# Digital Transformation and Digital Leadership in Higher Education Institutions: Insights from the Literature

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*Abstract:*

*Digital transformation is a critical continuum that significantly reshapes higher education institutions (HEIs) management processes, operational functions, and educational methods. As such, effectively managing digital transformation processes in these institutions is crucial. This study aims to investigate the challenges faced during digital transformation in HEIs and the role of digital leadership in addressing these challenges. Data for this research were collected from articles on digital leadership and digital transformation in HEIs indexed in the Web of Science (WOS) and Scopus databases, utilizing the systematic literature review method. The findings reveal that the main obstacles to digital transformation in HEIs include deficiencies in technological infrastructure, lack of digital skills and competencies, financial limitations, and resistance to change. Moreover, it was found that digital leadership plays an essential role in navigating the digital transformation process. The study also highlights several strategies that can be employed to overcome these challenges, such as improving internal communication, fostering a culture of innovation, and enhancing digital literacy training. By providing insights into the effective management of digital transformation in HEIs, this study aims to assist these institutions in adapting more effectively to emerging technological, managerial, and educational needs.*

*Keywords: Digital transformation, digital leadership, higher education.*

# INTRODUCTION

Universities and educational institutions today are developing various strategies to accelerate digital transformation. As of 2020, 13% of universities in the United States were undergoing digital transformation, 32% were developing strategies for it, and 38% were in the planning phase (Deloitte Digital Transformation Index, 2019). Digital transformation requires higher education institutions (HEIs) not only to adopt new technologies but also to reevaluate their organizational culture and strategic approaches (George & Wooden, 2023). In this transformation process, it is crucial for educational institutions to implement cultural and structural changes, adopt effective change management practices, and embrace a collaborative approach (Alenezi, 2021). Despite the opportunities offered by digital technologies, HEIs face various challenges in their adoption (Gkrimpizi, 2023). One way to overcome these challenges is through the application of digital leadership practices (Habeeb & Eyüboğlu, 2024).

The concept of digital transformation, particularly in the context of Industry 4.0, underscores the need for leaders to be regarded as "digital leaders" during this strategic transition process (Özmen et al., 2022). Digital leadership plays a critical role in effectively managing digital transformation processes in HEIs, as in other sectors. By guiding technological advancements and fostering innovation, digital leaders contribute significantly to institutional digital transformation. Effective digital leaders simplify the complexities of digital transformation by facilitating the integration of new technologies and driving strategic initiatives in this area (Anwar & Saraih, 2024).

Building on this, this study aims to examine the challenges and obstacles encountered during digital transformation processes in HEIs and to explore the role and impact of digital leadership practices in this. Specifically, it aims to identify the primary barriers and challenges faced by HEIs during digital transformation and to explore the role and impact of digital leadership in facilitating this process. Understanding these challenges and the influence of digital leadership is crucial for HEIs as they navigate the complexities of digital transformation. To achieve this, articles focusing on digital leadership and digital transformation in HEIs, indexed in the Web of Science (WOS) and Scopus databases, were identified and analyzed using the systematic literature review method. As a result of the analysis, it aims to identify the difficulties and obstacles encountered in the digital transformation process in higher education institutions, reveal the impact of digital leaders in this process, and determine the necessary strategies to manage this process successfully. It is expected that this study will serve as a guide for HEIs to adopt more effective and strategic approaches in their digital transformation processes. The findings of this research are expected to provide valuable insights into the strategies and practices that can help HEIs overcome obstacles and achieve successful transformation. This study, which explores the intersection of leadership and technological transformation, is expected to contribute to the formulation of effective strategies for managing digital transformation in higher education institutions, ultimately guiding these institutions toward more efficient and innovative educational environments.

## *Digital Transformation and Its Significance in HEIs*
Digital transformation can be defined as an evolutionary process aimed at creating value by transforming business models, operational processes, and customer experiences through the power of digital technologies and competencies (Morakanyane et al., 2017). In other words, digital transformation involves the restructuring of organizational business processes, business

models, and customer interactions using digital technologies. This process is built on three core components: technological, organizational, and social. From a technological perspective, the focus is on adopting new digital tools; at the organizational level, it involves changes in business processes and models; and on the social dimension, it enhances user experience and service quality (Coral et al., 2022). Thus, digital transformation is not merely about technological innovation; it is a broader concept encompassing organizational culture and strategic orientation (Bharadwaj et al., 2013). By fundamentally altering ways of doing business, digital transformation enables organizations to increase efficiency, foster innovation, and gain competitive advantage (Westerman et al., 2014). The process integrates technologies such as data analytics, cloud computing, and artificial intelligence, optimizing both internal operations and interactions with external stakeholders (Kane et al., 2015; Fitzgerald et al., 2013).

The digital transformation of HEIs began in the late 20th century with the introduction of computers and the Internet. Initially, these technologies were used to automate administrative tasks and improve communication through emails and online portals. The primary focus during this early period was to enhance efficiency and communication within academic environments (George & Wooden, 2023). Digital transformation in HEIs can be described as a comprehensive process aimed at integrating technology across all aspects of educational institutions to improve learning outcomes, operational efficiency, and student engagement (Gkrimpizi, 2023; Alenezi, 2021). Despite the opportunities presented by digital technologies, HEIs have encountered various challenges in adopting these innovations. Research highlights those strategic barriers, such as increased operational costs, complicate the integration of digital technologies into existing processes (Klein, 2020). Furthermore, issues like a lack of technology management, resistance to change, integration difficulties, and cultural barriers are significant obstacles (Fahey, 2021). Specifically, resistance to change and deficiencies in technology management can disrupt transformation processes (Alenezi, 2021).

Coral and Bernuy (2022) classified the primary challenges encountered during the digital transformation process in HEIs into six categories: digital skills, technological infrastructure, transformation models, economy, investment, and university readiness. *Digital Skills*: This category highlights the lack of digital competencies and the limited capacity of faculty members and students to adapt to new technologies. *Technological Infrastructure*: It refers to barriers within technological infrastructure, such as high costs and slow procurement processes. *Transformation Models*: This emphasizes the absence of digital transformation models tailored specifically for the education sector. *Economy*: Economic challenges faced by students, faculty members, and staff, including low-income levels and infrastructure costs, fall under this category. *Investment*: Uncertainties in technological investment policies and bureaucratic obstacles are included in this category. *University Readiness*: This pertains to the misalignment of university business processes and educational models with technological advancements and their overall preparedness for digital transformation.

Resistance to change is also commonly cited as a significant barrier in digital transformation processes. The higher education environment is often characterized by traditional practices and hierarchies resistant to change. Academic professionals may perceive new teaching methods or learning environments as threats to their job security (Alenezi, 2023). This culture of resistance can be mitigated through the efforts of digital leaders who inspire and promote a digital vision (Chandler, 2013).

### The Role of Digital Leadership in the Digital Transformation Process in HEIs

The concept of digital leadership encompasses the leadership skills and approaches necessary for effectively managing technological innovations and digital transformation processes (Habeeb & Eyüboğlu, 2024). Digital leaders play a pivotal role in organizational digital transformation by combining traditional leadership competencies with modern digital proficiencies. These leaders are essential drivers of digital evolution across various organizations (Nita & Gutu, 2023). By adopting a collaborative leadership approach, digital leaders emphasize flexibility and adaptability during transformation processes, aligning organizational structures with the demands of the digital era (Khurniawan & Irmawaty, 2024). Moreover, they balance short-term operational needs with long-term strategic objectives by fostering both flexibility and innovation (Karaköse et al., 2022). These leaders promote innovation, improve organizational performance, and cultivate cultures receptive to change while adapting to rapid technological advancements and educational needs (Brunner et al., 2023; Habeeb & Eyüboğlu, 2024).

In HEIs, digital leaders strategically integrate digital tools and methods into both educational and administrative processes, developing and encouraging innovative approaches (Brunner et al., 2023). They play a critical role in addressing the "digital divide," which reflects inequalities in access to and use of technological resources among students, faculty, and staff (Laufer et al., 2021). In this context, digital leaders are not only tasked with implementing technologies and innovations but also ensuring their alignment with institutional goals and sustainability (Habeeb & Eyüboğlu, 2024).

### METHOD

In this study, a systematic literature review methodology has been employed. This method allows for the examination of a large number of academic articles. With the increasing number of academic studies, methodologies such as systematic literature review have become more effective in examining research from a broad perspective, saving time for researchers while providing in-depth information (Yıldız, 2022).

### *Purpose of the Study and Research Questions*

This study aims to identify the challenges encountered during the digital transformation process in HEIs and to determine the role played by digital leaders in this process. Based on this objective, the following research questions have been formulated:

1. What are the main barriers and challenges encountered during the digital transformation process in HEIs?
2. How can the role and impact of digital leaders be defined in the digital transformation processes within HEIs?

This study analyzes data obtained from articles focused on digital leadership and digital transformation in HEIs, available in the Web of Science (WOS) and Scopus databases. Academic articles with titles or keywords containing terms such as "digital transformation," "digital leadership," "higher education," and "university" were included in the review. Additionally, concepts referring to digital transformation (e.g., technological transformation, Industry 4.0) and digital leadership (e.g., technological leadership, e-leadership) were incorporated into the scope of the study. Research such as book chapters, conference papers, theses, and reports were excluded. While studies on digital transformation in higher education

have been conducted in Turkiye, none relevant to digital leadership in higher education were detected. Therefore, the aforementioned databases were chosen. As a result of the review, nine articles on digital transformation and seven articles on digital leadership in HEIs were identified that met the specified criteria. The studies available in these databases provide broad international literature on digital transformation and digital leadership, which enhances the generalizability of the study's findings.

### *Ethics Committee Approval*
Exempt from Ethics Committee Approval

## FINDINGS

In particular, over the past decade, it has been emphasized that leaders must possess the ability to manage both the transformation process and new digital organizations in the digital transformation process (Klein, 2020). Based on this, studies from the last 10 years were included in the review. As a result of this examination, 9 articles on digital transformation and 7 articles on digital leadership were selected for analysis. Table 1 classifies the articles on digital transformation, and Table 2 summarizes the articles on digital leadership in HEIs. Also, both tables include their objectives, methods, samples, and key findings, derived from the articles. Additionally, the findings from the results and conclusion sections of these articles are summarized.

**Table 1:** Digital Transformation Articles

| Number | Article Name | Author/S& Year | Research Type | Sampling, Data Colection And Analysis Methods | Sample | Purpose | Findings |
|---|---|---|---|---|---|---|---|
| 1 | Categories for Barriers to Digital Transformation in Higher Education: An Analysis Based on Literature | Aditya et.al., (2021) | Qualitative | Overview | | Identifying barriers to digital transformation in HEIs. | In higher education, a total of 22 specific barriers to effective digital transformation have been identified. These barriers are categorized into nine key areas, which include issues related to vision, institutional strategy, and the economic environment. |
| 2 | Future-Shaping Themes: Digital Age Foresight İn Turkish University Strategic Plans | Aytar & Aslan, (2023) | Qualitative | Content Analysis | | To determine how the elements of the digital age are referenced through the digitalization features and components emphasized in the strategic plans of universities, as well as their future intentions regarding these elements. | Five main themes have been identified regarding the digital future of higher education: digital transformation, digital campus, digital education, digital infrastructure, and future-focused units. |
| 3 | The Barriers and Readiness to Deal With Digital Transformation in Higher Education | Budiyanto et.al., (2024) | Qualitative | Interview with semi-structured interview questions | Stakeholders of higher education institutions (students, faculty and management staff) | To identify the barriers to digital transformation as perceived by students, educators, and HEIs, particularly in the context of the changes brought about by the COVID-19 pandemic. | The key findings indicate that for students, the main challenges include a lack of IT equipment, insufficient digital literacy, passive learning, and fear of data loss. For faculty members, challenges such as a lack of digital literacy and adjustment time are prominent. At the management level, difficulties in managing IT infrastructure and insufficient IT staff are highlighted. |
| 4 | What Research Tells Us About Leadership Styles, Digital | Carvalho et.al., (2022) | Qualitative | Overview | | To examine the relationships between leadership, digital transformation, and | The most common leadership style is transformational leadership, the most frequently examined dimension of performance is related to teaching |

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| | Transformation and Performance İn State Higher Education | | | | performance in state-owned HEIs. | and learning activities, and the most discussed aspects of digital transformation are online learning systems and various types of technologies. |
| 5 | Managing Digital Transformation: A Case Study İn A Higher Education Institution | Díaz-Garcia et.al., (2023) | Qualitative | Interview with semi-structured interview questions and direct observation | To identify the key factors that can guide and facilitate the digital transformation of HEIs from the perspective of internal stakeholders. | Five factors that facilitate the digital transformation process have been identified: the teaching process, internal communication, cultural change, data-driven management, leadership, and the work environment. |
| 6 | Evaluate The Drivers For Digital Transformationin Higher Education İnstitutions İn The Era Of İndustry4.0 Based On Decision-Making Method | Wang et.al., (2023) | Qualitative | Empirical case study with q-Rung Orthopair Fuzzy-MEREC-SWARA-CoCoSo methods | To identify the main drivers for the implementation of digital transformation. | The most important driving forces for the implementation of digital transformation are the development, updating, and adaptation of the curriculum, the integration of digital technologies for universal education, and cloud computing. |
| 7 | Classification Of Barriers To Digital Transformation İn Higher Education Institutions: Systematic Literature Review | Gkrimpizi et.al., (2023) | Qualitative | Overview | To identify the barriers faced by HEIs in implementing digital transformation. | The most common barriers found are the lack of digital literacy, resistance to change and risk aversion, insufficient IT infrastructure, and budget constraints. |
| 8 | Managing For Competency With İnnovation Change İn Higher Education: Examining The Pitfalls And Pivots Of Digital Transformation | Jackson, (2019) | Qualitative | Overview | To examine how digital transformation technologies can impact the effectiveness of HEIs. | To understand the challenges and opportunities of digital transformation, proactive change management should be implemented. |

| 9 | Assessing Digital Transformation İn Universities | Rodríguez-Abitia and Bribiesca-Correa, (2021) | Qualitative | Overview | | To propose the implementation of an integrated digital transformation model for evaluating the maturity levels of educational institutions in their digital transformation processes and compare these with other industries. | It has been observed that universities lag behind other sectors, which is likely related to a lack of effective leadership and challenges in adapting to cultural changes. This situation is further negatively reinforced by insufficient innovation and financial support. |

**Table 2:** Digital Leadership Articles

| Number | Article Name | Author/S &Year | Research Type | Sampling, Data Colection And Analysis Methods | Sample | Purpose | Findings |
|---|---|---|---|---|---|---|---|
| 1 | Digital Leadership In The Digital Era Of Education: Enhancing Knowledge Sharing and Emotional İntelligence | Anwar & Saraih, (2024) | Quantitative | Structural Equation Model (SEM) of data collected through survey | 320 faculty members in private universities | To investigate how the elements of digital leadership enhance technical knowledge sharing and emotional intelligence among the teaching staff in HEIs. | The elements of digital leadership have a positive and significant impact on knowledge sharing and emotional intelligence. |
| 2 | E-Leadership Analysis During Pandemic Outbreak to Enhanced Learning In Higher Education | Chang et.al., (2022) | Qualitative | Interview with semi-structured questions content analysis | 24 rectors and deans | To identify the digital leadership processes used by leaders in higher education during the COVID-19 pandemic and to ensure the enhancement of effective learning.. | highlighted the importance of digital leadership practices for the quality and continuity of education in the pandemic. |
| 3 | Digital Leadership In Higher Education | Ehlers,(2021) | Qualitative | Overview | | To identify the challenges of digital leadership practices and digital transformation processes in HEIs. | In HEIs, a coherent strategy for digital transformation should be established, and a new organizational culture aligned with digital transformation |

| | | | | | | | efforts should be developed for effective digital leadership. |
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| 4 | A Typology For Digital Leadership In Higher Education: The Case Of A Large-Scale Mobile Technology İnitiative (Using Tablets) | Ghamrawi & Tamim, (2023) | Qualitative | Interview with semi-structured questions content analysis | State university administrators | to develop a typology for the digital leadership qualities of individuals in key management positions. | A 5D typology has been identified for digital leadership attributes: digital competence; digital culture; digital differentiation; digital governance; and digital advocacy. |
| 5 | A Systematic Review And Framework For Digital Leadership Research Maturity In Higher Education | Jameson, (2022) | Qualitative | Mixed Methods Assessment Tool (MMAT) | 36 studies published between 1999 and 2022 focusing on digital leadership in higher education | To synthesize and examine the empirical literature on digital leadership in higher education. | The general quality of the studies has been found to be relatively low, and many studies lack clarity in the justification of research questions and the chosen methods. |
| 6 | Effect Of E-Leadership On Employees' Outcomes İn The Higher Education Sector During COVID-19 And Beyond: A Case Study From Vietnam | Maheshwari et.al., (2024) | Quantitative | Frequency and variance analysis of data collected through survey | 445 employees in the higher education sector working from home during the pandemic. | To investigate the effects of e-leadership on employees in the higher education sector, focusing on its impact on job engagement, well-being, and organizational citizenship behaviors.. | Perceived e-leadership significantly impacts employees' job engagement, well-being, and organizational citizenship behaviors. |
| 7 | Leadership Types and Digital Leadership in Higher Education: Behavioural Data Analysis from University of Patras in Greece | Antonopoulou et.al., (2020) | Quantitative | Frequency and variance analysis of data collected through survey | 28 Department Heads | To examine the leadership skills of university department heads in relation to digital leadership, analyze the leadership styles they adopt, and explore the relationships between these styles and leadership outcomes. | Higher levels of transformational leadership are associated with greater productivity and satisfaction among employees, and are significantly linked to the effective implementation of digital leadership. 4o mini . |

### *Findings on Digital Transformation:*

- Digital transformation in higher education requires effective leadership, digital skills, flexibility, and technology integration. These factors directly impact the success of HEIs' digital transformation processes. Leadership, the adaptation of digital technologies, and strategic planning are key pillars of the transformation process. Educational institutions should adopt digital leadership qualities within their organizational structures and continuously follow technological innovations (Aditya et al., 2021).

- In Turkish universities' strategic plans, the components of digital transformation do not differ by university type. The term "innovation" is the most frequently used concept in digital transformation. Emphasis on aspects like smart access and digital infrastructure development reflects different facets of the digital transformation process. Research universities focus on technology transfer offices, while private universities prioritize continuous education centers (Aytar & Aslan, 2024).

- Students face barriers related to the applicability of digital transformation, such as lack of IT equipment, inadequate digital literacy, and challenges in independent learning. Faculty members encounter issues such as the need for digital literacy and long adaptation processes, but they manage the process through strategies like blended learning and data security preparations. Universities face challenges in managing IT infrastructure and digitalization policies but respond to these challenges through platform integration strategies. Preparation for the digital transformation process is shaped by strategies developed at both individual and institutional levels (Budiyanto et al., 2024).

- The relationships between leadership, digital transformation, and performance in public higher education institutions have been examined, with a particular emphasis on the impact of transformational leadership style on teaching and learning processes. It has been noted that digital technologies and online learning systems play a significant role in leadership processes, and this has been highlighted as contributing to enhancing institutional performance. Policymakers are advised to design performance-oriented plans while considering leadership styles and digital transformation processes (Carvalho et al., 2022).

- Technological innovations are radically changing the organizational processes of educational institutions. The COVID-19 pandemic has accelerated the pace of digital transformation, forcing educational institutions to adapt to technological innovations. For successful digital transformation, factors such as communication channels, cultural change, data-driven decision-making, and participatory leadership are crucial. Educational institutions should manage their transformation processes with these factors in mind (Díaz-García et al., 2023).

- Over the past decade, digital transformation has been regarded as a priority for HEIs. Digital transformation must redefine both the institutional structure and the business model. However, many universities continue to pursue their digital transformation processes within the framework of traditional approaches. For digital transformation to be successfully implemented in the higher education system, not only technological and structural changes but also managerial and cultural adaptations are necessary. Effective strategies and approaches must be established for successful management of digital transformation (Wang et al., 2023).

- The barriers to digital transformation in HEIs have been categorized into environmental, strategic, organizational, technological, human, and cultural. Among the barriers, the lack of digital literacy, resistance to change, and budget constraints stand out. It has been observed that these barriers evolve over time, and new barriers emerge with technological advancements. A better understanding of these barriers and the development of strategies will contribute to the successful implementation of digital transformation (Gkrimpzi et al., 2023).

- Digital transformation requires significant changes in the institutional structures of HEIs. In the process of digital transformation, higher education must address bidirectional capability gaps and adapt to external market demands. The ability of educational institutions to respond to technological innovations is critical for maintaining the relevance of higher education (Jackson, 2019).

- Digital transformation has gained significance with rapid advancements in technology and telecommunication networks. The education sector has been affected by digital transformation and must adapt to the demands of new generations. Leadership and cultural adaptation deficiencies in the digital transformation processes of educational institutions may hinder success. It is noted that the education sector is lagging behind other sectors and requires more innovative approaches (Rodríguez-Abitia & Bribiesca-Correa, 2021).

### *Findings on Digital Leadership*
Various studies on digital leadership in higher education demonstrate the critical role of digital leaders in managing digital transformation processes and providing significant strategies to enhance their effectiveness.

- Digital leadership is considered an important tool in overcoming the challenges encountered in digital transformation. Digital leadership, including visionary leadership, digital citizenship, and systematic improvement, can positively influence knowledge sharing and emotional intelligence in HEIs. However, challenges such as infrastructure deficiencies and resistance to change are encountered during digital transformation processes, and digital leaders need strategic leadership skills to overcome these barriers (Anwar & Saraih, 2024).

- It is noted that digital leaders successfully guided the process in remote education with both technical and crisis management skills. During this process, it was crucial for leaders to establish effective communication with faculty members and students working remotely and to ensure sustainability and quality in education. Especially during the pandemic, the e-leadership skills were critical in ensuring the continuity of the educational process (Chang et.al., 2022).

- Existing leadership approaches need to adapt to the cultural and structural changes specific to higher education, that is, to evolve into digital leadership. For digital transformation processes to succeed, it is emphasized that institutional cultures must be aligned with digitalization, and the organization of values and communication methods must be restructured (Ehlers, 2021).

- The five key features of digital leadership (digital competence, digital culture, digital differentiation, digital governance, and digital advocacy) have been identified as critical for successful leadership. Specifically, it is emphasized that leaders must adapt to digital technologies, support a digital culture in education, and increase digital awareness among employees and students. In this process, the advocacy role of digital leaders

stands out as an important factor in ensuring the adoption of digital technologies and the successful implementation of a digital transformation strategy (Ghamrawi & Tamim, 2023).

- Empirical studies on digital leadership in HEIs are noted to be limited in the literature, often containing methodological shortcomings. A study examining works between 1999 and 2022 highlighted the need for more comprehensive and rigorous research to enhance the research maturity of digital leadership. It was emphasized that digital leadership competencies should be studied in more depth, and the gaps in the literature should be addressed (Jameson et al., 2022).

- The critical role of digital leadership in remote working environments in the post-pandemic period has been emphasized. Digital leadership has a significant impact on employees' organizational commitment and citizenship behavior. It is also noted that digital leadership increases employees' motivation and that leaders' guiding and supportive roles during digital transformation processes positively influence organizational success (Maheshwari et al., 2024).

- Gender has been identified as an important factor in the application of leadership styles. Male participants, compared to females, report statistically higher levels of transformational, transactional, and digital leadership and are more satisfied with the outcomes of these leadership styles. Additionally, transformational and transactional leadership practices are found to have a positive and significant relationship with leadership outcomes. Digital leadership also shows a positive correlation with leadership outcomes; that is, as the effectiveness and satisfaction with leadership practices increase, the level of digital leadership also rises (Antonopoulou, 2020).

## CONCLUSION AND DISCUSSION

This study aimed to identify the primary barriers and challenges encountered in the digital transformation processes at HEIs, as well as to examine the role and impact of digital leadership practices in these processes. A literature review was conducted to gather data from articles on digital leadership and digital transformation in higher education from articles in the Web of Science (WOS) and Scopus databases. The limited number of studies indicates that the subject has not been sufficiently or deeply explored. Moreover, it is noteworthy that most of the studies have been conducted using qualitative methods. The research findings offer significant insights into understanding the primary barriers encountered in digital transformation processes and evaluating the impact of digital leaders in these processes.

### *Barriers Encountered in Digital Transformation*
The barriers encountered in the digital transformation process within higher education are multifaceted, encompassing organizational, technological, and social dimensions. According to Coral and Bernuy (2022), 56% of the barriers are organizational in nature, 37% are technological, and 7% are attributed to social factors. These findings underscore the prevalence of several significant obstacles, with technological infrastructure deficiencies, limited digital skills and competencies, economic constraints, and resistance to change being the most commonly identified barriers. In particular, shortcomings in technological infrastructure, such as inadequate IT equipment and digital tools, impede the effective use of digital technologies by both students and faculty (Budiyanto et al., 2024). Organizational challenges, such as entrenched resistance to change and limited financial resources, further exacerbate these technological barriers, hindering the successful implementation of digital transformation

initiatives (Gkrimpzi et al., 2023). These multifaceted barriers illustrate the complexity of digital transformation in higher education, requiring comprehensive strategies to address both technological and organizational challenges.

### The Role and Impact of Digital Leadership in Digital Transformation

The research findings emphasize the pivotal role of digital leadership in driving digital transformation within higher education. Key aspects of digital leadership, such as visionary leadership, digital citizenship, and systematic improvement, are fundamental in fostering transformation. These characteristics not only support the knowledge-sharing culture within institutions but also enhance emotional intelligence, which is crucial for smooth transitions during digital transformation (Anwar & Saraih, 2024). The importance of digital leadership becomes particularly evident during crisis situations, such as the COVID-19 pandemic, where its role in crisis management and maintaining organizational sustainability was underscored (Chang, 2022).

Furthermore, digital leaders' ability to adapt to emerging technological innovations and cultivate a digital culture within the institution is highlighted as a critical factor for successful transformation (Ghamrawi & Tamim, 2023). The integration of new digital technologies into educational practices is a crucial element of this leadership style, which contributes significantly to the long-term sustainability of educational institutions (Ququebeke & Gerpott, 2023). Additionally, digital leadership's influence extends to the management of virtual teams, ensuring seamless adaptation to digital tools and organizational processes, thereby reinforcing the stability and growth of the institution (Karaköse et al., 2022).

### Strategies to Overcome Challenges in Digital Transformation

Diaz-Garcia et al. (2023) highlight effective internal communication and organizational cultural change as key strategies to overcome barriers in the digital transformation process. Effective internal communication accelerates innovative processes, enhances decision-making flexibility, and facilitates adaptation to change. Organizational cultural change based on values such as diversity, excellence, innovation, and stakeholder service contribute to the creation of a digital organizational culture. Additionally, the adoption of new leadership approaches is essential. A comprehensive management approach tailored to employees' needs, the creation of a comfortable work environment, and the attraction and retention of skilled digital talent are significant factors in achieving success in the transformation process.

Furthermore, to overcome the challenges encountered in the digital transformation process, strengthening digital infrastructure and increasing digital literacy training is necessary (Aditya et al., 2021). Successfully managing digital transformation requires understanding these challenges and developing effective strategies. Additionally, training programs designed for digital leaders will equip them with the strategic skills necessary to manage digital transformation processes effectively (Diaz-Garcia et al., 2023). To enhance the performance of higher education institutions (HEIs), the interaction between leadership styles, such as digital and transformational leadership, and digital transformation must be strengthened (Carvalho et al., 2022). Digital transformation should be considered a dynamic system that evolves through the interaction of technological, organizational, and social components, requiring continuous alignment between these components (Coral et al., 2022).

In conclusion, this study provides significant insights into the barriers encountered in the digital transformation processes of HEIs and the role of digital leadership in these processes. The

research findings indicate that digital transformation is a dynamic system that requires continuous interaction and alignment between technological, organizational, and social components (Coral et al., 2022). Challenges such as digital infrastructure deficiencies, inadequate digital skills, economic constraints, and resistance to change are among the prominent obstacles in the transformation processes (Budiyanto et al., 2024; Gkrimpzi et al., 2023). Digital leadership plays a critical role in overcoming these challenges. The ability of digital leaders to adapt to technological innovations and foster a digital culture emerges as a decisive factor for success in digital transformation (Ququebeke & Gerpott, 2023). In this context, it is essential to develop effective strategies to overcome the barriers encountered in digital transformation processes. Internal communication and organizational cultural change facilitate the adoption of innovative approaches in transformation processes, while enhancing digital literacy training and strengthening technological infrastructure are crucial for the sustainability of the transformation (Diaz-Garcia et al., 2023; Aditya et al., 2021). Consequently, it can be concluded that HEIs can improve their performance by addressing digital leadership and digital transformation processes from a holistic perspective.

One of the major limitations of this study is that the articles included in the research were sourced exclusively from the WOS and Scopus databases. Therefore, it should be considered that this limitation may have reduced the number of articles evaluated in this study. Future research is recommended to comprehensively examine the concepts of digital transformation and digital leadership in higher education, the barriers encountered, and the strategies to be implemented in the transformation process using both qualitative and quantitative research methods.

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