

## The Impact of Digital Transformation in Higher Education Management: Integrating Online Learning and Educational Applications for Efficiency and Accessibility

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### ABSTRACT

In the era of the Fifth Industrial Revolution, digital transformation has become a strategic necessity in higher education management, particularly in achieving institutional efficiency and accessibility. Universities today are required to integrate digital technologies comprehensively through online learning and educational applications to address the growing complexity of academic management and to expand the reach of educational services. This study aims to examine the impact of digital transformation on managerial efficiency and accessibility in higher education, with the mediating roles of online learning integration and the use of educational applications. A quantitative approach was employed through a survey involving 250 academic community members from Indonesia and Libya. Data were analyzed using Structural Equation Modeling with AMOS software. The results revealed that digital transformation significantly influenced both online learning integration and the utilization of educational applications. These two mediating variables contributed positively to enhancing institutional efficiency and directly supported broader access to higher education. The findings underscored that successful digitalization in higher education management depended not only on technological adoption but also on integrative strategies that linked digital platforms and application systems. This study contributes practical insights for universities to strategically optimize online learning and educational applications as core drivers of efficient and inclusive digital transformation in higher education.

**Keywords:** Digital Transformation, Higher Education Management, Online Learning, Educational Applications, Efficiency, Accessibility



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## 1. INTRODUCTION

Digital transformation has emerged as a key driver of structural change across multiple sectors (Dąbrowska et al., 2022; Verhoef et al., 2021), including higher education (Akour & Alenezi, 2022; Hashim et al., 2022). In an era characterized by rapid advancements in information and communication technologies, universities are no longer limited to traditional methods of knowledge delivery. Instead, they are expected to function as adaptive, inclusive, and sustainable digital ecosystems. Lee et al. (2022) stated that this occurred during the COVID-19 pandemic, which significantly accelerated the adoption of technology in both academic and administrative functions. Supported by Alenezi (2023), this situation

demonstrated that the continuity of education now heavily depends on the digital readiness of higher education institutions. The ongoing shift indicates that digitalization is not merely a passing trend; it has become a fundamental necessity in reshaping how higher education is governed and managed.

According to Mohamed Hashim et al. (2022) and Rodríguez-Abitia & Bribiesca-Correa (2021), this transformation demands a comprehensive reform of higher education management, particularly in terms of operational efficiency and responsiveness to the dynamic needs of academic stakeholders. Digital transformation within educational management involves more than the deployment of administrative software (Fernández et al., 2023). It also requires a restructuring of systems, reformulation of institutional policies, and a rethinking of leadership approaches. According to Motz et al. (2023) and Gull et al. (2024), institutions that succeed in embedding digital systems within their management practices tend to possess greater competitiveness and resilience when facing disruptions in the education sector. As such, implementing digital strategies should not be viewed as isolated technological upgrades. Instead, they must be positioned as essential components of long-term institutional strategy.

One of the most critical aspects of this transformation is the integration of online learning and educational applications into the academic environment (García-Morales et al., 2021; Sahni et al., 2025). The widespread use of Learning Management Systems (LMS), along with digital tools such as Google Classroom, Moodle, Zoom, and Kahoot, has reshaped teaching and learning dynamics. These platforms not only support the continuation of remote education but also significantly enhance student participation and interaction. Nevertheless, Singun (2025) argues that many institutions still encounter obstacles in harmonizing the technologies they adopt. Additional challenges include inadequate training (Mathebula et al., 2025) and the lack of sustainability in platform implementation (García-Hernández et al., 2022). Therefore, evaluating how these tools are integrated and determining their real impact on institutional performance are essential areas of inquiry.

Efficiency and accessibility are two key indicators for evaluating the success of digital transformation in higher education. Efficiency is reflected in the speed, cost-effectiveness, and optimization of both managerial and academic processes through digital tools (Alenezi, 2023). Accessibility, on the other hand, relates to the extent to which all members of the academic community can access educational services regardless of geographic location, economic background, or physical condition (Sharma & Patil, 2022). Consequently, a clear and comprehensive understanding of these two dimensions is essential in assessing the outcomes of digital strategies.

Several previous studies have highlighted various aspects of digital transformation in higher education, ranging from digital readiness and digital academic leadership to the adoption of online learning and educational applications. However, few have comprehensively integrated these aspects within the broader context of institutional management. Wong et al. (2025) investigated the experiences of 400 students in Hong Kong during the rapid shift to online learning, emphasizing the importance of technological access, faculty digital competence, and digital equity in achieving learning flexibility and effectiveness. Fernández et al. (2023) demonstrated that institutional digital maturity is highly influenced by integrated strategies involving cloud computing, artificial intelligence (AI), and data analytics. Al-Shamsi (2025) found that digitalization in strategic planning significantly improves the efficiency of academic decision-making processes. Veluvali & Suriseti (2022) and Alotaibi (2024) highlighted the critical role of learning management systems (LMS) as a central component in modern educational technology ecosystems, facilitating communication, content delivery, and AI integration. Nevertheless, very few studies have explored how the integration of online learning and educational applications serves as mediating factors in the relationship between digital transformation and institutional outcomes, such as operational efficiency and improved student accessibility. Most existing research remains fragmented, addressing either technology or user satisfaction in isolation, without accounting for the complex interaction between technological and managerial components within the broader framework of educational transformation. To fill this gap, the present study offers a novel contribution by developing a structural model that examines the impact of digital transformation in higher education management, mediated by the integration of online learning and educational applications, on institutional efficiency and accessibility.

In light of the above, this study aims to examine the impact of digital transformation on managerial efficiency and accessibility in higher education, with the mediating roles of online learning integration and the use of educational applications. The main research questions explore how these factors are interrelated and to what extent digital transformation contributes to improved institutional services. The expected contributions include theoretical advancements through a validated model of digital education management, as well as practical guidance for institutional leaders and policymakers in designing targeted and sustainable digital transformation strategies.

## 2. METHOD

This study employed a quantitative approach using a survey method to systematically investigate the causal relationships between digital transformation, online learning integration, educational applications, management efficiency, and accessibility within higher education. Structural Equation Modeling (SEM) with AMOS software was utilized to analyze the structural relationships among latent variables, as this

method is well-suited for complex models that include mediating effects and latent constructs (Jobst et al., 2023).

The research sample consisted of 250 participants from higher education institutions in Indonesia and Libya, including students, lecturers, and academic staff. The sampling technique used was purposive sampling, with inclusion criteria requiring participants to be actively engaged in academic or administrative activities and to have had experience using online learning platforms and educational applications for at least one academic semester. To ensure ethical compliance and protect participants' privacy, all respondents were informed of the study's objectives and procedures. Participation was entirely voluntary, and informed consent was obtained prior to data collection. Confidentiality was maintained throughout the research process, and all data were anonymized.

The data were collected using a closed-ended questionnaire distributed online, with items measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was developed based on prior validated studies and reviewed by three subject-matter experts to ensure content validity. A pilot test was conducted with a limited group to test reliability, resulting in Cronbach's Alpha values above 0.70 for all constructs.

The research model tested ten hypotheses: (H1) Digital transformation has a significant positive effect on online learning integration; (H2) Digital transformation has a significant positive effect on educational application usage; (H3) Online learning integration has a significant positive effect on management efficiency; (H4) Educational applications have a significant positive effect on management efficiency; (H5) Online learning integration has a significant positive effect on accessibility; (H6) Educational applications have a significant positive effect on accessibility; (H7) Digital transformation has a significant direct effect on management efficiency; (H8) Digital transformation has a significant direct effect on accessibility; (H9) Online learning integration and educational applications mediate the relationship between digital transformation and management efficiency; and (H10) Online learning integration and educational applications mediate the relationship between digital transformation and accessibility.

Data were analyzed in two stages using AMOS. The measurement model was first assessed through Confirmatory Factor Analysis (CFA) to test convergent validity, discriminant validity, and construct reliability. This was followed by the evaluation of the structural model, where the path coefficients, indirect effects, and  $R^2$  values were tested to assess model fit and predictive accuracy. A bootstrapping procedure was employed to test the significance of mediation effects and path estimates using t-statistics and p-values.

The questionnaire consisted of 5 main constructs with their corresponding measurement items, adapted from existing literature. The indicators were structured as follows in Table 1.

**Table 1.** Survey Instruments

Construct	Code	Item Statements
Digital Transformation	DT1	Our institution has adequate digital infrastructure to support academic activities.
	DT2	Leadership at our institution supports the adoption of digital systems.
	DT3	The organizational culture embraces digital innovation.
Online Learning Integration	OL1	Online learning platforms are consistently used in courses.
	OL2	Online learning enhances teaching effectiveness.
	OL3	Students and lecturers interact effectively using online platforms.
Educational Applications	EA1	I regularly use educational applications to support learning or teaching.
	EA2	Educational applications are easy to access and navigate.
	EA3	The features of educational apps help improve learning outcomes.
Management Efficiency	ME1	Digital systems help speed up academic administrative services.
	ME2	Administrative processes are more efficient through automation.
	ME3	Digital adoption reduces operational time and cost.
Accessibility	AC1	Educational services are accessible from any location.

AC2	Online systems allow flexible learning or service access at any time.
AC3	All students and staff have equal access to digital resources.

### 3. RESULTS AND DISCUSSION

#### 3.1. Results

The structural equation model was analyzed using AMOS to assess the relationships between digital transformation, online learning integration, educational applications, management efficiency, and accessibility in higher education. Before hypothesis testing, the measurement model was validated through Confirmatory Factor Analysis (CFA). All indicator loadings exceeded the minimum requirement of 0.60, and both the Average Variance Extracted (AVE) and Composite Reliability (CR) values for each construct surpassed the recommended thresholds (AVE > 0.50 and CR > 0.70), ensuring good convergent validity and internal consistency.

Model fit was evaluated using several goodness-of-fit indices. As presented in Table 2, the model demonstrated acceptable to good fit across all indices, indicating the structural model's adequacy in capturing the relationships among variables.

**Table 2.** Survey Model Fit Indices for SEM (AMOS Output)

Fit Index	Value	Threshold	Interpretation
Chi-square/df	1.964	< 3.00	Good fit
GFI	0.909	≥ 0.90	Good fit
AGFI	0.875	≥ 0.80	Acceptable
CFI	0.931	≥ 0.90	Good fit
TLI	0.928	≥ 0.90	Good fit
RMSEA	0.062	≤ 0.08	Good fit

Once the model was confirmed to be valid, the hypothesized relationships among variables were tested. The results, as shown in Table 3, indicate that all ten proposed hypotheses were supported. Digital transformation had a significant direct impact on both online learning integration and the use of educational applications. These two variables also significantly influenced management efficiency, which in turn had a strong positive impact on accessibility.

**Table 3.** Hypothesis Testing Results

Hypothesis	Relationship	CR (t-value)	p-value	Result
H1	Digital Transformation → Online Learning Integration	2.372	0.014	Accepted
H2	Digital Transformation → Educational Applications	2.051	0.021	Accepted
H3	Online Learning Integration → Management Efficiency	2.176	0.025	Accepted
H4	Educational Applications → Management Efficiency	2.049	0.029	Accepted
H5	Online Learning Integration → Accessibility	2.067	0.031	Accepted
H6	Educational Applications → Accessibility	2.113	0.023	Accepted
H7	Digital Transformation → Management Efficiency	2.165	0.027	Accepted
H8	Digital Transformation → Accessibility	2.414	0.013	Accepted
H9	Mediation (DT → OL & EA → Management Efficiency)	Significant	< 0.05	Accepted

H10	Mediation (DT → OL & EA → Accessibility)	Significant	< 0.05	Accepted
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These results indicate that digital transformation in higher education is a powerful enabler of both digital teaching practices and platform utilization. The more digitally advanced an institution becomes, the more effectively it is able to integrate online learning environments and educational applications. As a result, these two variables contribute to a series of operational improvements, including streamlined academic processes, enhanced service delivery, and the optimization of data management systems. Ultimately, these improvements lead to greater efficiency in the management of higher education institutions.

In addition, the analysis reveals that both online learning integration and the use of educational applications contribute positively to educational accessibility. This enables broader and more flexible participation in higher education, particularly for students in geographically remote or underserved areas. Notably, digital transformation exerts not only a direct effect on management efficiency and accessibility, but also an indirect effect that operates through these two mediating variables. This finding underscores the strategic importance of online learning and educational technologies in maximizing institutional performance and expanding educational reach.

### 3.2. Digital Transformation as a Strategic Driver in Higher Education

The findings of this study indicate that digital transformation significantly influences higher education management, particularly through the integration of online learning and the adoption of educational applications. According to Alenezi (2023) and Hashim et al. (2022), universities that implement comprehensive digital technologies are better positioned to respond to change, make effective decisions, and manage academic processes more efficiently. D. Zhang et al. (2025) added that digitalization fosters systems that are measurable, integrated, and data-driven, forming a critical foundation for modern institutional governance. Moreover, it enhances managerial performance by streamlining administrative services, enabling real-time monitoring of faculty performance, and managing student data efficiently (Han et al., 2024). These technology-enabled systems promote transparency and strengthen institutional accountability, allowing university leaders to respond accurately and promptly to regulatory shifts, quality standards, and evolving student expectations.

According to the Dynamic Capabilities Theory (Teece, 2023), organizations must be able to sense, seize, and reconfigure internal and external resources to respond to rapidly changing environments. Digital transformation represents such a capability in higher education, enabling institutions to adapt to global demands, pedagogical innovations, and educational reforms in a strategic and agile manner. The Socio-Technical Systems Theory (Münch et al., 2022) posits that the success of digital initiatives depends not only on technological tools but also on adjustments to social structures within the organization, such as leadership, institutional culture, and staff competencies. Therefore, digital systems must be integrated holistically with the university's human and organizational dimensions to realize their full potential.

From a broader adoption perspective, the Technology-Organization-Environment (TOE) Framework (Ergado et al., 2021) explains that technological implementation is influenced by an institution's technological readiness, organizational capacity, and environmental pressures. In this regard, digital transformation is not merely a functional upgrade but a strategic response to external expectations for improved efficiency, accountability, and competitiveness in an increasingly globalized education landscape. Universities that align these dimensions can more effectively manage complexity, improve service delivery, and enhance institutional resilience amid shifting educational paradigms.

Beyond internal efficiencies, digital transformation enables higher education institutions to participate actively in global academic ecosystems. It facilitates engagement in collaborative platforms, digital publishing networks, and technology-driven quality assurance systems, thereby increasing institutional visibility and international competitiveness. Recent studies support this perspective, Gull et al. (2024) highlight that digital competence is now essential for long-term strategic planning and institutional resilience in education, while García-Hernández et al. (2022) emphasize that digitalization enhances sustainability practices and academic innovation in universities. Consequently, digital transformation must be understood as a core strategic driver, redefining the direction, practices, and impact of higher education management in the digital era.

### 3.3. Online Learning Integration Enhances Managerial Efficiency

The integration of online learning plays a critical role in enhancing the efficiency of educational management. According to Abbasnejad et al. (2024), online learning platforms provide flexible, scalable, and structured systems for delivering instructional content, managing assessments, and facilitating interaction between lecturers and students. This flexibility improves institutional operations by optimizing

resource allocation and reducing time-related constraints in academic workflows. In particular, asynchronous learning models and centralized content delivery allow for more efficient scheduling and better use of faculty time.

The efficiency generated through digital learning systems extends beyond teaching and learning, positively influencing broader academic and administrative processes. Automated scheduling tools, centralized learning management systems (LMS), and real-time analytics reduce administrative burdens and enhance cross-departmental coordination. These systems enable faster decision-making, more accurate tracking of learning progress, and better reporting capabilities. As a result, institutional performance becomes more adaptive, data-driven, and focused on measurable results, aligning with performance-based models of education governance.

According to the Resource-Based View (RBV) theory (Diaz-Gonzalez & Dentchev, 2022), online learning platforms can be seen as strategic institutional resources that provide a competitive advantage when they are valuable, rare, inimitable, and organizationally embedded. In this context, the integration of robust digital learning infrastructure becomes a key internal capability that supports effective decision-making and efficient service delivery in higher education. The Contingency Theory of Management (Mahmud et al., 2021) suggests that organizational effectiveness is achieved when internal processes are aligned with external demands. Online learning systems help universities meet external pressures, such as demand for flexible learning, accountability, and student-centered services by offering scalable, technology-enabled solutions.

The integration of online learning enhances institutional agility and responsiveness. It strengthens internal coordination, enables stakeholders to access critical information quickly, and fosters a management environment that is transparent and accountable. Recent research reinforces these findings: according to Almusfar (2025), learning management systems improve administrative efficiency, increase user satisfaction, and contribute significantly to institutional sustainability. Therefore, online learning integration should be recognized not only as a pedagogical innovation but as a strategic enabler of efficient and modern higher education management.

#### **3.4. The Role of Educational Applications in Strengthening Management Systems**

The adoption of educational applications significantly contributes to improving managerial efficiency in higher education institutions (Althunibat et al., 2021; Ullah et al., 2021). These applications facilitate a wide range of operational processes, such as digital attendance tracking, curriculum management, evaluation of learning outcomes, and automated academic reporting. When integrated into daily institutional activities, these tools streamline workflows, reduce administrative workload, and minimize human error in managing routine tasks. As a result, administrative resources can be reallocated toward more strategic functions that enhance overall institutional performance.

The efficiency generated by educational applications supports evidence-based decision-making and strengthens institutional coordination. Consistent with findings from Martins et al. (2021), application-based digitalization enhances transparency, accuracy, and responsiveness across both academic and administrative domains. Faculty and staff benefit from simplified task execution, real-time data access, and reduced duplication of effort. This creates space for more meaningful engagement with students and supports a focus on academic quality and innovation.

The integration of educational technology into management systems aligns with the Information Systems Success Model by DeLone and McLean (Çelik & Ayaz, 2022), which asserts that system quality, information quality, and service quality directly affect user satisfaction and organizational impact. When educational applications are effectively implemented, they improve data integrity, streamline communication, and enable timely reporting, ultimately reinforcing institutional effectiveness. In addition, from the lens of the Institutional Theory (Nicola, 2024), adopting such technologies reflects the organization's effort to conform to global expectations of digital modernization and quality assurance in higher education, thus improving its legitimacy and credibility in the academic ecosystem.

Overall, educational applications contribute to the development of agile, data-informed, and accountable management systems in universities. By embedding technology into the fabric of academic operations, institutions can align their internal processes with global standards and enhance their adaptability in a rapidly evolving educational environment. As highlighted by Lun et al. (2024), technology acceptance and system integration play a pivotal role in enhancing user experience and achieving long-term institutional goals. Therefore, educational applications should be considered not only as operational tools but as strategic assets in the transformation of higher education management.

#### **3.5. Enhancing Educational Accessibility Through Digital Transformation**

A key finding of this study emphasizes both the direct and mediated effects of digital transformation on improving accessibility in higher education. The integration of online learning systems and educational applications has significantly expanded access to academic services, especially for students in geographically remote or underserved regions (Gunter, 2025). Through digital platforms, higher education institutions are able to deliver instruction and academic support without being constrained by traditional

physical infrastructure or campus-based learning models. This has allowed more equitable participation in education regardless of students' location or mobility.

This finding supports the understanding that digital transformation functions as a powerful enabler of inclusion by addressing challenges related to infrastructure gaps, distance, and socio-economic inequalities. Online learning environments provide flexible access to instructional content, interactive resources, and real-time support, thereby accommodating diverse learning needs and schedules. According to the Digital Divide Theory (Reynolds et al., 2022), digital tools can help bridge disparities in educational access, provided that technological infrastructure and digital literacy are adequately addressed. Thus, institutions embracing digital systems are better equipped to implement inclusive policies and offer broader access to quality education.

From a theoretical perspective, the Capability Approach developed by Amartya Sen (Yoon, 2021) is highly relevant in this context. This framework emphasizes that true educational accessibility is not merely about physical access, but also about enabling individuals to achieve valuable learning outcomes. Digital transformation enhances students' capabilities by offering choices in learning modes, accommodating various abilities, and reducing institutional barriers. Additionally, Universal Design for Learning (UDL) principles support the use of flexible, technology-enhanced environments to create accessible learning experiences for all students, including those with disabilities or learning differences (L. Zhang et al., 2022).

As digital infrastructure and broadband connectivity continue to improve globally, the potential for scalable, inclusive, and cost-effective academic delivery increases. Digital technologies thus play a critical role in advancing equity in higher education and supporting the broader goals of educational democratization. Recent empirical studies underscore this point. For instance, Liu (2021) and Matsieli & Mutula (2024) found that the shift to online learning during the COVID-19 pandemic provided key insights into how digital platforms can be leveraged for inclusive access, despite existing inequalities. Digital transformation should be viewed not only as an innovation in delivery but also as a strategic commitment to expanding access and fostering educational justice in the digital era.

### 3.6. The Strategic Mediation Role of Online Learning and Educational Applications

The results of this study reveal that the integration of online learning platforms and educational applications plays a strategic mediating role in amplifying the effects of digital transformation on both efficiency and accessibility within higher education institutions. These two elements act as functional channels through which digital transformation produces its intended outcomes. Without the presence of well-integrated digital learning systems and user-centered educational technologies, the transformative potential of digitalization in higher education would be considerably constrained.

This finding aligns with the principles of Process-Oriented Mediation (Naser SadrAbadi et al., 2020), which suggests that certain internal mechanisms mediate the relationship between strategic interventions and organizational outcomes. In this context, online learning and educational applications serve not merely as technological complements but as essential operational enablers that translate digital investments into concrete institutional performance. These mediators operationalize the abstract concept of digital transformation by facilitating improved communication, streamlined workflows, and flexible academic delivery all of which contribute directly to efficiency and accessibility.

According to the Technology Acceptance Model (TAM) (Rosli et al., 2022), the effectiveness of any digital system depends significantly on users' perceived usefulness and ease of use. Online learning platforms and educational applications, when designed to meet these criteria, foster greater engagement among faculty, students, and administrative staff. Their role in shaping user experiences and institutional outcomes cannot be underestimated, as they serve as the interface through which digital transformation initiatives are implemented and experienced on a daily basis. Therefore, their strategic function extends beyond technical infrastructure to include user empowerment, behavioral change, and innovation adoption.

Consequently, higher education institutions aiming to enhance managerial performance and expand educational access must prioritize the systematic development and integration of these digital tools. As supported by Fernández et al. (2023), successful digital transformation is contingent upon the effective orchestration of mediating technologies that align with institutional goals. Their role is not peripheral, but central to ensuring that digital transformation yields meaningful, measurable, and sustainable improvements in academic and administrative domains. Thus, investment in these digital mediators should be regarded as a strategic imperative for institutions navigating the evolving landscape of higher education.

### 3.7. Relevance to Global Challenges in Higher Education

In response to global challenges in higher education such as rapid technological advancement, changing labor market demands, and evolving preferences of digital-native learners, this study offers critical insights into the transformative role of digitalization. The findings demonstrate that the integration of online learning platforms and educational applications functions as a strategic mechanism that enhances managerial efficiency and broadens educational accessibility. These tools serve as essential mediators that

translate digital transformation into measurable institutional outcomes, including operational agility, improved decision-making, and expanded academic reach.

According to Vičić Krabonja et al. (2024), sustainable digital transformation requires more than the adoption of new infrastructure. It involves strategic leadership, the development of digital literacy among academic and administrative stakeholders, and the reengineering of institutional processes to support innovation and inclusion. As the demand for hybrid learning models, flexible credentials, and international academic collaboration continues to rise, higher education institutions must adopt integrated digital strategies that ensure both responsiveness and resilience. Institutions that position digital transformation at the core of their management culture are more likely to thrive in dynamic global contexts by fostering transparency, accountability, and equitable access to quality education. In this light, digital transformation emerges not merely as a technological enhancement but as a foundational imperative for institutional relevance and long-term sustainability.

#### 4. CONCLUSION

This study empirically demonstrated that digital transformation played a crucial role in enhancing the efficiency and accessibility of higher education. The significant influence of digital transformation on the integration of online learning and the use of educational applications indicated that these two mediating variables served as strategic pathways for optimizing institutional management. The integration of digital learning systems enabled the flexible and structured delivery of content, while educational applications supported the automation of managerial processes such as attendance tracking, assessment, and academic reporting. Both elements directly and indirectly contributed to the creation of a more efficient and inclusive governance model in higher education.

The findings also revealed that digitalization not only impacted internal institutional performance but also expanded access to education in remote areas and among previously underserved communities. This emphasized that strategically designed digital transformation could offer a sustainable solution for addressing global challenges in higher education. The effectiveness of digitalization's influence, as reflected in the structural model, underscored the importance of investment in technological infrastructure, online learning systems, and integrated educational applications.

This study had a limitation in that it did not deeply explore the qualitative perspectives of policymakers, faculty members, and students. Future research is therefore recommended to adopt a mixed-methods approach and to examine contextual factors such as institutional digital readiness, national policies, and organizational culture that may influence the digital transformation process. The practical contribution of this study lies in offering strategic recommendations for higher education institutions to position online learning integration and educational application usage as core components of digital transformation. By optimizing these two elements, institutions may enhance managerial efficiency and broaden access to higher education in ways that are more adaptive and inclusive to the demands of the digital era.

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