Technology and Society Perspectives (TACIT) Vol. 4, No. 3, November 2026-February 2027, pages 737–749

Digital Transformation in Educational Management: Strategies to Enhance the Effectiveness and Competitiveness of Educational Institutions in the Digital Economy Era

Arifannisa[1*], Aminah Zuhriyah[2], Nor Khakim[3], Enny Haryanti[4]

[1,2,3]*STKIP Kusuma Negara, Indonesia*
[4]*STIE Indonesia Banking School, Indonesia*

ARTICLE INFO

Article history:
Received: 22 September 2026
Revised: 25 October 2026
Accepted: 01 November 2026

DOI:
10.61100/tacit.v4i3.395

Keywords:
Digital Transformation, Educational Management, Digital Leadership, Management Effectiveness, Institutional Competitiveness

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

ABSTRACT

Digital transformation has become increasingly important for educational institutions seeking to improve management effectiveness and institutional competitiveness. This study aims to examine digital transformation strategies and their potential contributions to educational management in the digital economy. Using a narrative literature review, the study synthesizes 30 primary sources comprising 28 journal articles and two institutional reports. The findings identify five interconnected themes: organizational transformation, digital strategy and institutional readiness, digital leadership and competence, management effectiveness, and institutional competitiveness and governance. The synthesis indicates that successful digital transformation requires strategic planning, organizational capacity, competent human resources, and integrated digital governance. This study proposes the Integrated Digital Transformation and Educational Competitiveness Framework, connecting digital strategies and organizational capacity with management effectiveness and institutional competitiveness. The framework offers a conceptual foundation for developing sustainable digital transformation strategies in educational institutions, although the proposed relationships require further empirical validation across diverse educational contexts.

ABSTRAK

Transformasi digital semakin penting bagi lembaga pendidikan dalam meningkatkan efektivitas manajemen dan daya saing kelembagaan. Penelitian ini bertujuan menganalisis strategi transformasi digital serta potensi kontribusinya terhadap pengelolaan pendidikan di era ekonomi digital. Penelitian menggunakan pendekatan narrative literature review dengan menyintesis 30 sumber utama, terdiri atas 28 artikel jurnal dan dua laporan kelembagaan. Hasil kajian mengidentifikasi lima tema yang saling berkaitan, yaitu perubahan organisasi, strategi digital dan kesiapan institusi, kepemimpinan dan kompetensi digital, efektivitas manajemen, serta daya saing dan tata kelola kelembagaan. Sintesis menunjukkan bahwa keberhasilan transformasi digital membutuhkan perencanaan strategis, kapasitas organisasi, sumber daya manusia yang kompeten, dan tata kelola digital yang terintegrasi. Penelitian ini mengusulkan Integrated Digital Transformation and Educational Competitiveness Framework yang menghubungkan strategi digital dan kapasitas organisasi dengan efektivitas manajemen serta daya saing lembaga pendidikan. Kerangka tersebut memberikan landasan konseptual bagi pengembangan strategi transformasi digital berkelanjutan, meskipun hubungan yang diusulkan masih memerlukan pengujian empiris pada berbagai konteks pendidikan.

1. INTRODUCTION

The development of the digital economy has transformed how organizations conduct their activities, manage resources, and deliver services to society. These changes have occurred not only in the business sector but have also influenced educational institutions, which are increasingly expected to provide services that are faster, more flexible, transparent, and technology-driven. In this context, digital transformation can no longer be understood merely as the use of computers, administrative applications, or online learning platforms.

** Corresponding author, email address: arifannisa@stkipkusumanegara.ac.id*

Rather, it involves broader changes in organizational strategies, work processes, decision-making, and value creation. Vial (2019) explains that digital transformation is a process of organizational change driven by the use of digital technologies, which can reshape how organizations create value. Verhoef et al. (2021) also distinguish the digitalization of organizational activities from digital transformation, which involves more fundamental organizational changes. These perspectives suggest that digital transformation in education is not simply about replacing manual systems with digital technologies but about changing how educational institutions are managed to improve their effectiveness and adaptability in the digital economy.

The need for digital transformation has become increasingly important as educational institutions face changing student needs, technological developments, and growing expectations regarding educational service quality. Students and society have become more accustomed to digital services that provide rapid access to information and enable various activities to be conducted without requiring physical presence. These conditions encourage educational institutions to develop academic administration systems, enrollment services, financial management systems, institutional communication platforms, and technology-based educational monitoring mechanisms. OECD (2023) explains that a digital education ecosystem encompasses interconnected infrastructure, resources, information systems, policies, and governance arrangements. However, UNESCO (2023) cautions that the use of technology in education does not necessarily generate benefits unless considerations of effectiveness, equitable access, and user needs are adequately addressed. Therefore, the primary challenge for educational institutions is not merely to provide technology but to ensure that technology genuinely contributes to improving service quality and educational management effectiveness.

In practice, digital transformation in educational institutions continues to encounter various organizational challenges. Technology adoption sometimes develops through separate applications or systems, resulting in limited integration among academic information, financial management, human resources, and student services. Such conditions can restrict the benefits of technology because administrative processes may still involve repetitive tasks, while coordination between organizational units remains less than optimal. Castro Benavides et al. (2020), through their systematic review of digital transformation in higher education, demonstrate that digital transformation is a multidimensional process requiring attention to various institutional aspects. Fernández et al. (2023) also discuss the importance of integrated digital strategies in developing higher education institutions. Meanwhile, Gkrimpizi et al. (2023) identify various barriers to digital transformation, including organizational challenges, resource limitations, and technological readiness. These findings indicate that the availability of digital applications does not necessarily demonstrate successful transformation if educational institutions have not effectively integrated technology with their management systems and organizational needs.

These challenges are closely related to educational management effectiveness. Effectiveness should not be assessed solely by how quickly administrative tasks are completed but also by an institution's ability to allocate resources appropriately, provide accurate information, strengthen coordination, and make decisions based on organizational needs. In increasingly complex educational environments, data management has become essential for understanding student development, evaluating services, and planning institutional policies. Stojanov and Daniel (2024) demonstrate that the application of big data and analytics in higher education is associated with the development of information management and decision-making practices. Cosa and Torelli (2024) also discuss how digital transformation relates to the evolution of more flexible organizational performance measurement systems. Although these studies were not conducted exclusively within educational institutions, their perspectives provide a foundation for understanding the importance of information systems and performance evaluation in modern management. Accordingly, educational management effectiveness should be understood as an organization's ability to translate technology utilization into higher-quality work processes, coordination, and decision-making.

Successful digital transformation is also inseparable from leadership and human resource readiness. Educational leaders are responsible for determining the direction of change, establishing technology investment priorities, developing organizational culture, and ensuring that academic and administrative personnel can adapt to digital systems. Available technologies may not be optimally utilized when users lack the necessary competencies or do not fully understand their relevance to their responsibilities. Reis-Andersson (2024) emphasizes the importance of school leaders' perspectives in understanding educational digitalization. Wollscheid et al. (2025) also highlight growing research attention to digital school leadership. Meanwhile, Farias-Gaytan et al. (2023) connect digital transformation with digital literacy in higher education environments. These studies suggest that technological change must be accompanied by the development of

human and organizational capabilities. Thus, digital leadership and human resource competencies are essential components that enable technological transformation to develop into sustainable changes in educational management.

Beyond management effectiveness, digital transformation is also associated with the competitiveness of educational institutions. In the digital economy era, educational institutions face increasing pressure to maintain the relevance of their services, improve student experiences, develop innovations, and respond to changing societal and labor market needs. Competitiveness in education should not be understood solely as competition to attract more students. It also encompasses an institution's ability to create value through service quality, reputation, innovation, and organizational sustainability. Otto et al. (2024) discuss emerging digital practices that support student-centered learning environments, while Ahsan et al. (2023) examine the implementation of micro-credentials as a form of innovation in higher education services. These studies illustrate how technology can create opportunities to develop more flexible and relevant educational services. However, improvements in competitiveness cannot be assumed to occur automatically following technology adoption. Competitiveness should be understood as the ability of educational institutions to leverage digital transformation to deliver valuable, adaptive, and sustainable services.

Although research on digital transformation in education continues to expand, the existing literature reflects differences in research focus. Some studies emphasize the concepts and strategies of organizational transformation, as discussed by Vial (2019), Verhoef et al. (2021), and Hanelt et al. (2021). Other studies focus more specifically on institutional readiness, implementation barriers, infrastructure development, and digital competencies, as reflected in the work of Castro Benavides et al. (2020), Gkrimpizi et al. (2023), and Singun (2025). Meanwhile, research on leadership, data management, and educational service innovation has developed through different perspectives. These differences indicate that digital transformation has been examined across various dimensions, yet the conceptual relationships among digital strategy, leadership, organizational readiness, management effectiveness, and institutional competitiveness require a more integrated synthesis. The research gap addressed in this study does not arise from a lack of discussion about educational technology but from the need to integrate management and competitiveness perspectives to develop a more comprehensive understanding of digital transformation.

Based on these considerations, this study aims to analyze the development of literature on digital transformation in educational management and identify organizational strategies that may contribute to improving the effectiveness and competitiveness of educational institutions in the digital economy era. The study employs a narrative literature review approach by synthesizing 30 primary sources covering digital transformation, leadership, human resource competencies, management effectiveness, service innovation, and educational governance. Through this synthesis, the study seeks to develop the Integrated Digital Transformation and Educational Competitiveness Framework as a conceptual framework connecting digital transformation strategies, leadership, organizational readiness, and technology management with educational management effectiveness and institutional competitiveness. The primary contribution of this study lies in integrating digital transformation and strategic management perspectives to explain how educational institutions can strengthen organizational effectiveness while enhancing their competitiveness. The proposed framework is conceptual and does not claim to establish empirically verified causal relationships. The findings are expected to provide a foundation for future research while offering insights for educational leaders and policymakers in designing more focused, inclusive, and sustainable digital transformation strategies.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 Digital Transformation in Educational Management

Digital transformation is a process of organizational change involving the use of technology to reshape strategies, work processes, organizational structures, and approaches to value creation. In the educational context, digital transformation is not limited to the use of technological tools in teaching and learning activities but also encompasses changes in administrative management, information systems, academic services, decision-making, and relationships between educational institutions and their stakeholders. Vial (2019) explains that digital transformation is a process of change triggered by digital technologies that influences how organizations conduct their activities and create value. Verhoef et al. (2021) distinguish digitization, digitalization, and digital transformation as stages involving different scopes of change. Digitization refers to converting analog information into digital formats, digitalization involves using technology to improve processes,

while digital transformation encompasses broader organizational changes. This distinction is important because educational institutions that have adopted digital systems have not necessarily undergone digital transformation if technology has not fundamentally changed how their organizations are managed.

Digital transformation in education should also be understood as part of an ongoing process of organizational change. Hanelt et al. (2021) explain that digital transformation is associated with changes in organizational strategies and structures, as well as the need to develop adaptive capabilities. In higher education, Castro Benavides et al. (2020) demonstrate that digital transformation encompasses various interconnected institutional dimensions. These dimensions involve technology, organizational processes, human resources, and institutional strategies. Fernández et al. (2023) also emphasize the importance of developing digital initiatives that are integrated with organizational direction. Therefore, digital transformation in educational management should not be regarded as a technology project that ends once a system has been implemented. Digital transformation is a process of institutional renewal that requires alignment between technology, organizational strategies, and educational service needs.

From a strategic management perspective, digital transformation is also associated with an organization's ability to respond to environmental changes. Educational institutions face changing student needs, technological developments, competition in educational services, and increasingly complex accountability requirements. These conditions require institutions to develop strategies that are not solely oriented toward short-term efficiency but also support organizational sustainability. Bisri et al. (2023) discuss the success factors of digital transformation in higher education, while Alenezi and Akour (2023) highlight the importance of digital transformation planning through a structured approach. This perspective is consistent with the concept of dynamic capabilities developed by Teece (2007), which refers to an organization's ability to recognize changes, seize opportunities, and reconfigure resources to maintain its relevance. In this study, this perspective serves as a supporting theoretical foundation for understanding that successful digital transformation depends on the ability of educational institutions to align their strategies and resources with changes in the digital environment.

2.2 Digital Strategy, Organizational Readiness, and Implementation Barriers

Digital strategy refers to an organization's policy direction in determining how technology is utilized to achieve institutional objectives. In educational management, such strategies may include developing academic information systems, integrating administrative processes, digitalizing student services, managing data, and improving coordination across organizational units. However, digital strategy cannot be implemented effectively through the procurement of devices or applications alone. It must be translated into organizational priorities, clearly defined responsibilities, competency development, and appropriate evaluation mechanisms. Alenezi and Akour (2023) discuss the importance of digital transformation planning in higher education institutions, while Díaz-Garcia et al. (2023) examine digital transformation management through an institutional case study approach. Both perspectives suggest that technology implementation should be situated within a structured organizational management framework. Thus, an effective digital strategy explains not only which technologies are used but also why they are needed, how they are implemented, and what organizational benefits they are expected to deliver.

The success of digital strategies is closely related to organizational readiness. This readiness encompasses infrastructure availability, financial support, human resource capabilities, organizational culture, and leadership commitment to change. Within the Technology–Organization–Environment (TOE) framework, Tornatzky and Fleischer (1990) explain that technological innovation adoption can be understood through technological, organizational, and external environmental contexts. This framework is relevant for analyzing the readiness of educational institutions because technology adoption does not occur independently of internal capabilities and environmental pressures. Rodríguez-Abitia and Correa (2021) discuss the assessment of digital transformation in universities, while Mhlanga et al. (2022) identify important lessons concerning digital transformation in higher education during the COVID-19 pandemic. Both studies highlight the need to understand institutional readiness comprehensively. Therefore, digital transformation readiness is determined not only by the availability of technology but also by an organization's ability to manage change and sustain its implementation.

Implementation barriers are particularly important because educational institutions differ in their resources and organizational capacities. Gkrimpizi et al. (2023) classify various barriers to digital transfor-

mation in higher education institutions, while Singun (2025) reviews challenges affecting digital transformation implementation in educational environments. These barriers may include inadequate infrastructure, resistance to change, insufficient digital competencies, financial constraints, and a lack of alignment between organizational policies and practices. For example, an educational institution may have a digital administrative system, yet its benefits remain limited if employees continue maintaining manual records simultaneously. Such conditions may create repetitive work and reduce the efficiency that digital systems are intended to achieve. Consequently, barriers to digital transformation should be understood as managerial and institutional challenges rather than merely technical problems.

2.3 Digital Leadership and Human Resource Competencies

Digital leadership refers to the ability of organizational leaders to direct the use of technology to support institutional objectives, organizational change, and institutional development. In educational management, digital leadership encompasses the ability to establish a vision for change, determine technological priorities, facilitate communication, encourage collaboration, and create a working environment that supports organizational learning. Educational leaders do not necessarily need to master every technical aspect of technology, but they must understand how technology can improve services and decision-making processes. Reis-Andersson (2024) discusses the role of school leaders in digitalization processes, while Wollscheid et al. (2025) highlight developments in research on digital leadership in schools. This literature indicates that leadership plays an important role in connecting digital policies with organizational practices. Without clear leadership direction, technology adoption risks developing as fragmented activities across organizational units without producing integrated institutional change.

In addition to leadership, human resource digital competencies are essential components of educational management transformation. Academic and administrative personnel perform different roles, but both require the ability to use technology in accordance with their professional responsibilities. These competencies extend beyond operating applications to include understanding digital information, maintaining data security, using digital systems responsibly, and adapting work practices to technological developments. Farias-Gaytan et al. (2023) discuss the relationship between digital transformation and digital literacy in higher education, while Alhubaishy and Aljuhani (2021) examine challenges related to instructors' and students' attitudes toward digital transformation. These perspectives suggest that technology acceptance and utilization are influenced by human factors. Therefore, digital competency development should become an integral part of human resource management strategies rather than merely a training activity conducted when new applications are introduced.

Competency development must also be continuous because technological change often occurs faster than adjustments to organizational procedures. Siddiq et al. (2024) discuss the concept of digital agency, which provides a perspective on individuals' ability to act meaningfully in digital environments. Meanwhile, Nakaziba and Ngulube (2024) emphasize continuing professional development related to digital transformation in academic library environments. These perspectives help explain the importance of individuals' capabilities to use technology actively and in accordance with their professional needs. Within educational institutions, competency development can be supported through training, mentoring, knowledge sharing, and evaluations of technology utilization. However, the effectiveness of these activities depends on organizational support and their relevance to users' responsibilities. Thus, digital leadership and human resource competencies are complementary components in developing organizational readiness to respond to technological change.

2.4 Educational Management Effectiveness through Digital Technology Utilization

Educational management effectiveness refers to the ability of educational institutions to achieve organizational objectives through appropriate management of resources, work processes, information, and services. In the context of digital transformation, effectiveness can be reflected in simplified administrative procedures, improved coordination, information availability, more accurate decision-making, and enhanced performance evaluation capabilities. However, effectiveness should not be equated with the speed of technology use. A digital system that accelerates particular tasks does not necessarily improve organizational effectiveness if the information it produces is inaccurate or is not used in decision-making. Stojanov and Daniel (2024) discuss research developments concerning big data and analytics in higher education, providing a foundation for understanding the potential of digital information management. Cosa and Torelli (2024) also examine

developments in performance measurement systems in the context of digital transformation. These perspectives indicate that the managerial value of technology lies in its ability to support better organizational processes and decisions rather than merely in the number of digital systems owned by educational institutions.

Technology utilization in educational management can also support the development of services that are more responsive to users' needs. Integrated information systems may help educational institutions manage student data, monitor academic activities, and provide service information more consistently. Paulsen and Lindsay (2024) discuss the development of learning analytics dashboards that increasingly focus on learning needs, while König et al. (2024) examine the development of individual digital study assistants in higher education. Although these studies are more closely related to learning services, their perspectives are relevant for understanding how information and technology can support educational service development. From a management perspective, digital information utilization can help institutions identify user needs and plan service improvements. However, improving service quality still requires organizational capabilities to translate digital information into actions that respond to student needs and institutional objectives.

Management effectiveness is also associated with an organization's ability to manage knowledge and develop innovation continuously. Kurti and Salavati (2024) discuss the development of knowledge environments within academic institutions, while Ahsan et al. (2023) examine the implementation of micro-credentials as a form of innovation in higher education. These studies provide perspectives suggesting that technology and organizational knowledge can support the development of more flexible educational services. Nevertheless, service innovation does not necessarily indicate improved effectiveness if its implementation increases workloads, fails to meet user needs, or incurs costs that outweigh its benefits. Therefore, educational institutions need to consider the alignment between technology, work processes, human resource capabilities, and organizational objectives. Educational management effectiveness in the digital era should be understood as the outcome of technology management that is purposeful, integrated, and subject to continuous evaluation.

2.5 Institutional Competitiveness and Governance in the Digital Economy Era

Institutional competitiveness refers to the ability of educational institutions to maintain relevance, improve service quality, build stakeholder trust, and adapt to environmental changes. In the digital economy era, competitiveness is not limited to the ability to attract students but also encompasses service innovation, the quality of learning experiences, institutional reputation, and organizational sustainability. Digital transformation can support these capabilities by enabling the development of more accessible, flexible, and responsive services. Otto et al. (2024) discuss digital practices that support student-centered learning environments, while Santoveña-Casal and López (2024) examine developments in digital pedagogies in higher education. Both studies demonstrate that technology can support changes in how educational institutions deliver services. Nevertheless, technology adoption does not automatically enhance competitiveness if the innovations developed fail to provide tangible value to students and stakeholders.

Technological developments, including artificial intelligence, also create new opportunities and challenges for educational institutions. Artificial intelligence-based technologies can support information provision, service development, and academic activities. However, their implementation requires careful consideration of information quality, data security, ethical concerns, and user readiness. Bhullar et al. (2024) discuss developments in research on ChatGPT utilization in higher education, while Zhou et al. (2024) examine digital technology adaptation in educational activities during the COVID-19 pandemic. This literature suggests that technological innovation must be understood alongside implementation conditions and organizational needs. From a competitiveness perspective, the ability of educational institutions to utilize emerging technologies responsibly can contribute to maintaining service relevance. However, these benefits should be evaluated based on their contributions to educational quality and institutional sustainability rather than merely the novelty of the technologies adopted.

Digital governance is an essential component because technological transformation involves decisions concerning investment, information security, responsibility allocation, data management, and performance evaluation. OECD (2023) emphasizes the importance of developing effective digital education ecosystems through the interconnectedness of technology, resources, policies, and governance. UNESCO (2023) also cautions that educational technology utilization must consider students' interests, equitable access, and evidence of technological benefits. These perspectives indicate that institutional competitiveness should not be developed through technology adoption without clear direction but through governance mechanisms that

ensure technology supports educational objectives. Therefore, digital governance is necessary to maintain a balance between innovation, organizational effectiveness, service quality, and institutional responsibility.

Based on the literature reviewed, digital transformation, organizational strategy, leadership, human resource competencies, management effectiveness, and institutional competitiveness are interconnected concepts that perform distinct functions. Digital transformation represents the process of organizational change, digital strategy provides direction for implementation, while leadership and human resource competencies support organizational readiness. Management effectiveness reflects an organization's ability to manage processes and resources, whereas competitiveness concerns an institution's capacity to create value and maintain relevance in a changing environment. The relationships among these concepts cannot be assumed to occur automatically because they are influenced by organizational readiness, institutional characteristics, resource availability, and educational environmental conditions. Thus, integrating these perspectives provides a conceptual foundation for understanding how digital transformation can support management effectiveness and strengthen the competitiveness of educational institutions. This synthesis subsequently serves as the basis for developing the Integrated Digital Transformation and Educational Competitiveness Framework through the thematic analysis presented in the results and discussion section.

3. RESEARCH METHOD

3.1 Research Design

This study employs a narrative literature review approach to examine digital transformation in educational management and its relationship with the effectiveness and competitiveness of educational institutions in the digital economy era. This approach was selected because it enables the integration of various theoretical perspectives, empirical findings, and policy recommendations addressing digital transformation from organizational management and educational perspectives. Unlike quantitative research, which tests relationships among variables using primary data, this review focuses on interpreting and synthesizing the literature to identify recurring themes, similarities and differences in findings, and research gaps. The review is organized around five main aspects: digital transformation and organizational change, digital strategy and institutional readiness, digital leadership and competence, educational management effectiveness, and institutional competitiveness and digital governance. The synthesis provides the foundation for developing the Integrated Digital Transformation and Educational Competitiveness Framework, which remains conceptual and has not been empirically tested.

3.2 Data Sources and Literature Search Strategy

The study draws on scholarly publications and institutional documents relevant to digital transformation in educational management. The literature search was directed toward journal articles accessible through Google Scholar, Crossref, and academic publishers' websites, as well as official reports published by international organizations such as the OECD and UNESCO. The search keywords included digital transformation in education, educational management, digital leadership, digital strategy, organizational readiness, educational effectiveness, institutional competitiveness, and digital governance. Combinations of these keywords were used to identify publications examining digital technology utilization in educational institutional management at both school and higher education levels. Literature published between 2019 and 2025 was prioritized to capture discussions relevant to recent developments in digital transformation, while earlier foundational theoretical sources were also considered. The main corpus comprises 30 publications, consisting of 28 peer-reviewed journal articles and two international institutional reports. Publications released before 2019 were retained when they made significant contributions to understanding digital transformation and organizational change.

3.3 Inclusion and Exclusion Criteria

Literature selection was based on substantive relevance, source credibility, and contributions to the research objectives. The inclusion criteria covered publications addressing digital transformation in education or organizations, digital strategies and readiness, leadership, human resource competencies, management effectiveness, service innovation, and institutional governance. Journal articles and reports from international institutions were considered when they provided relevant conceptual discussions, research findings, or policy recommendations. Conversely, publications focusing exclusively on the technical use of learning applica-

tions without a clear connection to organizational management were not prioritized. Sources lacking sufficient bibliographic information, those unrelated to the research focus, or those substantially duplicating discussions presented in other publications were also excluded from the main corpus. Relevance was assessed by considering the title, abstract, research objectives, study context, and contribution of each publication to the overall synthesis.

Table 1. Literature Selection Criteria

Criteria	Inclusion	Exclusion
Publication type	Peer-reviewed journal articles and official institutional reports	Unverified publications and unsupported online commentary
Publication period	Primarily 2019–2025, with earlier foundational studies	Older studies without clear theoretical relevance
Research focus	Digital transformation, educational management, leadership, effectiveness, and competitiveness	Technical technology use without organizational relevance
Institutional context	Schools, universities, and relevant organizational studies	Studies without a meaningful connection to educational management
Language	English-language publications	Publications outside the defined language scope
Source quality	Traceable scholarly publications and official institutional documents	Sources with insufficient bibliographic information

3.4 Literature Selection Procedure

The literature selection procedure followed four stages: identification, initial screening, eligibility assessment, and establishment of the final literature corpus. During the identification stage, a total of 120 publication records were identified from various academic sources. Following the initial relevance assessment and duplicate removal, 95 records remained for further screening based on their titles and abstracts. The screening process resulted in the exclusion of 37 publications that did not sufficiently address the research focus, leaving 58 publications for full-text eligibility assessment. During this stage, 28 publications were excluded because they did not meet the established inclusion criteria or lacked sufficient substantive information for narrative analysis. Consequently, 30 primary publications were included in the final literature corpus, representing 25% of the initially identified records. The selection procedure provided a structured basis for identifying relevant studies and organizing the literature for subsequent thematic analysis. As this study adopted a narrative literature review approach, the selection process was used to support transparency in literature identification and assessment rather than to claim full compliance with the PRISMA protocol. The literature selection procedure is illustrated in Figure 1.

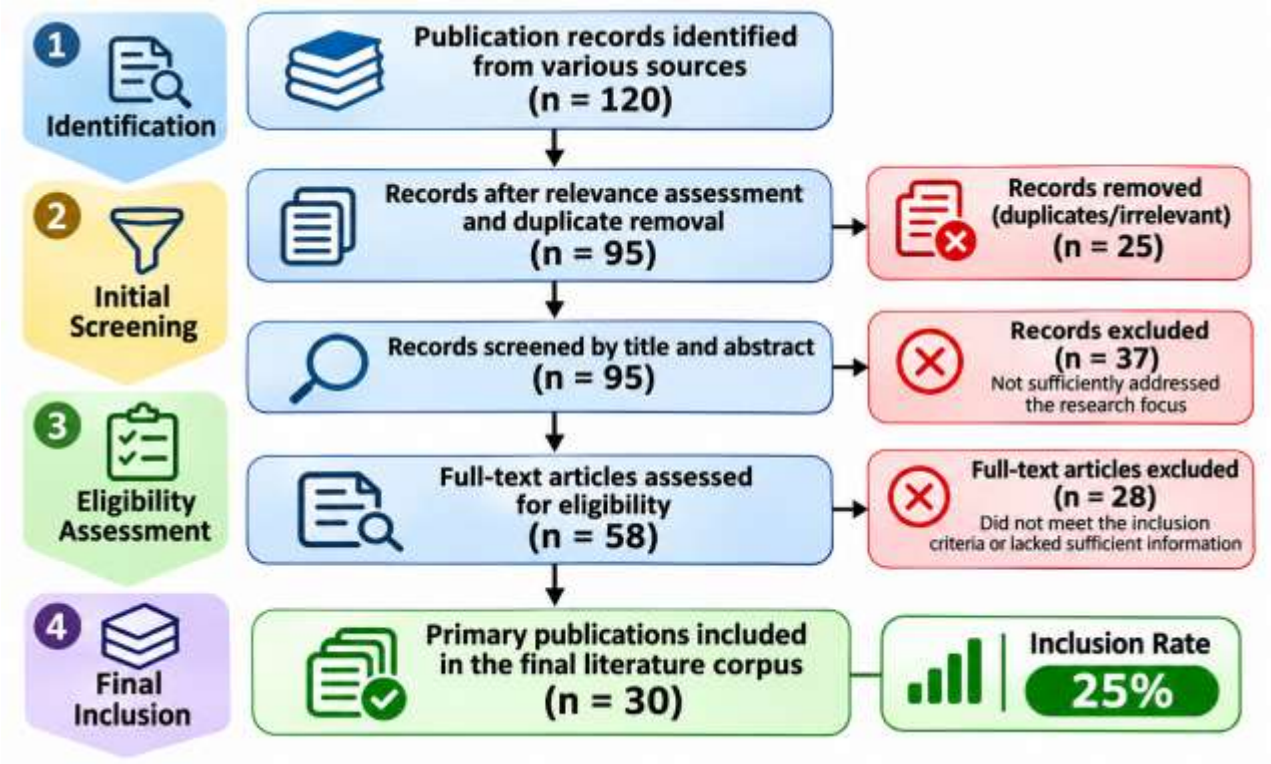


Figure 1. Literature Selection Flow Diagram

3.5 Literature Analysis and Synthesis Techniques

The analysis employs a thematic synthesis approach to organize the literature according to conceptual similarities, research focus, and contributions to educational management. Each publication was examined by considering its authors and publication year, research objectives, institutional context, methodological approach, key findings, and relevance to the effectiveness and competitiveness of educational institutions. The reviewed publications were subsequently organized into five main themes. The first theme examines digital transformation as a process of organizational change. The second explores digital strategy, institutional readiness, and implementation barriers. The third focuses on digital leadership and human resource competencies. The fourth addresses technology utilization in supporting educational management effectiveness. The fifth examines the conceptual relationships among digital innovation, governance, and institutional competitiveness. Each theme incorporates six publications as its dominant reference group, although individual publications may contribute to more than one theme.

The synthesis was conducted by comparing perspectives and findings across publications to identify recurring patterns, contextual differences, and limitations in the available evidence. This review does not employ meta-analysis or statistical testing because the publications analyzed differ in their research designs, study subjects, and methodological approaches. Furthermore, literature addressing higher education institutions and schools was analyzed while considering differences in their institutional characteristics. The findings were used to formulate conceptual relationships among digital transformation strategies, leadership, organizational readiness, management effectiveness, and institutional competitiveness. The Integrated Digital Transformation and Educational Competitiveness Framework was developed as an outcome of conceptual synthesis rather than as a model demonstrating established causal relationships. Through this approach, the study seeks to provide a more integrated understanding of digital transformation strategies in educational management while identifying directions for future empirical research.

4. DATA ANALYSIS AND DISCUSSION

4.1 Characteristics of the Reviewed Literature

This review organizes 30 primary publications addressing digital transformation, organizational strategy, leadership, human resource competencies, management effectiveness, and the competitiveness of educational institutions. The initial literature corpus consists of 28 scholarly journal articles and two international

institutional reports published by the OECD (2023) and UNESCO (2023). The selected publications include conceptual studies, literature reviews, case studies, and policy reports. Most sources were published between 2019 and 2025, allowing the discussion to capture developments in digital transformation within education during this period. Some publications examine organizational change in general, while others focus on schools, higher education institutions, and academic services. These differences in context provide an opportunity to understand digital transformation from a broader perspective. However, they also require careful interpretation because the characteristics and capacities of educational institutions are not necessarily uniform.

The literature mapping reveals that discussions of digital transformation in education extend beyond the use of learning technologies. The literature also addresses changes in organizational strategy, institutional readiness, digital leadership, academic and administrative staff competencies, information management, and service innovation. Based on their dominant focus, the 30 publications were classified into five main themes: digital transformation and organizational change, digital strategy and institutional readiness, digital leadership and competence, educational management effectiveness, and institutional competitiveness and digital governance. Each theme is supported by six primary publications, although some sources are relevant to more than one theme. This classification serves as an analytical tool for developing the synthesis rather than suggesting that each study addresses only one issue.

Table 2. Thematic Synthesis of 30 Publications

No.	Authors (Year)	Main Focus	Thematic Contribution
1	Vial (2019)	Digital transformation and organizational change	T1 – Digital transformation as organizational change
2	Verhoef et al. (2021)	Digital transformation and value creation	T1 – Strategic transformation and organizational value
3	Hanelt et al. (2021)	Digital transformation and organizational strategy	T1 – Organizational adaptation and strategic change
4	Castro Benavides et al. (2020)	Digital transformation in higher education	T1 – Institutional transformation in education
5	Fernández et al. (2023)	Digital transformation initiatives in universities	T1 – Integrated institutional digital strategies
6	Bisri et al. (2023)	Success factors in higher education transformation	T1 – Institutional transformation requirements
7	Alenezi & Akour (2023)	Digital transformation planning	T2 – Strategic planning and implementation
8	Díaz-Garcia et al. (2023)	Managing institutional digital transformation	T2 – Digital strategy and organizational management
9	Gkrimpizi et al. (2023)	Barriers to digital transformation	T2 – Organizational and technological barriers
10	Singun (2025)	Digital transformation implementation barriers	T2 – Institutional readiness and implementation challenges
11	Mhlanga et al. (2022)	Digital transformation lessons during COVID-19	T2 – Institutional readiness and digital adaptation
12	Rodríguez-Abitia & Correa (2021)	Assessing university digital transformation	T2 – Digital maturity and institutional assessment
13	Wollscheid et al. (2025)	Digital school leadership	T3 – Digital leadership and organizational change
14	Reis-Andersson (2024)	Leadership in school digitalization	T3 – Leadership roles in digital implementation
15	Farias-Gaytan et al. (2023)	Digital transformation and digital literacy	T3 – Digital competence development
16	Alhubaishy & Aljuhani (2021)	Attitudes toward digital transformation	T3 – Technology acceptance and user readiness
17	Siddiq et al. (2024)	Digital agency	T3 – Individual digital capability
18	Nakaziba & Ngulube (2024)	Digital professional development	T3 – Continuous digital competence development
19	Stojanov & Daniel (2024)	Big data and analytics in higher education	T4 – Data-informed educational management

20	Cosa & Torelli (2024)	Digital transformation and performance management	T4 – Organizational performance measurement
21	Paulsen & Lindsay (2024)	Learning analytics dashboards	T4 – Digital information for educational improvement
22	König et al. (2024)	Digital study assistants	T4 – Technology-enabled educational services
23	Kurti & Salavati (2024)	Knowledge management in academic institutions	T4 – Organizational knowledge management
24	Ahsan et al. (2023)	Micro-credentials in higher education	T4 – Innovation in educational services
25	Otto et al. (2024)	Student-centered digital learning environments	T5 – Digital service innovation
26	Bhullar et al. (2024)	ChatGPT in higher education	T5 – Emerging technologies and institutional adaptation
27	Santoveña-Casal & López (2024)	Digital pedagogies in higher education	T5 – Educational innovation and service quality
28	Zhou et al. (2024)	Digital technology adaptation	T5 – Organizational adaptability
29	OECD (2023)	Digital education ecosystems	T5 – Digital governance and institutional effectiveness
30	UNESCO (2023)	Technology in education	T5 – Equity, governance, and sustainable digital education

Notes: T1 = Digital Transformation and Organizational Change; T2 = Digital Strategy and Institutional Readiness; T3 = Digital Leadership and Competence; T4 = Educational Management Effectiveness; T5 = Institutional Competitiveness and Digital Governance. The classifications reflect the dominant contribution of each source to the narrative synthesis.

4.2 Digital Transformation as a Process of Organizational Change

The synthesis indicates that digital transformation in educational management should be understood as a process of organizational change that extends beyond the adoption of digital devices or applications. Vial (2019) situates digital transformation within organizational changes influenced by technological developments, while Verhoef et al. (2021) explain that digital transformation involves more fundamental strategic changes than the digitalization of particular activities. Hanelt et al. (2021) also emphasize the relationship between digital transformation, organizational strategy, and organizational change. These three perspectives provide a foundation for understanding that educational institutions cannot achieve meaningful transformation merely by replacing manual administrative procedures with electronic systems. More significant changes concern how technology influences organizational structures, coordination, decision-making, and institutional service delivery. Thus, digital transformation represents a change in how educational institutions are managed rather than merely a change in the tools used to perform organizational activities.

In higher education, Castro Benavides et al. (2020) demonstrate that digital transformation encompasses various interconnected institutional dimensions. Fernández et al. (2023) discuss the importance of integrated transformation strategies, while Bisri et al. (2023) identify factors supporting successful digital transformation in higher education institutions. The synthesis of these studies suggests that successful transformation requires alignment among strategy, technology, organizational processes, and human resources. For example, implementing an academic information system can help educational institutions manage student data and academic activities. However, these benefits may remain limited if organizational units continue to apply different procedures or lack clear mechanisms for information exchange. Under such circumstances, technology may have been adopted, but comprehensive organizational transformation has not yet occurred.

These findings can be understood through the perspective of dynamic capabilities, which emphasizes an organization's ability to recognize changes, seize opportunities, and reconfigure resources. In educational settings, these capabilities may be reflected in institutional readiness to develop digital services, update organizational procedures, and adjust policies in response to student needs and technological developments. However, adaptive capabilities are not equally distributed across educational institutions. Institutions with limited resources may experience difficulties developing integrated systems or sustaining technological improvements. Therefore, digital transformation should be viewed as a gradual process of organizational adaptation that requires continuity among strategic decisions, institutional capacity, and implementation evaluation.

4.3 Digital Strategy, Institutional Readiness, and Implementation Barriers

The second theme indicates that digital strategy plays an important role in determining the direction and sustainability of institutional transformation. Alenezi and Akour (2023) discuss digital transformation planning in higher education, while Díaz-Garcia et al. (2023) examine how digital change is managed at the institutional level. Both studies highlight the relevance of planning and change management in implementing digital transformation. A clear strategy can help educational institutions establish technological development priorities, allocate resources, and define organizational responsibilities. Conversely, technology adoption without an integrated direction may produce fragmented systems that do not adequately support institutional needs. Digital strategy is essential because technology can generate organizational benefits only when its utilization is directed toward clear and measurable objectives.

Organizational readiness is another important issue emerging from the literature. Rodríguez-Abitia and Correa (2021) discuss the assessment of digital transformation in universities, while Mhlanga et al. (2022) identify lessons learned from the acceleration of digital transformation in higher education during the COVID-19 pandemic. These studies provide a foundation for understanding that digital readiness concerns not only infrastructure but also an institution's ability to adapt its work processes and services. From the Technology–Organization–Environment (TOE) perspective, transformation readiness can be analyzed through technological conditions, organizational capacity, and external environmental influences. Adequate digital infrastructure can support change implementation, but its success still depends on leadership support, employee capabilities, and the alignment of technology with institutional needs. Therefore, organizational readiness should be assessed comprehensively before educational institutions undertake more complex transformation programs.

The literature also indicates that implementation barriers are not exclusively technical. Gkrimpizi et al. (2023) classify barriers to digital transformation in higher education, while Singun (2025) examines various challenges affecting digital transformation implementation. These barriers may include resource limitations, organizational resistance, inadequate digital competencies, and institutional coordination problems. As a conceptual illustration, an educational institution may possess a comprehensive administrative application, yet employees may still experience difficulties if the system does not align with existing workflows or if adequate training has not been provided. This situation demonstrates that technology procurement does not automatically resolve management challenges. Successful digital strategies require alignment among technology, organizational readiness, user capabilities, and institutional environmental support.

4.4 Digital Leadership and Human Resource Competencies

The third theme indicates that digital leadership is an essential component in directing organizational change. Reis-Andersson (2024) examines school leaders' experiences in digitalization processes, while Wollscheid et al. (2025) map developments in research on digital school leadership. Both studies highlight the importance of considering leadership roles in technological transformation. In educational management, leaders are not merely responsible for approving the procurement of digital systems but also for establishing a vision for change, facilitating communication, and ensuring that technology is utilized in accordance with institutional objectives. Without supportive leadership, technology utilization may develop into fragmented administrative activities. Digital leadership is necessary to connect an organization's strategic direction with meaningful changes in work processes and educational services.

In addition to leadership, human resource competencies influence how technology is utilized in organizational activities. Farias-Gaytan et al. (2023) discuss the relationship between digital transformation and digital literacy in higher education, while Alhubaishy and Aljuhani (2021) examine challenges related to users' attitudes toward digital transformation. This literature suggests that technology acceptance and utilization must be understood from a human perspective rather than solely through system characteristics. Academic and administrative personnel may possess different levels of digital competence depending on their experiences, responsibilities, and opportunities for professional development. Consequently, implementing the same system does not necessarily produce uniform user experiences or benefits. These conditions highlight the importance of job-relevant training and organizational support throughout the change process.

Siddiq et al. (2024) provide a perspective on digital agency, while Nakaziba and Ngulube (2024) discuss continuing professional development to support digital transformation in academic environments. These perspectives broaden the understanding that digital competence involves not only the ability to oper-

ate technology but also the capacity to use it meaningfully in professional contexts. Within educational institutions, competency development can be facilitated through training, mentoring, collaboration, and organizational learning. However, these activities must be supported by policies that provide employees with opportunities to apply newly acquired capabilities. Thus, digital leadership and human resource competencies are complementary components in establishing organizational readiness and sustaining digital transformation.

4.5 Digital Transformation and Educational Management Effectiveness

The fourth theme indicates that digital technology utilization has the potential to support educational management effectiveness through information management, coordination, performance evaluation, and service innovation. Stojanov and Daniel (2024) examine developments in the use of big data and analytics in higher education, while Cosa and Torelli (2024) discuss changes in performance measurement systems within the context of digital transformation. These studies suggest that digital information and evaluation systems can become important components of organizational management. In educational institutions, data utilization may help leaders understand academic developments, resource requirements, and service quality. However, data availability does not necessarily lead to better decisions if the information is inaccurate, fragmented, or poorly understood by decision-makers. Educational management effectiveness depends on an organization's ability to translate digital information into decisions and actions that support institutional objectives.

Technology utilization is also associated with the development of more responsive educational services. Paulsen and Lindsay (2024) discuss developments in learning analytics dashboards, while König et al. (2024) examine the development of digital study assistants in higher education. Although these studies focus primarily on learning services, their perspectives are relevant to understanding how information and technology can support institutional service development. As a conceptual example, integrated information systems can help educational institutions identify student needs, accelerate information delivery, and reduce repetitive administrative tasks. Nevertheless, these benefits require clear operational procedures and users who can utilize information appropriately. Therefore, improvements in effectiveness should be evaluated based on changes in process and service quality rather than merely the availability of digital systems.

Management effectiveness can also be associated with knowledge management and institutional innovation. Kurti and Salavati (2024) discuss knowledge management environments in academic institutions, while Ahsan et al. (2023) examine the implementation of micro-credentials as an innovation in higher education. These studies suggest that digital transformation can be examined alongside organizational capacity development and service renewal. However, innovation does not always produce greater effectiveness if implementation requires resources that outweigh its benefits. Educational institutions must consider development costs, user capabilities, service quality, and operational sustainability. Thus, management effectiveness is a potential outcome of strategically managed digital transformation rather than an automatic consequence of technology adoption.

4.6 Institutional Competitiveness and Digital Governance

The fifth theme indicates that the competitiveness of educational institutions can be understood through their ability to develop relevant, innovative, and sustainable services. Otto et al. (2024) discuss digital practices supporting student-centered learning environments, while Santoveña-Casal and López (2024) examine developments in digital pedagogies in higher education. These studies demonstrate that technology can serve as a means of renewing educational services. From a competitiveness perspective, the ability to provide services that respond to student needs may represent a source of institutional value. However, these studies do not directly establish that technology utilization improves institutional competitiveness. Therefore, the relationship between digital innovation and competitiveness should be understood as a conceptual relationship requiring further investigation. Competitiveness is not determined by the quantity of technologies adopted but by an educational institution's ability to create value through service quality, relevance, and sustainability.

Emerging technologies also expand the strategic options available to educational institutions. Bhullar et al. (2024) discuss the use of ChatGPT in higher education, while Zhou et al. (2024) examine digital technology adaptation in educational activities. Both studies provide insights into the opportunities and challenges associated with technological change in educational environments. Emerging technologies may help institu-

tions develop services and adapt activities to user needs, but their implementation continues to involve challenges related to competencies, ethics, information quality, and organizational readiness. From a competitiveness perspective, the ability to adopt innovations should be accompanied by the capacity to evaluate their benefits and risks. Institutions that pursue technological developments without considering organizational needs may incur additional costs and management complexities without necessarily improving service quality.

The digital governance perspective reinforces the importance of balancing innovation with institutional responsibility. OECD (2023) discusses the development of effective digital education ecosystems, while UNESCO (2023) emphasizes the need to consider quality, equity, and user interests in educational technology utilization. Both reports indicate that technology should be managed through policies and organizational mechanisms that account for the various consequences of implementation. Within educational institutions, digital governance may encompass data management, information security, policy transparency, service accessibility, and technology investment evaluation. These aspects are important because poorly managed digital transformation may create new risks, including unequal access and inefficient resource utilization. Sustainable institutional competitiveness requires digital innovation supported by effective governance, service quality, and organizational responsibility.

4.7 Integrated Digital Transformation and Educational Competitiveness Framework

Based on the synthesis of the five themes, this study develops the Integrated Digital Transformation and Educational Competitiveness Framework as a conceptual framework for understanding the relationships among digital transformation, management effectiveness, and institutional competitiveness (see Figure 2). The framework integrates perspectives on organizational transformation, digital strategy, institutional readiness, leadership, human resource competencies, and educational governance. Its development is based on the understanding that digital technology does not directly generate effectiveness and competitiveness without organizational capabilities to manage change. Therefore, the framework does not position technology as the sole determining factor but rather as part of a transformation process involving strategic decisions, institutional capacity, and management practices.

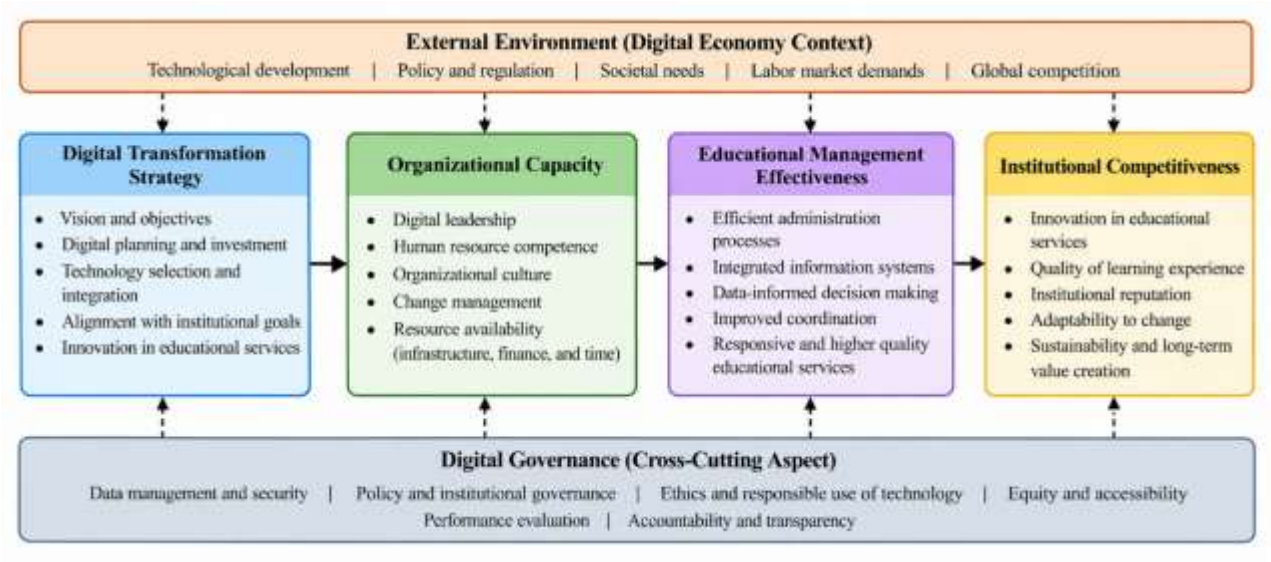


Figure 2. Integrated Digital Transformation and Educational Competitiveness Framework

The first component of the framework is digital transformation strategy, which encompasses policy direction, technology planning, system integration, and the alignment of innovation with educational institutional objectives. The second component is organizational transformation capacity, which includes digital leadership, human resource readiness, organizational culture, and adaptive capabilities. These components are understood as conditions that enable technology to be utilized more strategically in educational management processes. This perspective is consistent with literature on digital transformation and organizational

change, which emphasizes the importance of alignment among technology, strategy, and internal institutional capabilities.

The next component is educational management effectiveness, which encompasses administrative efficiency, institutional coordination, information quality, decision-making, and service responsiveness. Within this framework, management effectiveness is positioned as a potential outcome of integrated digital transformation. However, this relationship should not be interpreted as an empirically established causal relationship. Improvements in effectiveness may be influenced by infrastructure conditions, user capabilities, institutional characteristics, and implementation consistency. Therefore, management effectiveness should be evaluated based on meaningful changes in organizational processes and service quality.

The final component is institutional competitiveness, which encompasses service innovation, institutional relevance, the quality of student experiences, adaptive capabilities, and organizational sustainability. Competitiveness is understood as the ability of educational institutions to maintain and enhance institutional value within a continuously changing digital economy. Within this framework, management effectiveness may represent one condition supporting stronger competitiveness, but it is not positioned as the sole determinant. Academic quality, reputation, resources, student characteristics, and external environmental conditions may also influence an institution's ability to maintain its relevance. Accordingly, the conceptual framework avoids assuming that digital transformation automatically leads to improved competitiveness.

The framework also positions digital governance and institutional environmental conditions as aspects that must be considered throughout the transformation process. Digital governance concerns data management, information security, accountability, equitable access, and the evaluation of technology utilization. Meanwhile, environmental conditions include technological developments, societal needs, educational policies, and the demands of the digital economy. Both aspects may influence how digital strategies are designed and implemented. Thus, the integration of strategy, organizational capacity, management effectiveness, and competitiveness should be understood as relationships occurring within specific institutional contexts.

Overall, the Integrated Digital Transformation and Educational Competitiveness Framework makes a conceptual contribution by connecting digital transformation and strategic management perspectives within a unified analytical structure. The framework indicates that successful digital transformation cannot be adequately assessed solely through the extent of technology adoption. Instead, it requires consideration of organizational capabilities to manage change, improve effectiveness, and create sustainable educational value. Nevertheless, the proposed framework remains conceptual and has not undergone empirical testing. Future research may examine the relationships among its components using quantitative, qualitative, or mixed-methods approaches across different types of educational institutions. Such investigations are necessary to determine the extent to which digital transformation strategies and organizational capacities are associated with management effectiveness and institutional competitiveness in different institutional contexts.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

This study demonstrates that digital transformation in educational management involves not only the adoption of technology but also changes in organizational strategies, leadership, human resource competencies, and organizational governance. Based on a synthesis of 30 primary publications, five interconnected themes were identified: digital transformation and organizational change, digital strategy and institutional readiness, digital leadership and competence, educational management effectiveness, and institutional competitiveness and digital governance. The findings indicate that successful digital transformation depends on the ability of educational institutions to integrate technology with their organizational strategies and capabilities. Technology utilization has the potential to improve administrative efficiency, coordination, decision-making quality, and educational service innovation. However, these benefits do not occur automatically, as they are influenced by organizational readiness and institutional environmental conditions. This study develops the Integrated Digital Transformation and Educational Competitiveness Framework as a conceptual contribution to understanding how digital strategies and organizational capacities may support management effectiveness and strengthen the competitiveness of educational institutions in the digital economy era.

The findings provide theoretical and practical implications for the development of digitally enabled educational management. Theoretically, this review extends the understanding of digital transformation by integrating perspectives on organizational change, digital strategy, leadership, institutional readiness, and competitiveness within a unified conceptual framework. This integration suggests that digital transformation should be understood as a managerial and strategic process rather than merely the application of technology

in educational activities. Practically, the findings may provide insights for school leaders, higher education administrators, and policymakers in designing digital strategies aligned with institutional needs. Information system development, human resource competency enhancement, digital leadership strengthening, and performance evaluation should be implemented in an integrated manner. Furthermore, educational institutions need to ensure that technology investments contribute to service quality, management effectiveness, and organizational sustainability. Accordingly, digital transformation can be directed toward creating educational value that is more relevant and responsive to developments in the digital economy.

This study has several limitations that should be considered when interpreting its findings. First, it employs a narrative literature review approach based on an initial corpus of 30 publications. Consequently, the resulting synthesis cannot be considered representative of all research on digital transformation in educational management. Second, the reviewed literature differs in institutional contexts, methodologies, and organizational characteristics, with a greater emphasis on higher education than on schools. These differences limit the direct applicability of the findings across all types of educational institutions. Third, some publications discuss digital transformation, innovation, or organizational effectiveness without directly measuring institutional competitiveness. Therefore, the relationships among the concepts presented in the proposed framework are derived from literature interpretation and synthesis rather than empirical evidence of causality. Moreover, the Integrated Digital Transformation and Educational Competitiveness Framework remains conceptual and has not been tested using empirical data. These limitations indicate that the findings should be regarded as a foundation for theoretical development and further research.

Future research is recommended to empirically examine the Integrated Digital Transformation and Educational Competitiveness Framework to develop a deeper understanding of the relationships among digital transformation strategies, organizational capacity, management effectiveness, and institutional competitiveness. Quantitative approaches, such as Structural Equation Modeling–Partial Least Squares (SEM-PLS), may be employed to test relationships among constructs, while qualitative approaches can help explain the experiences of educational leaders and administrative personnel in managing digital change. Comparative studies involving schools and higher education institutions are also needed to identify differences in readiness, barriers, and implementation strategies based on institutional characteristics. Furthermore, longitudinal research may be conducted to examine changes in effectiveness and competitiveness over time following digital transformation implementation. For educational institutions, digital transformation should be pursued through strategic planning, competency development, information system integration, and continuous performance evaluation. The primary priority should not be the number of technologies adopted but rather the institution's ability to utilize technology to sustainably improve management effectiveness, service quality, and competitiveness.

REFERENCES

Ahsan, K., et al. (2023). Implementation of micro-credentials in higher education: A systematic literature review. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-11739-z

Alenezi, M., & Akour, M. (2023). Digital transformation blueprint in higher education: A case study of PSU. *Sustainability, 15*(10), Article 8204. https://doi.org/10.3390/su15108204

Alhubaishy, A., & Aljuhani, A. (2021). The challenges of instructors' and students' attitudes in digital transformation: A case study of Saudi universities. *Education and Information Technologies*. https://doi.org/10.1007/s10639-021-10491-6

Bhullar, P. S., et al. (2024). ChatGPT in higher education—A synthesis of the literature and a future research agenda. *Education and Information Technologies*. https://doi.org/10.1007/s10639-024-12723-x

Bisri, M., et al. (2023). A systematic literature review on digital transformation in higher education: Revealing key success factors. *International Journal of Emerging Technologies in Learning, 18*(14). https://doi.org/10.3991/ijet.v18i14.40201

Castro Benavides, L. M., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors, 20*(11), Article 3291. https://doi.org/10.3390/s20113291

Cosa, M., & Torelli, R. (2024). Digital transformation and flexible performance management: A systematic literature review of the evolution of performance measurement systems. *Global Journal of Flexible Systems Management*. https://doi.org/10.1007/s40171-024-00409-9

Díaz-Garcia, V., et al. (2023). Managing digital transformation: A case study in a higher education institution.

Electronics, 12(11), Article 2522. https://doi.org/10.3390/electronics12112522

Farias-Gaytan, S., et al. (2023). Digital transformation and digital literacy in the context of complexity within higher education institutions: A systematic literature review. *Humanities and Social Sciences Communications*. https://doi.org/10.1057/s41599-023-01875-9

Fernández, A., Gómez, B., Binjaku, K., & Meçe, E. K. (2023). Digital transformation initiatives in higher education institutions: A multivocal literature review. *Education and Information Technologies, 28*, 12351–12382. https://doi.org/10.1007/s10639-022-11544-0

Gkrimpizi, T., et al. (2023). Classification of barriers to digital transformation in higher education institutions: Systematic literature review. *Education Sciences, 13*(7), Article 746. https://doi.org/10.3390/educsci13070746

Hanelt, A., Bohnsack, R., Marz, D., & Marante, C. A. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies, 58*(5), 1159–1197. https://doi.org/10.1111/joms.12639

König, C. M., et al. (2024). Development guidelines for individual digital study assistants in higher education. *International Journal of Educational Technology in Higher Education*. https://doi.org/10.1186/s41239-024-00439-4

Kurti, E., & Salavati, S. (2024). Towards a viable knowledge environment within an academic institution. *Systems Research and Behavioral Science*. https://doi.org/10.1007/s11213-024-09681-3

Mhlanga, D., et al. (2022). COVID-19 and the key digital transformation lessons for higher education institutions in South Africa. *Education Sciences, 12*(7), Article 464. https://doi.org/10.3390/educsci12070464

Nakaziba, S., & Ngulube, P. (2024). A model for enhancing digital transformation through technology-related continuing professional development activities in academic libraries in context. *Discover Education*. https://doi.org/10.1007/s44217-024-00178-8

Organisation for Economic Co-operation and Development. (2023). *OECD digital education outlook 2023: Towards an effective digital education ecosystem*. OECD Publishing. https://doi.org/10.1787/c74f03de-en

Otto, S., et al. (2024). Emerging digital practices supporting student-centered learning environments in higher education: A review of literature and lessons learned from the COVID-19 pandemic. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-11789-3

Paulsen, J., & Lindsay, E. (2024). Learning analytics dashboards are increasingly becoming about learning and not just analytics—A systematic review. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-12401-4

Reis-Andersson, J. (2024). Leading the digitalisation process in K–12 schools—The school leaders' perspective. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-11935-x

Rodríguez-Abitia, G., & Correa, C. (2021). Assessing digital transformation in universities. *Future Internet, 13*(2), Article 52. https://doi.org/10.3390/fi13020052

Santoveña-Casal, S., & López, S. R. (2024). Mapping of digital pedagogies in higher education. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-11888-1

Siddiq, F., et al. (2024). New kid on the block? A conceptual systematic review of digital agency. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-12038-3

Singun, A. (2025). Unveiling the barriers to digital transformation in higher education institutions: A systematic literature review. *Discover Education*. https://doi.org/10.1007/s44217-025-00430-9

Stojanov, A., & Daniel, B. K. (2024). A decade of research into the application of big data and analytics in higher education: A systematic review of the literature. *Education and Information Technologies, 29*, 5807–5831. https://doi.org/10.1007/s10639-023-12033-8

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350. https://doi.org/10.1002/smj.640

Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation*. Lexington Books.

UNESCO. (2023). *Global education monitoring report 2023: Technology in education—A tool on whose terms?* https://doi.org/10.54676/UZQV8501

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research, 122*, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems, 28*(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

Wollscheid, S., et al. (2025). Research trends on digital school leadership over time: Science mapping and content analysis. *Education and Information Technologies*. https://doi.org/10.1007/s10639-024-12909-3

Zhou, X., et al. (2024). Digital technology adaptation and initiatives: A systematic review of teaching and learning during COVID-19. *TechTrends*. https://doi.org/10.1007/s12528-023-09376-z