality. The digitisation of research processes, data analytics, and the application of AI in academic research are already well documented in contemporary studies.

However, certain key processes, such as self-directed learning and internationalisation, remain less systematically addressed. Although digital platforms supporting self-directed learning are becoming more widespread, their long-term effect on learning outcomes has not yet been sufficiently evaluated. There is also limited research on integrating virtual and augmented reality (VR/AR) into autonomous learning environments, or on how AI can personalise learning experiences. Similarly, the digital transformation of student exchange programs and international cooperation is still underexplored. Although various virtual mobility schemes exist, there is little empirical evidence on how to effectively organise and sustain digital collaboration between universities.

The level of analysis of HEIs' additional processes varies significantly. The best-documented areas consist of digital infrastructure management and academic support, as these are closely linked to modernisation efforts as well as quality assurance mechanisms. Studies confirm that an efficient IT infrastructure, cloud-based data

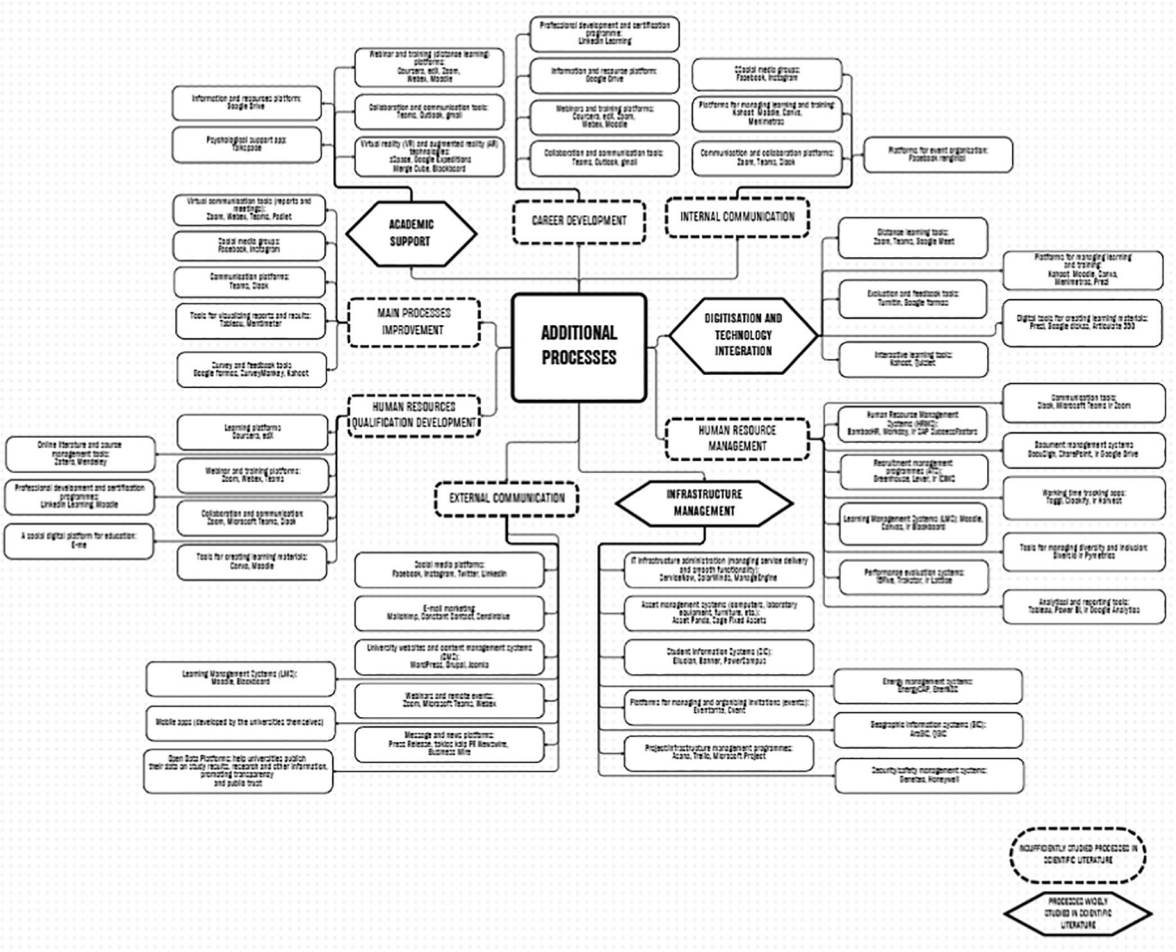

Figure 2. Additional processes of HEIs. (Source: Created by the authors).

systems, and integrated student information platforms enhance administrative performance and improve the overall student experience.

However, other additional processes, particularly those related to social engagement, internal communication, and digital marketing, at this time remain under-researched. Although HEIs increasingly use social media and digital platforms to reach students, their effectiveness in fostering academic engagement and community-building has not yet been adequately assessed. Similarly, digital document management and HR systems are in place in most institutions, but their usefulness and their factual, strategic contribution to management efficiency are rarely analysed. External communication and digital branding strategies also receive little attention in academic research, despite their importance for institutional reputation, student recruitment, and overall community building. Observations made during this study indicate that while the core and additional processes of HEIs are increasingly digitised, several areas remain conceptually fragmented and insufficiently explored.

Future research should focus on how the main and additional processes of higher education can be efficiently digitised and integrated into the HEIs' operations. It is important to assess in depth the creation of digital communities, the development of digital leadership in academic institutions, and the impact of technology on administrative efficiency. These recommendations derive from the observed asymmetry between the maturity of main and supplementary processes, as discussed above. More coherent research in this area would enable universities to optimise their internal processes and to better meet the needs of students and faculty in the digital age, ensuring a broader preparedness of students for the global context.

Digital transformation in HEIs requires coherent leadership and strategic planning. It is important not only to optimise day-to-day processes, but also to assess how digital transformation can help create new learning

and research opportunities. The main challenges identified through content analysis were synthesised from recurring themes across the examined institutional documents. They reflect the areas where digital transformation processes are most constrained, precisely in governance coordination, data management, and digital competence development. Figure 3 summarises these challenge clusters and their interrelations, providing a visual synthesis of the findings discussed above.

Digital transformation is inevitable, but its implementation faces significant challenges, especially in areas that have not yet been sufficiently explored. Compared to well-studied processes like study organisation and evaluation, less explored areas, like self-directed learning, digital internationalisation, administrative modernisation, and the digital transformation of academic social life, present the greatest uncertainties.

The first and perhaps most significant strategic and organisational challenge is the absence of a clear digital transformation strategy. Many HEIs still lack methodological guidance on how to implement digital transformation effectively. Without a coherent institutional vision, technological deployment becomes fragmented, leading to isolated solutions rather than integrated, system-wide change. This fragmentation is evident in areas like self-directed learning and internationalisation, where universities experiment with digital tools but lack systematic research and unified implementation models to sustain student and faculty engagement.

The second challenge consists of technological and infrastructural implementation in the HEIs. Digital transformation requires robust IT infrastructure, yet many HEIs still operate with outdated systems that cannot manage large datasets or support inter-platform functionality. Digitisation of administrative processes, document management, and student data analysis depends on modern, scalable technologies. Thus, underinvestment in these areas continues to limit progress. Insufficient technological capacity restricts data-driven decision-making and slows innovation across institutional processes.

The third challenge of digital transformation in HEIs points towards human and cultural aspects of sustainable integration of digital transformation processes. Resistance to change among lecturers, students, and administrative staff remains a persistent barrier. Many perceive digital transformation as disruptive, requiring significant adaptation, acquisition of new competencies, and changes to established routines. Internationalisation is still dominated by physical exchanges, while virtual mobility programs often fail to meet expected engagement levels due to uncertainty about their effectiveness. These tendencies reveal that barriers to digital transformation are not only technological but also psychological. Self-directed learning in digital environments requires greater student autonomy and motivation, but most HEIs still lack digital mentoring, monitoring, and support systems to facilitate this transition. A change in institutional culture and leadership commitment is therefore essential.

Competence and capacity challenges create the fourth obstacle to digital transformation implementation. The shortage of IT professionals and digitally skilled academic staff further complicates transformation efforts. Many employees lack both the technical and managerial competencies necessary for effective implementation. The insufficient preparation of lecturers to use new technologies widens the gap between digital potential and its actual realisation, emphasising the need for continuous training and competence development initiatives.

Financial limitations and regulatory difficulties remain one of the strongest barriers to digital transformation. The deployment of digital platforms, infrastructure upgrades, cybersecurity measures, and staff training require

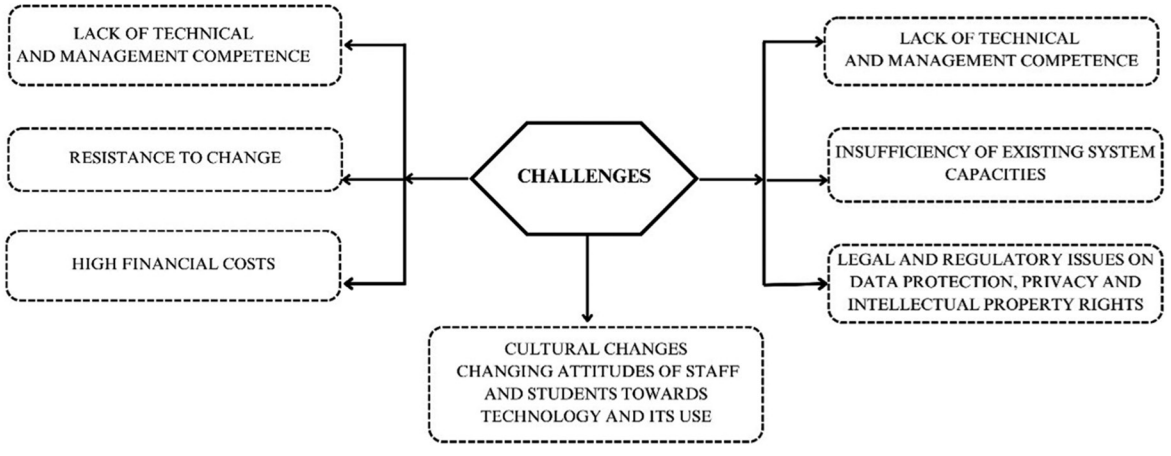

Figure 3. Key Challenges of Digital Transformation in HEIs. (Source: Created by the authors).

substantial and continuous investment. This is particularly challenging in experimental areas, such as the use of augmented and virtual reality in education, where evidence of effectiveness remains limited. Legal and regulatory frameworks related to data protection, privacy, and intellectual property further complicate implementation, especially in international partnerships where policies differ between countries or regions.

Overall, successful digital transformation requires not only technological readiness but also strategic alignment, strong leadership, and long-term investment in institutional capabilities. The systematisation of processes, clear strategic planning, and capacity building are essential to create a sustainable and effective digital ecosystem for higher education.

Discussion

Our findings demonstrate that digital transformation in HEIs is not merely a technical modernisation process but a multidimensional transformation that redefines academic, administrative, and cultural processes. This study confirms that effective digitalisation depends on the alignment of strategic governance, institutional culture, and leadership capacity, as discussed in prior research (Alenezi, 2021; Ehlers, 2020). The results revealed that while HEIs have successfully integrated technological solutions in certain core processes, such as learning management and assessment, the transformation remains uneven across institutions and process areas and requires further research.

The analysis highlights that managerial and governance dimensions are central to sustaining long-term digital maturity. In particular, our findings indicate that institutions with clearly articulated digital strategies and defined accountability structures show higher levels of coordination and efficiency. This supports the argument that digital transformation requires both top-down policy alignment and bottom-up engagement from staff and students (Finze et al., 2023). In contrast, institutions with fragmented decision-making processes often face implementation gaps, where isolated technological initiatives fail to deliver system-wide improvements.

From a theoretical perspective, these results extend systems and institutional theories of digital transformation by emphasising the interdependence between technology, governance, and human factors. This study contributes to the literature by linking management process transformation with cultural adaptation, thus supporting frameworks of digital maturity (Bravo-Jaico et al., 2025; Marks et al., 2020). This dual focus on both organisational design and behavioural change illustrates that digital transformation must be viewed as a process encompassing both social and technical aspects rather than a purely technological upgrade.

Furthermore, findings reveal persistent challenges in the cultural dimension of digital transformation. Staff resistance, insufficient digital literacy, and the lack of shared digital vision remain substantial barriers. As suggested by recent studies, leadership that fosters open communication, continuous learning, and participatory governance can mitigate these obstacles and promote sustainable innovation (Rymaniak et al., 2024). This research underscores the necessity of developing digital leadership as a competency that enables institutional resilience and adaptability.

Finally, the overall integration of emerging trends such as AI-assisted learning, virtual mobility, and data-driven decision-making into the context of HEIs' management processes proves to further complicate the process. Our findings align with the 2025 Deloitte Insights report, which highlights the increasing importance of responsible AI governance and innovation management in higher education (Clark et al., 2025). These developments show that HEIs must move beyond experimentation toward structured digital ecosystems, ensuring both ethical and pedagogical sustainability.

Conclusions

Digital transformation in HEIs faces several interrelated challenges that hinder the success of digitisation processes. Resistance to change, lack of a clear strategy, insufficient competencies, outdated systems, and high financial costs remain persistent barriers to full digital integration. To successfully implement digital transformation, universities must adopt a holistic perspective that combines strategic management, technological innovation, and cultural adaptation.

This study concludes that effective digitalisation requires leadership capable of bridging academic and administrative domains. Leaders in digital environments must articulate a clear institutional vision, engage staff in co-creation processes, and communicate digital goals transparently across all organisational levels. Building such

leadership capacity promotes not only smoother technological adoption but also shared ownership of change. In this sense, digital transformation becomes an enabler of institutional learning and innovation.

From a practical perspective, findings suggest that HEIs should strengthen data governance, enhance staff training, and invest strategically in interoperable IT infrastructure. Institutions that establish coherent frameworks for data management and cybersecurity are better positioned to ensure academic integrity and operational efficiency. Continuous professional development and skill-building programs must also be prioritised, focusing on digital pedagogy, analytics, and collaboration tools.

At the policy level, national and regional education authorities should facilitate digital transformation by providing targeted funding, developing unified digital standards, and promoting cross-institutional knowledge exchange. Coordinated public policies can mitigate disparities among institutions and support sustainable growth within the higher education ecosystem.

Future research should explore the longitudinal impacts of digital transformation on institutional performance, student outcomes, and staff engagement. Particular attention should be given to the role of artificial intelligence, virtual reality, and international digital collaboration in shaping the next generation of higher education processes. Overall, this study reinforces the idea that digital transformation is not a destination but an evolving process of adaptation and learning that requires strategic vision, collaboration, and continuous improvement.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Generative AI Declaration in Scientific Writing (OBLIGATORY)

In preparing this work, the authors used DeepL to improve the linguistic quality of the English text. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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