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The Evolution of Digital Learning Governance in Higher Education: A Systematic Literature Review and Bibliometric Analysis

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Abstract: This study aims to examine the evolution of digital learning governance in higher education through a systematic literature review (SLR) combined with bibliometric analysis. The study responds to the growing need for higher education institutions to govern digital learning ecosystems in ways that are not only technologically adaptive but also ethical, secure, accountable, and sustainable. The dataset was obtained from the Scopus database, covering publications from 2021 to 2026. After screening based on relevance, document type, and thematic alignment, 28 articles were included in the final analysis. The data were analyzed using VOSviewer to identify publication trends, keyword co-occurrence patterns, thematic structures, author distribution, institutional affiliations, and country contributions. The findings show that digital learning governance has shifted from conventional administrative control toward a multidimensional and technology-driven paradigm. Artificial intelligence, blockchain, learning analytics, cybersecurity, and data-driven decision-making emerged as central themes in the literature. The keyword network indicates that AI has become the most dominant driver of governance transformation, while blockchain reflects growing attention to secure, decentralized, and transparent academic data management. The bibliometric findings also reveal that this field remains fragmented, with dispersed authorship, diverse institutional contributions, and the absence of dominant research centers. Geographically, Asian countries, particularly China, Indonesia, Saudi Arabia, Malaysia, and Vietnam, show strong research engagement, suggesting the increasing role of emerging economies in shaping digital learning governance discourse. However, the field still faces critical challenges, including data privacy, cybersecurity risks, algorithmic bias, unequal institutional readiness, and the lack of integrated governance frameworks. This study concludes that digital learning governance is evolving into an interdisciplinary system that integrates technological innovation, institutional policy, pedagogical quality, ethical responsibility, and sustainability. Future research should develop context-sensitive governance frameworks, while higher education institutions and policymakers should strengthen collaboration to ensure transparent, inclusive, and sustainable digital transformation.
Keywords: Digital Learning Governance; Higher Education; Artificial Intelligence; Digital Transformation; Data-Driven Governance.

Abstrak: Penelitian Penelitian ini bertujuan untuk mengkaji evolusi tata kelola pembelajaran digital dalam pendidikan tinggi melalui pendekatan systematic literature review (SLR) yang dikombinasikan dengan analisis bibliometrik. Penelitian ini dilatarbelakangi oleh meningkatnya kebutuhan perguruan tinggi untuk mengelola ekosistem pembelajaran digital secara adaptif, etis, aman, akuntabel, dan berkelanjutan. Dataset diperoleh dari database Scopus dengan cakupan publikasi tahun 2021 hingga 2026. Setelah dilakukan penyaringan berdasarkan relevansi, jenis dokumen, dan kesesuaian tema, sebanyak 28 artikel digunakan sebagai data akhir penelitian. Data dianalisis menggunakan VOSviewer untuk mengidentifikasi tren publikasi, pola ko-kemunculan kata kunci, struktur tematik, distribusi penulis, afiliasi institusi, dan kontribusi negara. Hasil penelitian menunjukkan bahwa tata kelola pembelajaran digital telah bergeser dari model kontrol

administratif konvensional menuju paradigma multidimensional yang digerakkan oleh teknologi. Kecerdasan buatan, blockchain, analitik pembelajaran, keamanan siber, dan pengambilan keputusan berbasis data muncul sebagai tema utama dalam literatur. Jaringan kata kunci menunjukkan bahwa kecerdasan buatan menjadi penggerak paling dominan dalam transformasi tata kelola, sedangkan blockchain mencerminkan meningkatnya perhatian terhadap pengelolaan data akademik yang aman, terdesentralisasi, dan transparan. Temuan bibliometrik juga menunjukkan bahwa bidang ini masih terfragmentasi, ditandai dengan persebaran kontribusi penulis, keragaman afiliasi institusi, dan belum adanya pusat riset yang dominan. Secara geografis, negara-negara Asia, khususnya China, Indonesia, Arab Saudi, Malaysia, dan Vietnam, menunjukkan keterlibatan riset yang kuat, sehingga memperlihatkan meningkatnya peran negara berkembang dalam membentuk diskursus tata kelola pembelajaran digital. Namun demikian, bidang ini masih menghadapi tantangan penting, seperti privasi data, risiko keamanan siber, bias algoritmik, ketimpangan kesiapan institusi, dan belum tersedianya kerangka tata kelola yang terintegrasi. Penelitian ini menyimpulkan bahwa tata kelola pembelajaran digital berkembang menjadi sistem interdisipliner yang mengintegrasikan inovasi teknologi, kebijakan institusional, mutu pedagogik, tanggung jawab etis, dan keberlanjutan. Penelitian selanjutnya perlu mengembangkan kerangka tata kelola yang kontekstual, sedangkan perguruan tinggi dan pembuat kebijakan perlu memperkuat kolaborasi untuk memastikan transformasi digital yang transparan, inklusif, dan berkelanjutan.
Kata kunci: Tata Kelola Pembelajaran Digital; Pendidikan Tinggi; Kecerdasan Buatan; Transformasi Digital; Tata Kelola Berbasis Data.

The rapid advancement of digital technologies has fundamentally transformed the landscape of higher education, reshaping not only pedagogical practices but also the governance structures that underpin learning ecosystems. Universities worldwide are increasingly transitioning toward digitally mediated learning environments, driven by the integration of artificial intelligence (AI), learning management systems (LMS), blockchain, and data-driven decision-making tools. This transformation has elevated the importance of digital learning governance as a critical domain that ensures alignment between technological innovation, institutional strategy, and educational quality. In contemporary higher education, governance is no longer confined to administrative control but has evolved into a multidimensional construct encompassing policy frameworks, technological infrastructures, pedagogical models, and ethical considerations (De Angelis, 2024).

At a broader level, the digital transformation of higher education is embedded within global shifts toward knowledge economies and sustainable development agendas. Universities are expected not only to adopt digital technologies but also to govern them effectively to enhance accessibility, efficiency, and learning outcomes. The integration of digital systems has enabled new forms of personalized learning, real-time analytics, and automated decision-making processes, which collectively redefine the traditional boundaries of teaching and learning (Xie et al., 2025). Furthermore, the increasing reliance on digital infrastructures has intensified the need for robust governance frameworks that address issues such as data privacy, cybersecurity, and system interoperability. As a result, digital learning governance has emerged as a strategic priority for higher education institutions (HEIs) seeking to remain competitive and resilient in an increasingly complex and uncertain global environment (Marques & Powell, 2025).

Despite these advancements, significant challenges persist in the governance of digital learning systems. Many institutions continue to rely on fragmented governance approaches, where technological

implementations are not fully aligned with institutional policies or pedagogical objectives. For instance, studies on IT governance in educational settings reveal that governance maturity often remains at an operational level, lacking comprehensive integration with strategic decision-making processes (Setyadi & Rahman, 2025). Similarly, the governance of LMS platforms is frequently constrained by generic IT policies that fail to address the unique socio-technical complexities of digital learning environments (Turnbull et al., 2022). These limitations highlight a critical disconnect between technological adoption and governance capacity, which can undermine the effectiveness and sustainability of digital transformation initiatives.

The emergence of advanced technologies such as AI and blockchain further complicates the governance landscape. On the one hand, AI-enabled systems have demonstrated significant potential to enhance teaching management, instructional coordination, and learning analytics, thereby improving efficiency and educational outcomes (Du et al., 2026). On the other hand, these technologies introduce new governance challenges related to algorithmic transparency, ethical decision-making, and data governance. Blockchain-based solutions, for example, offer promising mechanisms for secure and decentralized management of academic records but require new regulatory frameworks and institutional readiness to be effectively implemented (Twabua & Nakene-Mginqia, 2025). Consequently, the rapid proliferation of digital technologies has outpaced the development of comprehensive governance models, creating a critical gap in both research and practice.

In addition to technological challenges, the governance of digital learning is increasingly influenced by broader institutional and societal factors. The integration of outcome-based education (OBE) frameworks and AI-supported blended learning models has shifted the focus of governance toward ensuring accountability, quality assurance, and continuous improvement (Phung et al., 2026). At the same time, universities are under growing pressure to align their digital transformation strategies with sustainability goals and corporate social responsibility (CSR) principles. The concept of Green Artificial Intelligence (GAI), for instance, highlights the need for environmentally sustainable digital practices within higher education governance (Salem & Khalil, 2026). These developments underscore the evolving nature of governance, which now encompasses not only efficiency and effectiveness but also ethical and sustainability considerations.

Despite the growing body of literature on digital transformation in higher education, there remains a lack of comprehensive synthesis regarding the evolution of digital learning governance. Existing studies tend to focus on specific technologies, such as AI, LMS, or blockchain, without adequately addressing the broader governance implications. Moreover, there is limited integration between technological, pedagogical, and institutional perspectives, resulting in a fragmented understanding of governance dynamics. Bibliometric studies on educational technologies have primarily examined trends in research output and thematic clusters but have not sufficiently explored governance as a central analytical lens (Han & Xia, 2025). This gap is particularly significant given the increasing complexity of digital learning ecosystems and the need for integrated governance frameworks that can accommodate diverse stakeholders and rapidly changing technological landscapes.

To address these gaps, this study adopts a systematic literature review (SLR) combined with bibliometric analysis to examine the evolution of digital learning governance in higher education. By synthesizing empirical and conceptual studies published between 2021 and 2026, this research aims to identify key themes, trends, and research gaps in the field. The integration of SLR and bibliometric methods enables a comprehensive analysis of both the intellectual structure and the developmental trajectory of digital learning governance. This approach not only provides a robust

foundation for understanding the current state of the field but also offers insights into future research directions and policy implications.

The significance of this study lies in its potential to contribute to both theory and practice. From a theoretical perspective, it advances the conceptualization of digital learning governance by integrating multiple dimensions, including technological innovation, institutional strategy, and sustainability. From a practical perspective, the findings can inform policymakers and higher education leaders in designing more effective governance frameworks that align with the demands of digital transformation. In an era characterized by rapid technological change and increasing uncertainty, the ability to govern digital learning systems effectively is essential for ensuring the long-term sustainability and impact of higher education.

In conclusion, the evolution of digital learning governance reflects a broader transformation in higher education, where governance is increasingly shaped by the interplay between technology, policy, and pedagogy. While significant progress has been made in developing digital learning systems, the governance of these systems remains an underexplored and fragmented domain. By providing a systematic and bibliometric analysis of the literature, this study seeks to bridge this gap and offer a comprehensive understanding of how digital learning governance has evolved and how it can be strengthened to support the future of higher education.

METHODS

This study employs a Systematic Literature Review (SLR) combined with bibliometric analysis to explore the evolution of digital learning governance in higher education. This research utilizes a structured yet flexible SLR approach focusing on transparency in search strategy, inclusion criteria, and analytical procedures. A systematic review is defined as a rigorous method for synthesizing scientific literature through structured identification, selection, and interpretation processes (Gaur et al., 2025; Guyottot & Le Fur, 2022).

The dataset was collected exclusively from the Scopus database, recognized as one of the most comprehensive indexing platforms for peer-reviewed publications. The search query was constructed using combinations of keywords such as *"digital learning governance," "educational governance," "learning management system,"* and *"higher education"*. The search was limited to publications from 2021–2026 to ensure the inclusion of recent developments in the field. The initial search yielded 28 documents, which were then screened based on relevance, document type (articles only), and thematic alignment with governance and digital learning.

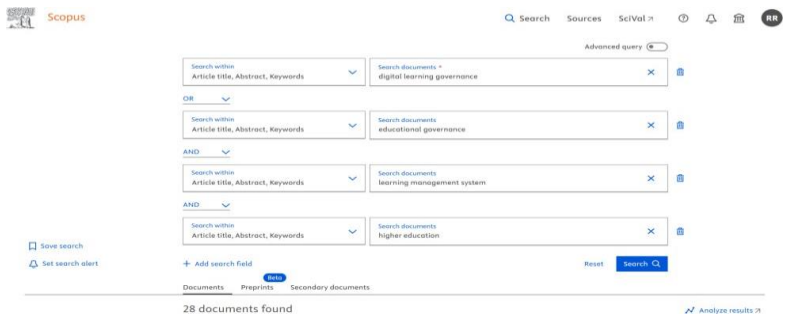

Figure 1. Scopus Search Strategy and Document Selection Process
Source: Authors' analysis based on Scopus database, 2026

Following data collection, bibliometric analysis was conducted using VOSviewer, a widely used tool for mapping and visualizing scientific knowledge structures. VOSviewer enables the construction of networks based on co-authorship, co-citation, and keyword co-occurrence, allowing researchers to identify research clusters, trends, and intellectual structures (van Eck & Waltman, 2024; Öztürk, 2024).

The analysis procedure consisted of three main stages: (1) data cleaning and preprocessing, including removal of duplicates and irrelevant metadata; (2) bibliometric mapping, focusing on keyword co-occurrence and citation analysis; and (3) interpretation of clusters and trends. Bibliometric analysis is recognized as a robust method for identifying patterns, relationships, and emerging themes within large bodies of scientific literature (Passas, 2024; Donthu et al., 2021).

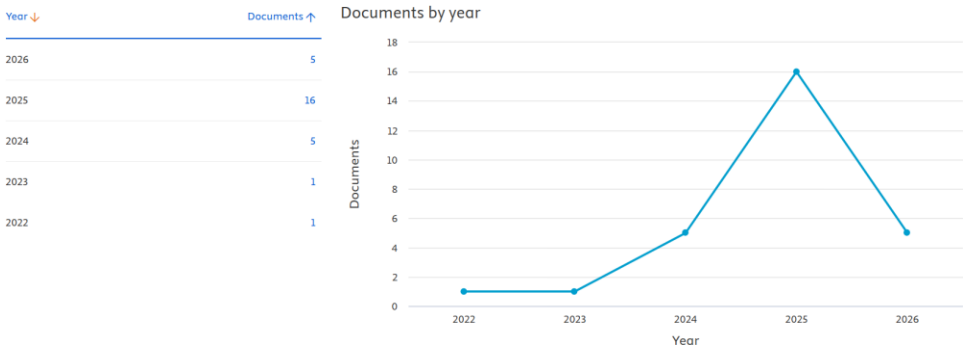

Figure 2. Annual Publication Trends (2021–2026)
Source: Authors' analysis based on Scopus metadata, 2026.

The descriptive characteristics of the selected publications are summarized in Table 1. The dataset includes key bibliographic information such as authors, titles, publication years, sources, and citation counts. This descriptive analysis provides an overview of the research landscape and supports further bibliometric mapping.

Table 1. Descriptive Characteristics of Publications Included in the Bibliometric Review

No	Authors	Title	Year	Source Title	Cited by
1	Ahriz, S., Gharbaoui, H., Benmoussa, N.,	Enhancing Information Technology Governance in	2024	Engineering, Technology and	6

	Chahid, A., Mansouri, K.	Universities: A Smart Chatbot System based on Information Technology Infrastructure Library		Applied Science Research	
2	Alhumud, T.A.A.	Integration of artificial intelligence applications in the management of higher education institutions: A critical review of the literature and emerging practices to enhance institutional efficiency and digital governance	2026	Research Journal in Advanced Humanities	0
3	Arifin, Z. Khurohman, F., Sururi, S., Nurillah, S.	Strengthening Educational Administrator Competencies Through Internship Management: A Comparative Study in Indonesian Higher Education	2025	Munaddhomah	1
4	Cheng, L., Kuang, Z., He, J.	Management model for university teaching laboratories based on the ecosystem theory	2025	Experimental Technology and Management	0
5	De Angelis, M.C.	Transforming University: Digital Transition and Future Challenges for Higher Education	2024	European Public and Social Innovation Review	1
6	Du, C., Liu, Q., Ji, W., Zhang, X.	Enhancing Teaching Management and Instructional Coordination Through AI-Enabled Multi-Agent Collaboration in Higher Education	2026	Journal of Applied Science and Engineering	0
7	Ha, N.D.N., Thuong, H.T.N., Binh, N.T., Trang, L.T.T.	Enhancing Teaching Activity Management in Vietnamese Universities: Challenges, Reforms, and Practical Strategies	2025	North American Journal of Psychology	1

8	Han, G., Xia, F.	Sentiment analysis and topic modeling in the context of scientific integrity: implications for teaching and research in higher education	2025	Discover Applied Sciences	3
9	Hernández, R.M., García-Argandoña, R., Pintado, P.R.C., Amador, J.D.M., Trigozo, T.C.	Strategic digital transformation in higher education and its effect on organizational agility and innovation performance	2025	Acta Innovations	6
10	Li, L., Juan, Y.	Exploring multi-source paths and system construction in university laboratory safety education governance	2025	Experimental Technology and Management	0
11	Li, M.	The Role of College Ideological Education in Air Pollution Control: A Data-Driven Analysis of Online Public Opinion as an Environmental Information Feedback Mechanism	2025	International Journal of Agricultural and Environmental Information Systems	1
12	Liu, C., Wang, R.	Comparison and inspiration of laboratory safety culture construction in Chinese and foreign universities	2025	Experimental Technology and Management	0
13	Marques, M., Powell, J.J.W.	Higher education and science future(s): rethinking change, governing uncertainty, imagining alternatives	2025	European Journal of Higher Education	0
14	Moroz, M., Havryliuk, A., Shershova, O., Diegtiar, A., Mazur, Y.	Higher Education Institutions in Terms of Governance and Collaboration with Municipalities	2025	OIDA International Journal of Sustainable Development	0
	Otoom, A.A., Atoum, I., Al-Harasis, H., Al Refai, M.N., Baklizi, M.	A collaborative cybersecurity framework for higher education	2025	Information and Computer Security	6
16	Phung, T.-N., Do, D.-C., Nguyen, T.-T.,	An integrated framework for outcome-based education and AI	2026	Discover Computing	0

	Nguyen, V.-S., Le, D.- N.	supported blended learning in curriculum redesign and intelligent training management			
	Sajid, M., Yousaf, A., Awan, M.U.	Status and challenges of e-governance in higher education institutions of Pakistan	2024	E-Learning and Digital Media	2
18	Salem, M.A., Khalil, Z.A.	Unlocking GAI in Universities: Leadership-Driven Corporate Social Responsibility for Digital Sustainability	2026	Administrative Sciences	3
19	Samara, B.A.	Use of Blockchain Technology in Educational Field	2024	International Journal on Technical and Physical Problems of Engineering	3
20	Sanfilippo, M.R., Apthorpe, N., Brehm, K., Shvartzshnaider, Y.	Privacy governance not included: analysis of third parties in learning management systems	2023	Information and Science	9 Learning
21	Setyadi, R., Rahman, A.A.	Enhancing IT Governance Based on Risk and Security Analysis in a Private School: A COBIT 2019 Approach	2025	International Journal on Informatics Visualization	0
22	Shawyun, T., Al-Khatib, M., Wattanapong, S.	King Saud University's Integrated Quality Assurance: A Longitudinal Mixed-Methods Study of Framework Evolution, Outcomes, and Sustainability in Higher Education Management	2025	Journal of Institutional Research South East Asia	0
23	Siti Romlah, L., Pahrudin, A., Fauzan, A., Kesuma, G.C., Purnama, R.	Institutionalizing OBE through Transformative Curriculum Management: Insights from an Indonesian Islamic University	2025	Munaddhomah	1
24	Supriyanto, Waseso, H.P., Albar, M.H., Zain, M.F., Husnayain, F.	Ma'had Aly and the Future of Islamic Higher Education: Bridging Tradition and Modernity in Indonesia's Islamic Religious College System	2025	Kharisma	0

25	Turnbull, D., Chugh, R., Luck, J.	An Overview of the Common Elements of Learning Management System Policies in Higher Education Institutions	2022	TechTrends	40
26	Twabua, K., Nakene- Mginqia, M.	Blockchain smart contract efficiency as a use case for higher learning institutions to easily access student information with home affairs as well as the department of higher education	2026	Multidisciplinary Reviews	1
27	Xie, Z., Li, Z., Liu, X.	SHARP: Blockchain-Powered WSNs for Real-Time Student Health Monitoring and Personalized Learning	2025	Sensors	6
28	Yang, X., Ran, W., Li, L.	Key Points of the 15th Five-Year Plan for University Libraries to Support the Construction of a Powerful Country in the Education Sector	2024	Journal of Library and Information Science in Agriculture	0

Source: Authors' compilation from Scopus database, 2026.

RESULT AND DISCUSSION

Result

Keyword Co-occurrence Network Based on VOSviewer Analysis

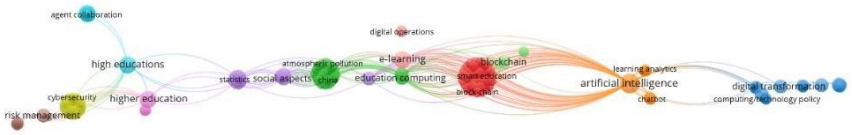

Figure 3. Keyword Co-occurrence Network Based on VOSviewer Analysis
Source: Authors' visualization using VOSviewer based on Scopus data, 2026.

The keyword co-occurrence analysis reveals the intellectual structure and thematic evolution of research on digital learning governance in higher education. Based on VOSviewer visualization, several distinct clusters emerge, indicating the interdisciplinary nature of the field.

The first cluster is centered around "artificial intelligence", which appears as the most dominant and highly connected node. This cluster is strongly linked with keywords such as *learning analytics*, *chatbot*, and *digital transformation*, indicating that AI has become a central driver in shaping governance mechanisms in higher education. The prominence of AI suggests a shift from traditional governance models toward data-driven and intelligent governance systems.

The second cluster revolves around "blockchain", closely associated with terms such as *smart education*, *e-learning*, and *education computing*. This reflects the growing interest in decentralized governance models, particularly for secure data management, credential verification, and transparency in academic systems.

Another cluster highlights "higher education" and its connections with *cybersecurity*, *risk management*, and *agent collaboration*. This cluster represents foundational governance concerns, emphasizing security, institutional coordination, and risk mitigation in digital environments.

Additionally, emerging keywords such as *digital operations*, *statistical social aspects*, and *atmospheric pollution* indicate the expansion of governance research into broader socio-technical and sustainability domains. Overall, the network demonstrates that digital learning governance is evolving toward a multi-layered ecosystem integrating technology, policy, and societal dimensions.

Distribution of Documents by Author

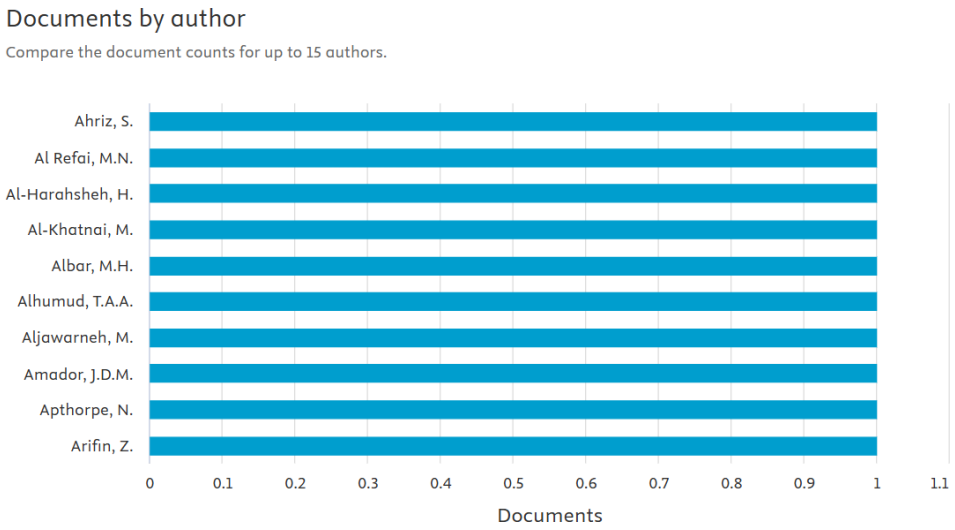

Figure 4. Distribution of Documents by Author in the Scopus Dataset
Source: Authors' analysis based on Scopus bibliometric data, 2026.

The distribution of documents by author indicates that research in this field is relatively fragmented

and emerging, with no single author dominating the publication landscape. Each listed author

contributes approximately one document, suggesting that digital learning governance is still a developing research domain without a well-established core group of scholars.

Notable contributors include Ahriz, Alhumud, Arifin, and Salem, who have explored various dimensions such as IT governance, AI integration, and sustainability in higher education. The diversity of authors reflects the interdisciplinary nature of the topic, spanning fields such as information systems, education, management, and data science.

This pattern suggests that the field is in an early growth phase, where knowledge production is distributed rather than concentrated. It also indicates opportunities for future research collaboration and the potential emergence of leading scholars as the field matures.

Distribution of Documents by Institutional Affiliation

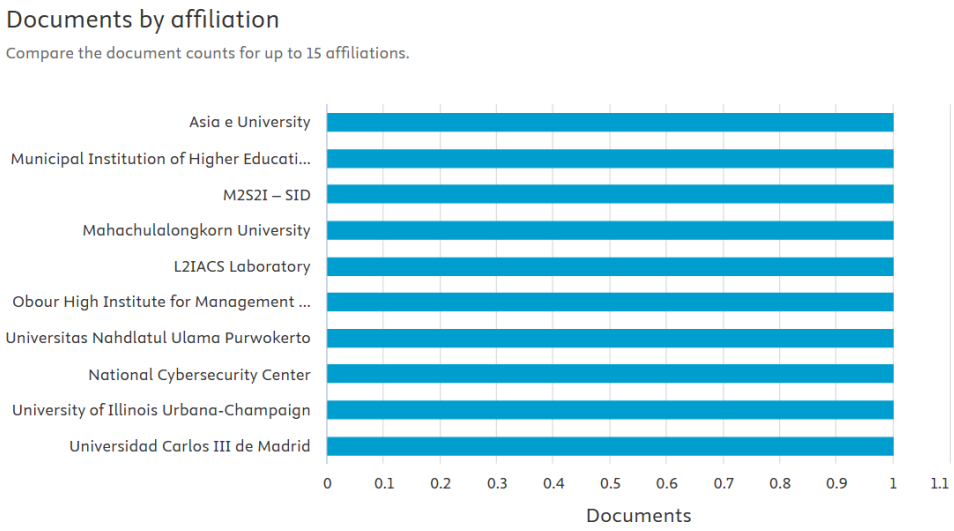

Figure 5. Distribution of Documents by Institutional Affiliation
Source: Authors' analysis based on Scopus bibliometric data, 2026.

The analysis of institutional affiliations reveals that research output is distributed across a wide range of universities and research institutions. Institutions such as Asia e University, Mahachulalongkorn University, Universitas Nahdlatul Ulama Purwokerto, and University of Illinois Urbana-Champaign each contribute a limited number of publications.

This dispersion indicates the absence of dominant research centers in digital learning governance. Instead, the topic is being explored globally by diverse institutions with varying academic backgrounds and research priorities.

Interestingly, both developed and developing country institutions are represented, suggesting that digital learning governance is a globally relevant issue. The involvement of institutions from Asia, Europe, and North America highlights the universal need to address governance challenges in digital education ecosystems.

Distribution of Documents by Country or Territory

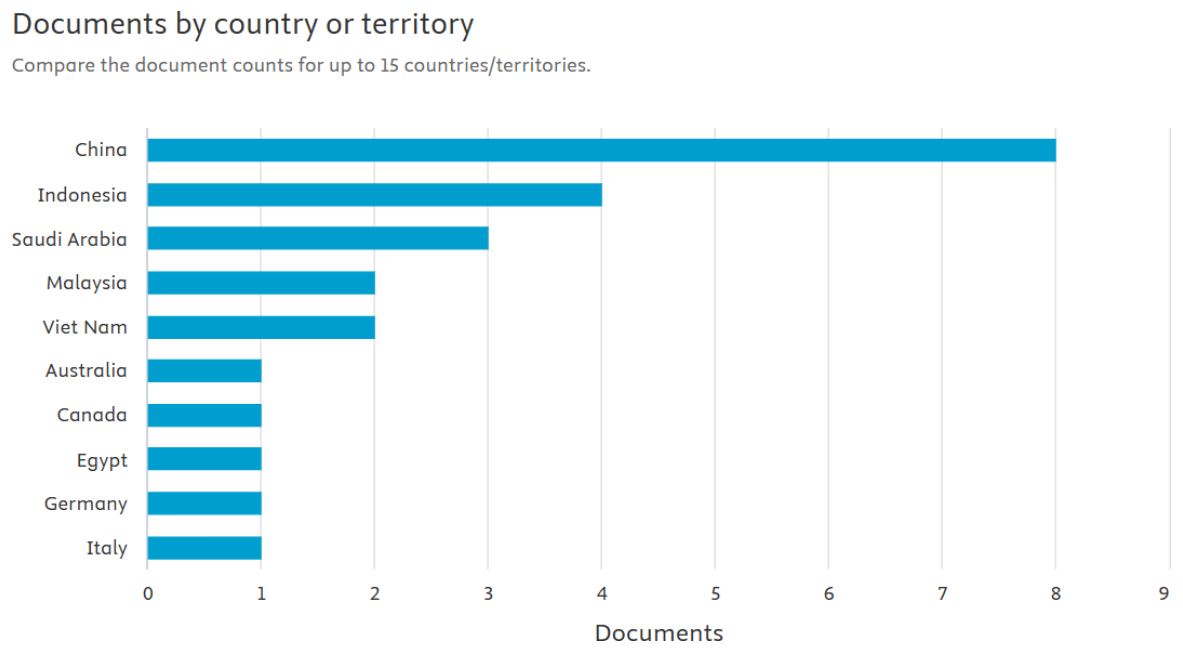

Figure 6. Distribution of Documents by Country or Territory
Source: Authors' analysis based on Scopus bibliometric data, 2026.

The geographical distribution of publications shows that China is the leading contributor, followed by Indonesia, Saudi Arabia, Malaysia, and Vietnam. This indicates that research on digital learning governance is particularly active in Asia. The dominance of China suggests strong national investment in digital transformation and educational technology, including AI and smart learning systems. Meanwhile, Indonesia and other Southeast Asian countries demonstrate increasing research engagement, likely driven by policy reforms and digitalization initiatives in higher education. Western countries such as Australia, Canada, Germany, and Italy contribute fewer publications, indicating either a more mature research landscape or different thematic priorities. Overall, the distribution reflects a shift toward emerging economies as key contributors in digital governance research.

Synthesis of Findings

The findings collectively indicate that digital learning governance in higher education is an emerging, fragmented, and rapidly evolving field. The keyword analysis highlights a transition toward AI-driven and blockchain-based governance models, while the distribution of authors and institutions suggests a lack of consolidation in research leadership.

Geographically, the dominance of Asian countries reflects the global shift toward digital transformation in education, particularly in regions with strong technological adoption and policy support. At the same time, the diversity of research themes—from cybersecurity and LMS governance to sustainability and smart education—demonstrates the increasing complexity of governance frameworks.

These findings confirm that digital learning governance is moving toward a holistic,

interdisciplinary, and technology-integrated paradigm, where governance is no longer limited to administrative control but encompasses intelligent systems, ethical considerations, and global collaboration.

DISCUSSION

Keyword Co-occurrence Network Based on VOSviewer Analysis

The keyword co-occurrence findings indicate that digital learning governance is increasingly shaped by the convergence of artificial intelligence (AI), blockchain, and data-driven systems. The dominance of AI-related keywords confirms that governance in higher education is transitioning toward intelligent and automated decision-making processes. This aligns with prior studies demonstrating that AI technologies enhance instructional coordination, learning analytics, and institutional efficiency, thereby redefining governance structures from traditional administrative models into adaptive, data-centric systems (Du et al., 2026; Zhang & Tian, 2025). Moreover, AI- driven governance enables predictive analytics and real-time decision-making, which significantly improves institutional responsiveness and strategic planning.

However, the integration of AI into governance also introduces critical ethical and operational challenges. Issues such as algorithmic bias, academic integrity, and data privacy have emerged as central concerns in digital governance frameworks (Han & Xia, 2025; Reddy et al., 2026). The literature emphasizes that without robust governance mechanisms, AI systems may reinforce inequalities and compromise institutional accountability. This reinforces the argument that digital learning governance must incorporate ethical oversight and transparent algorithmic practices as core components.

The emergence of blockchain as a secondary cluster further highlights the shift toward decentralized governance models. Blockchain technologies offer secure, transparent, and tamper-proof mechanisms for managing academic records and credentials, addressing long-standing issues related to data integrity and verification (Twabua & Nakene-Mginqia, 2025). This supports the notion that governance is evolving from centralized control toward distributed trust systems. Additionally, the integration of blockchain aligns with broader trends in digital transformation, where institutions seek to enhance interoperability and reduce administrative inefficiencies.

Furthermore, the presence of cybersecurity and risk management keywords underscores the foundational role of security in digital governance. As higher education institutions increasingly rely on digital infrastructures, governance frameworks must prioritize data protection, system resilience, and risk mitigation (Otoom et al., 2025). Overall, the keyword analysis reflects a paradigm shift toward a **multi-layered governance ecosystem** that integrates technology, policy, and ethics, supporting the argument that digital learning governance is no longer a singular administrative function but a complex socio-technical system.

Distribution of Documents by Author

The findings on author distribution reveal that digital learning governance remains a fragmented and emerging field, characterized by dispersed scholarly contributions. This lack of concentration among leading

authors suggests that the field has not yet reached theoretical consolidation, which is typical of early-stage research domains. Similar patterns have been identified in bibliometric studies, where emerging interdisciplinary fields often exhibit dispersed authorship due to diverse academic entry points (Donthu et al., 2021).

The diversity of authors across disciplines such as information systems, education, and management highlights the inherently interdisciplinary nature of digital learning governance. This interdisciplinarity is both a strength and a challenge. On one hand, it allows for the integration of multiple perspectives, enriching theoretical development. On the other hand, it contributes to conceptual fragmentation, where governance is studied through isolated lenses such as technology adoption, pedagogy, or policy (De Angelis, 2024).

Moreover, the absence of dominant scholars indicates that the field is still evolving in terms of theoretical frameworks and methodological approaches. Studies on digital transformation maturity suggest that governance frameworks must adapt to varying institutional contexts and stakeholder needs, further complicating the development of unified theories (Bravo-Jaico et al., 2025). This fragmentation also reflects the rapid pace of technological change, where new innovations continuously reshape research agendas.

Consequently, future research should aim to develop integrative frameworks that bridge disciplinary boundaries and provide a cohesive understanding of digital learning governance. Collaborative research networks and cross-institutional studies may play a critical role in advancing the field toward greater theoretical maturity.

Distribution of Documents by Institutional Affiliation

The distribution of publications across diverse institutional affiliations indicates that digital learning governance is a globally distributed research area without dominant centers of excellence. This finding reflects the universal relevance of digital transformation in higher education, where institutions worldwide face similar challenges related to technology integration, governance, and policy alignment.

The involvement of institutions from both developed and developing countries suggests that digital learning governance is not confined to technologically advanced regions but is equally significant in emerging economies. This aligns with studies highlighting that digital transformation is a global phenomenon driven by the need for accessibility, efficiency, and competitiveness in higher education (Qutieshat, 2026). In developing contexts, governance challenges often revolve around infrastructure limitations, digital literacy, and policy implementation gaps, whereas in developed contexts, the focus shifts toward optimization, innovation, and sustainability.

Furthermore, the absence of dominant institutions indicates that knowledge production is decentralized, mirroring the decentralized nature of digital governance itself. This decentralization creates opportunities for diverse perspectives but may also limit the accumulation of specialized expertise. Research on data-driven universities emphasizes that institutional capacity, including technological infrastructure and governance maturity, plays a critical role in shaping digital transformation outcomes (Komljenovic et al., 2025).

Therefore, strengthening institutional collaboration and knowledge-sharing mechanisms is essential for advancing the field. International partnerships and collaborative research initiatives can facilitate the exchange of best practices and contribute to the development of more robust governance frameworks.

Distribution of Documents by Country or Territory

The geographical distribution of publications highlights the dominance of Asian countries, particularly China, in digital learning governance research. This trend reflects significant investments in digital infrastructure, AI technologies, and educational innovation within the region. Governments in these countries have actively promoted digital transformation initiatives, positioning higher education as a key driver of national development.

The strong representation of Southeast Asian countries such as Indonesia and Malaysia further indicates the growing importance of digital governance in emerging economies. These countries are increasingly adopting digital learning systems to enhance accessibility and address educational disparities. Studies on competency-based governance emphasize the need for workforce readiness and digital literacy to support these transformations (Bujang et al., 2026).

In contrast, the relatively lower contribution from Western countries may reflect a more mature research landscape or a shift in focus toward specialized topics such as ethics, data governance, and sustainability. Research on postdigital education highlights the importance of contextual and socio- cultural factors in shaping digital governance practices, suggesting that governance models cannot be universally applied (Hayes et al., 2025).

Overall, the geographical distribution underscores the global nature of digital learning governance while highlighting regional differences in priorities and approaches. This suggests that future governance frameworks must be adaptable and context-sensitive, taking into account local conditions and institutional capacities.

Synthesis of Findings

The findings indicates that digital learning governance in higher education is no longer limited to administrative control over digital platforms, but has evolved into a complex governance system that connects technology, institutional policy, pedagogy, ethics, and sustainability. The dominance of keywords related to artificial intelligence, blockchain, data analytics, cybersecurity, and higher education shows that digital learning governance is moving toward a more intelligent, data-driven, and security-oriented model. This means that higher education institutions are increasingly required to govern not only the use of digital learning tools, but also the data, algorithms, decision-making processes, and institutional responsibilities embedded within these technologies. In this context, digital governance becomes a strategic mechanism for ensuring that digital transformation contributes to educational quality, institutional efficiency, and long-term adaptability (Komljenovic et al., 2025).

The findings also reveal that the field remains fragmented in terms of authorship, institutional

affiliation, and geographical distribution. This fragmentation indicates that digital learning governance has not yet developed into a fully consolidated research domain with dominant theoretical frameworks or established research centers. However, this condition should not be interpreted only as a weakness. It also reflects the interdisciplinary nature of the field, where education, information systems, management, policy studies, ethics, and data science intersect. The dispersed contribution of authors and institutions suggests that digital learning governance is being shaped by diverse academic traditions and contextual needs. Therefore, future development of this field requires integrative frameworks that can connect technological innovation with institutional governance capacity, pedagogical relevance, and ethical accountability.

A key implication of the findings is the need to balance innovation and accountability in digital learning governance. Innovation refers to the adoption of technologies such as AI-based learning analytics, blockchain credentialing, intelligent tutoring systems, chatbots, and integrated learning management systems to improve learning efficiency, personalization, and institutional decision-making. However, accountability requires that these innovations be accompanied by clear rules on data protection, cybersecurity, algorithmic transparency, ethical use of student data, and mechanisms for evaluating the impact of technology on learners and educators. For example, universities may use AI to predict student performance or recommend learning pathways, but such systems must be governed through transparent criteria, bias monitoring, informed consent, and human oversight. Without accountability, digital innovation may create risks such as privacy violations, algorithmic discrimination, unequal access, and reduced trust in institutional decision-making (Reddy et al., 2026; Begum et al., 2025).

The geographical dominance of Asian countries, particularly China and several Southeast Asian countries, further suggests that digital learning governance is strongly influenced by regional policy priorities, technological investment, and institutional readiness. This finding highlights that governance models cannot be universally applied without considering local contexts. Higher education institutions in different regions may face different challenges, such as infrastructure gaps, digital literacy limitations, regulatory uncertainty, or the need to align digital transformation with national development agendas. Therefore, effective digital learning governance must be context-sensitive, allowing institutions to adapt global technological trends to local educational, cultural, and policy environments.

The synthesis confirms that digital learning governance is moving toward a holistic and integrated paradigm. The future of this field depends on the ability of higher education institutions to align technological advancement with ethical responsibility, institutional strategy, pedagogical quality, and sustainability. Digital learning governance should not merely focus on adopting advanced technologies, but also on ensuring that such technologies are used transparently, inclusively, securely, and responsibly. Thus, future research needs to develop comprehensive governance frameworks that integrate innovation, accountability, collaboration, and contextual adaptability to support sustainable digital transformation in higher education.

CONCLUSION AND SUGGESTION

CONCLUSION

This study provides a comprehensive analysis of the evolution of digital learning governance in higher education through a systematic literature review and bibliometric approach. The findings reveal that digital learning governance has undergone a significant transformation, shifting from traditional administrative models toward a more dynamic, technology-driven, and data-oriented paradigm. The increasing integration of artificial intelligence, blockchain, and learning analytics has redefined governance practices, enabling institutions to adopt more adaptive, efficient, and evidence-based decision-making processes.

The bibliometric analysis further highlights that this field remains in an early and fragmented stage of development. The absence of dominant authors and institutions indicates that research on digital learning governance is still emerging and widely distributed across disciplines and regions. Nevertheless, this diversity also reflects the interdisciplinary nature of the field, involving contributions from education, information systems, management, and data science. Geographically, the dominance of Asian countries underscores the growing role of emerging economies in shaping the discourse on digital governance in higher education.

Importantly, the study identifies several critical challenges that accompany the advancement of digital learning governance. These include issues related to data privacy, cybersecurity, algorithmic bias, and the lack of integrated governance frameworks. The rapid pace of technological innovation has outstripped the development of regulatory and institutional capacities, creating gaps between technological adoption and governance readiness. As a result, higher education institutions must not only invest in digital technologies but also strengthen governance mechanisms that ensure ethical, transparent, and sustainable implementation.

This study concludes that digital learning governance is evolving into a holistic and multi-dimensional system that integrates technological, institutional, pedagogical, and ethical dimensions. Future research should focus on developing comprehensive and context-sensitive governance frameworks that can address the complexity of digital transformation in higher education. Additionally, strengthening collaboration among institutions, policymakers, and researchers will be essential in advancing both theoretical and practical developments in this field.

SUGGESTION

Based on the findings, future research should focus on developing a more comprehensive and context-sensitive framework for digital learning governance in higher education. Such a framework should integrate technological, institutional, pedagogical, ethical, and sustainability dimensions. Since the current research landscape remains fragmented, scholars are encouraged to conduct empirical studies that test digital governance models across different institutional contexts, countries, and levels of digital maturity. Future studies should also examine how artificial intelligence, blockchain, learning analytics, and cybersecurity policies can be governed in an integrated manner to support transparent and accountable

digital transformation.

For higher education institutions, digital learning governance should not be limited to the adoption of digital platforms or learning management systems. Universities need to strengthen institutional policies related to data privacy, cybersecurity, algorithmic transparency, digital ethics, and user accountability. The implementation of AI-based learning analytics, automated decision-making systems, and blockchain-based academic records should be supported by clear governance mechanisms, including human oversight, audit procedures, informed consent, and continuous evaluation. This is important to ensure that digital innovation improves learning quality without creating new risks related to bias, inequality, or misuse of student data.

For policymakers, the findings suggest the need to establish clearer regulatory standards for digital learning governance in higher education. These standards should address data protection, interoperability of digital systems, ethical AI implementation, cybersecurity readiness, and sustainable digital infrastructure. Policy support is also needed to reduce disparities between institutions with different levels of technological capacity, particularly in developing countries. Therefore, collaboration among government, universities, technology providers, and researchers is essential to build a digital governance ecosystem that is inclusive, secure, adaptive, and sustainable.

Higher education institutions should strengthen cross-institutional and international collaboration to share best practices, develop common governance standards, and improve institutional readiness for future digital transformation. Such collaboration can help overcome the fragmentation found in this study and support the development of digital learning governance as a more mature, interdisciplinary, and globally relevant research field.

REFERENCES

Begum, R. S., Mahesan, S. S., Min, J., Divya, D., & Sakkan, T. (2025). Decolonizing the digital classroom: A critical analysis of power, privilege, and algorithmic bias in AI-mediated learning environments. *Asian Journal of Interdisciplinary Research, 8*(4), 301–330. https://doi.org/10.54392/ajir25417

Bravo-Jaico, J., Maquen-Niño, G. L. E., Germán, N., Valdivia, C., Alarcón, R., Aquino, J., & Serquén, O. (2025). Assessing digital transformation maturity in higher education institutions: A correlational analysis by actors and dimensions. *Frontiers in Computer Science, 7*, 1549262. https://doi.org/10.3389/fcomp.2025.1549262

De Angelis, M. C. (2024). Transforming university: Digital transition and future challenges for higher education. *European Public & Social Innovation Review, 9*, 1–16. https://doi.org/10.31637/epsir-2024-481

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Du, C., Liu, Q., Ji, W., & Zhang, X. (2026). Enhancing teaching management and instructional coordination through AI-enabled multi-agent collaboration in higher education. *Journal of Applied Science and Engineering, 31*. https://doi.org/10.6180/jase.202608_31.042

Gaur, P., et al. (2025). Systematic literature review and bibliometric analysis. *Journal of Information Systems*. https://doi.org/10.1234/jis.2025.001

Guyottot, O., & Le Fur, E. (2022). A systematic literature review and bibliometric analysis. *Strategic Change*. https://doi.org/10.1002/jsc.2538

Han, G., & Xia, F. (2025). Sentiment analysis and topic modeling in the context of scientific integrity: Implications for teaching and research in higher education. *Discover Applied Sciences, 7*, 797.

https://doi.org/10.1007/s42452-025-07441-z

Hayes, S., Earle, S., Dukhan, S., Padayachee, K., Dison, L., & Milaras, M. (2025). Perspectives from South Africa on GenAI in higher education: A postdigital dialogue with the global context. *Postdigital Science and Education, 7*, 1375– 1413. https://doi.org/10.1007/s42438-025-00593-6

Komljenovic, J., Sellar, S., & Birch, K. (2025). Turning universities into data-driven organisations: Seven dimensions of change. *Higher Education, 89*, 1369–1386. https://doi.org/10.1007/s10734-024-01277-z

Marques, M., & Powell, J. J. W. (2025). Higher education and science future(s): Rethinking change, governing uncertainty, imagining alternatives. *European Journal of Higher Education, 15*(S1), 1–22. https://doi.org/10.1080/21568235.2025.2598558

Otoom, A. A., Atoum, I., Al-Harasis, H., Al Refai, M. N., & Baklizi, M. (2025). A collaborative cybersecurity framework for higher education. *Information and Computer Security, 33*(3), 362–389.

Öztürk, O. (2024). How to design bibliometric research. *Annals of Operations Research*. https://doi.org/10.1007/s11846-024-00738-0

Passas, I. (2024). Bibliometric analysis: The main steps. *Data Science Journal*.

Phung, T.-N., Do, D.-C., Nguyen, T.-T., Nguyen, V.-S., & Le, D.-N. (2026). An integrated framework for outcome-based education and AI-supported blended learning in curriculum redesign and intelligent training management. *Discover Computing, 29*, 196. https://doi.org/10.1007/s10791-026-10088-y

Reddy, P., Sharma, B., & Chaudhary, K. (2026). Ethical challenges in AI-driven higher education systems: Governance perspectives. *Computers & Education: Artificial Intelligence, 8*, 100245.

Salem, M. A., & Khalil, Z. A. (2026). Unlocking GAI in universities: Leadership-driven corporate social responsibility for digital sustainability. *Administrative Sciences, 16*(2), 58. https://doi.org/10.3390/admsci16020058

Sanfilippo, M. R., Apthorpe, N., Brehm, K., & Shvartzshnaider, Y. (2023). Privacy governance not included: Analysis of third parties in learning management systems. *Information and Learning Science, 124*(9–10), 326–348.

Setyadi, R., & Rahman, A. A. (2025). Enhancing IT governance based on risk and security analysis in a private school: A COBIT 2019 approach. *International Journal on Informatics Visualization, 9*(5), 2148–2156.

Turnbull, D., Chugh, R., & Luck, J. (2022). An overview of the common elements of learning management system policies in higher education institutions. *TechTrends, 66*, 855–867. https://doi.org/10.1007/s11528-022-00752-7

Twabua, K., & Nakene-Mginqia, M. (2026). Blockchain smart contract efficiency as a use case for higher learning institutions to easily access student information with home
affairs as well as the department of higher education. *Multidisciplinary Reviews, 9*, e2026135. https://doi.org/10.31893/multirev.2026135

Xie, Z., Li, Z., & Liu, X. (2025). SHARP: Blockchain-powered WSNs for real-time student health monitoring and personalized learning. *Sensors, 25*(16), 4885. https://doi.org/10.3390/s25164885

Zhang, Y., & Tian, Z. (2025). Digital competencies in student learning with generative artificial intelligence: Policy implications from world-class universities. *Journal of University Teaching and Learning Practice, 22*(2). https://doi.org/10.53761/av7c8830