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E-Learning and Digital Transformation: A Global Bibliometric Review (2015–2024)

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Abstract:
Purpose: This study examines the global evolution of research on e-learning and digital transformation and identifies the main publication trends, leading contributors, dominant subject areas, and thematic patterns during the period 2015–2024.
Methods: A bibliometric approach was adopted using the Scopus database. After applying predefined inclusion and exclusion criteria, 462 English-language articles published between 2015 and 2024 were retained for analysis. The dataset was examined using bibliometric indicators and visualization tools to assess annual scientific production, countries, institutions, authors, journals, subject areas, and keyword co-occurrence patterns.
Findings: The results show a marked increase in scientific output, especially after 2020, reflecting the accelerated integration of digital technologies into education. China, India, and the United States emerged as the most productive countries, while Computer Science, Social Sciences, and Engineering were the dominant subject areas. The keyword structure also revealed strong connections among e-learning, digital transformation, higher education, online learning, and artificial intelligence.
Contributions: This study provides a global bibliometric mapping of the field and offers a clearer understanding of its development, intellectual structure, and future research directions. It also highlights the growing role of e-learning as a driver of digital transformation in education.

Keywords: E-learning; Digital Transformation; Bibliometric Analysis.
Jel Classification Codes: I21; O33.

المستخلص:
تبحث هذه الدراسة في التطور العالمي للبحوث المتعلقة بالتعلم الإلكتروني والتحول الرقمي، وتحدد الاتجاهات الرئيسية في المنشورات، والمساهمين البارزين، والمجالات الموضوعية السائدة، والأنماط المواضيعية خلال الفترة 2015–2024. تم اعتماد نهج بيبليومتري باستخدام قاعدة بيانات Scopus. وبعد تطبيق معايير الإدراج والاستبعاد المحددة مسبقًا، تم الاحتفاظ بـ 462 مقالًا باللغة الإنجليزية نُشرت بين عامي 2015 و2024 لتحليلها. وتم فحص مجموعة البيانات باستخدام مؤشرات بيبليومترية وأدوات التصور لتقييم الإنتاج العلمي السنوي، والبلدان، والمؤسسات، والمؤلفين، والمجلات، والمجالات الموضوعية، وأنماط تكرار الكلمات المفتاحية. ظهر النتائج زيادة ملحوظة في الإنتاج العلمي، خاصة بعد عام 2020، مما يعكس التكامل المتسارع للتكنولوجيات الرقمية في التعليم. برزت الصين والهند والولايات المتحدة كأكثر الدول إنتاجًا، بينما كانت علوم الحاسوب والعلوم الاجتماعية والهندسة هي المجالات الموضوعية السائدة. كما كشفت بنية الكلمات المفتاحية عن روابط قوية بين التعلم الإلكتروني والتحول الرقمي والتعليم العالي والتعلم عبر الإنترنت والذكاء الاصطناعي. توفر هذه الدراسة خريطة بيبليومترية عالمية لهذا المجال وتقدم فهمًا أوضح لتطوره وبنيته الفكرية واتجاهات البحث المستقبلية. كما تسلط الضوء على الدور المتزايد للتعلم الإلكتروني كمحرك للتحول الرقمي في التعليم.

كلمات مفتاحية: تعليم الكتروني، تحول رقمي، تحليل ببليومتري
تصنيف جال: I21; O33

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I- Introduction :

The COVID-19 epidemic created an unparalleled disruption to educational systems worldwide and expedited the move from conventional face-to-face instruction to online and technology-mediated learning environments. In this setting, e-learning arose not simply as an emergency option but as a viable and scalable solution that enabled institutions to sustain instructional continuity during times of crisis. This transition exposed both the limitations of traditional educational models and the growing necessity of digitally enabled learning systems capable of ensuring flexibility, accessibility, and resilience (World Health Organization [WHO], 2020; Bozkurt & Sharma, 2021; Bond et al., 2021).

Beyond its direct instructional function, e-learning has gradually become one of the most conspicuous expressions of digital transition in education. Digital transformation refers to the integration of digital technology into organizational structures, processes, and services in ways that redefine operational models and strategic priorities (Westerman, Bonnet, & McAfee, 2014; Verhoef et al., 2021). In educational settings, this revolution extends beyond the simple usage of internet platforms. It comprises the deployment of digital infrastructures, cloud-based systems, artificial intelligence, learning analytics, and interactive tools that influence not just how learning is provided, but also how institutions handle communication, evaluation, and decision-making. From this approach, e-learning may be regarded as both a component and a driver of greater digital revolution within contemporary education.

As scholarly interest in this confluence continues to rise, it becomes increasingly vital to study how research on e-learning and digital transformation has evolved. Existing research has examined themes such as online learning effectiveness, learner engagement, digital platforms, and institutional adaptation. However, there remains a need for a comprehensive quantitative mapping of the literature that identifies publication growth, key authors, dominant subject areas, and developing thematic trends. In this sense, bibliometric analysis provides a good methodological approach since it permits the systematic assessment of scientific production, citation structures, and knowledge patterns within a specific topic.

The span 2015–2024 was selected for this study for two key reasons. First, it covers an entire decade of scientific production, providing a clearer assessment of the progress and maturation of research in this domain. Second, it contains both the years preceding the COVID-19 pandemic and the years that followed it, making it possible to study how the pandemic operated as an accelerator of research on digitally mediated education and institutional reform. In addition, the analysis was confined to papers published in English. This approach was selected because English remains the major language of internationally indexed scientific communication, and confining the dataset to English-language publications helps increase consistency and comparability in bibliometric analysis. At the same time, this criterion is acknowledged as a limitation, as it may omit relevant contributions published in other languages.

In light of these issues, the present study tries to address the following research question:

What are the key trends and scientific landmarks that have shaped the development of research in E-learning and Digital Transformation over the past decade, in terms of temporal and geographical distribution, institutional and individual contributions, core knowledge domains, and influential publication platforms?

To address this topic, the study conducts a bibliometric analysis of global research on e-learning and digital transformation indexed in the Scopus database between 2015 and 2024. By charting the growth of publications, identifying the main nations, institutions, authors, journals, and subject areas, and investigating keyword co-occurrence patterns, this study attempts to provide a greater understanding of the intellectual structure and development of this discipline. In doing so, it

contributes to the expanding conversation on how e-learning has developed from a technology learning choice into a fundamental catalyst of digital change in education.

II– Methods and Materials:

Bibliometric analysis employs various statistical and mathematical methods to analyze scientific literature, including citation analysis, co-authorship analysis, and keyword clustering (Celestino et al., 2024; Anggraini & Mahdiannur, 2024).

Standard tools and software used in bibliometric analysis include VOSviewer and the bibliometrix package in RStudio, which facilitate the visualization of bibliometric maps and trends (Celestino et al., 2024; Anggraini & Mahdiannur, 2024).

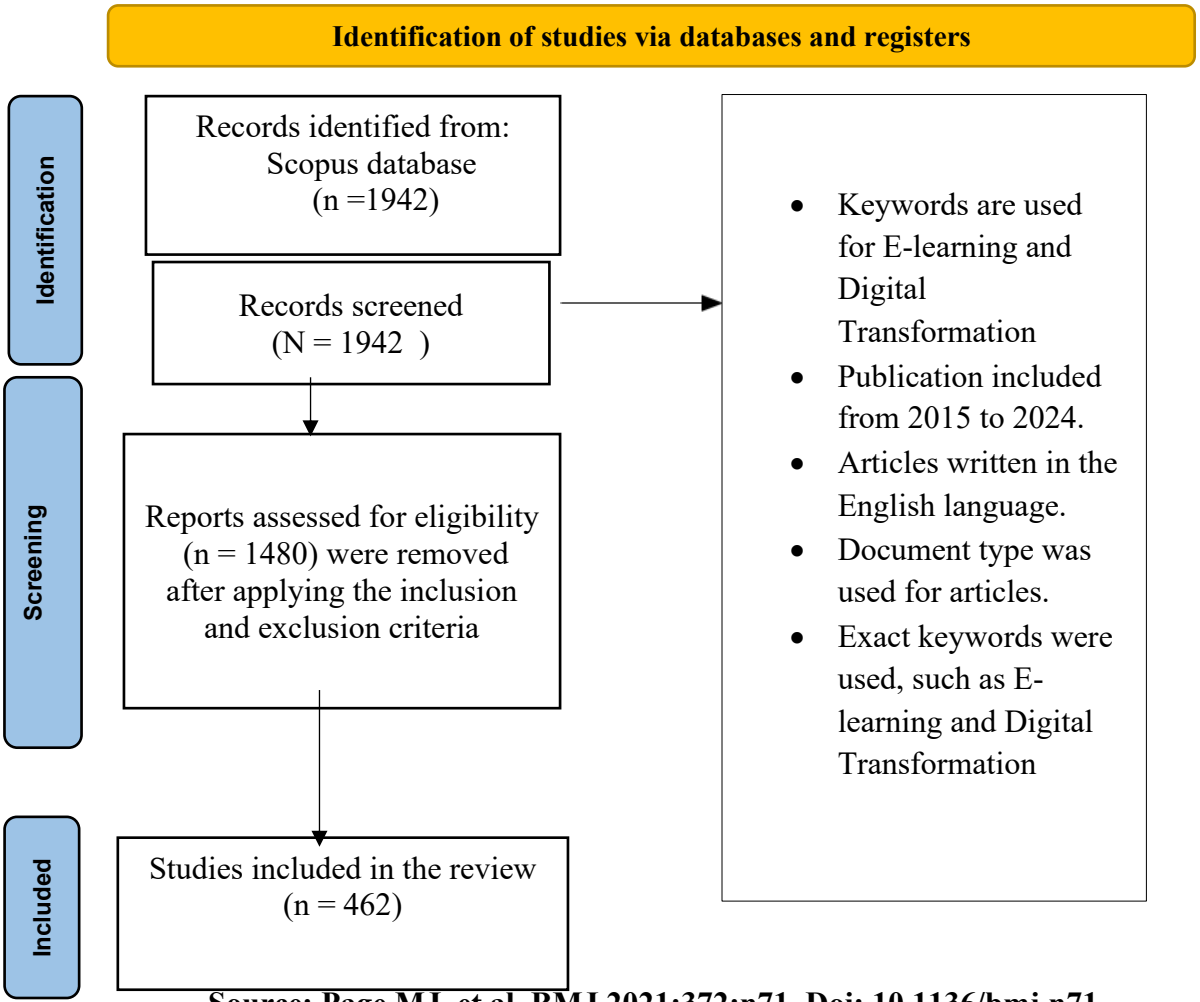
The process typically involves collecting data from databases such as Web of Science and Scopus, cleaning the data, and applying bibliometric methods to generate meaningful insights (Passas, 2024; Simion et al., 2023).

Applications and Case Studies

Bibliometric analysis is applied across various fields, including the natural and engineering sciences, to assess publication and citation statistics, identify influential journals, and visualize research outputs (Surekha et al., 2024).

While the PRISMA 2020 framework significantly advances the reporting of systematic reviews, it also highlights the ongoing challenges in ensuring the quality and transparency of research.

Figure 01 PRISMA 2020 for this review



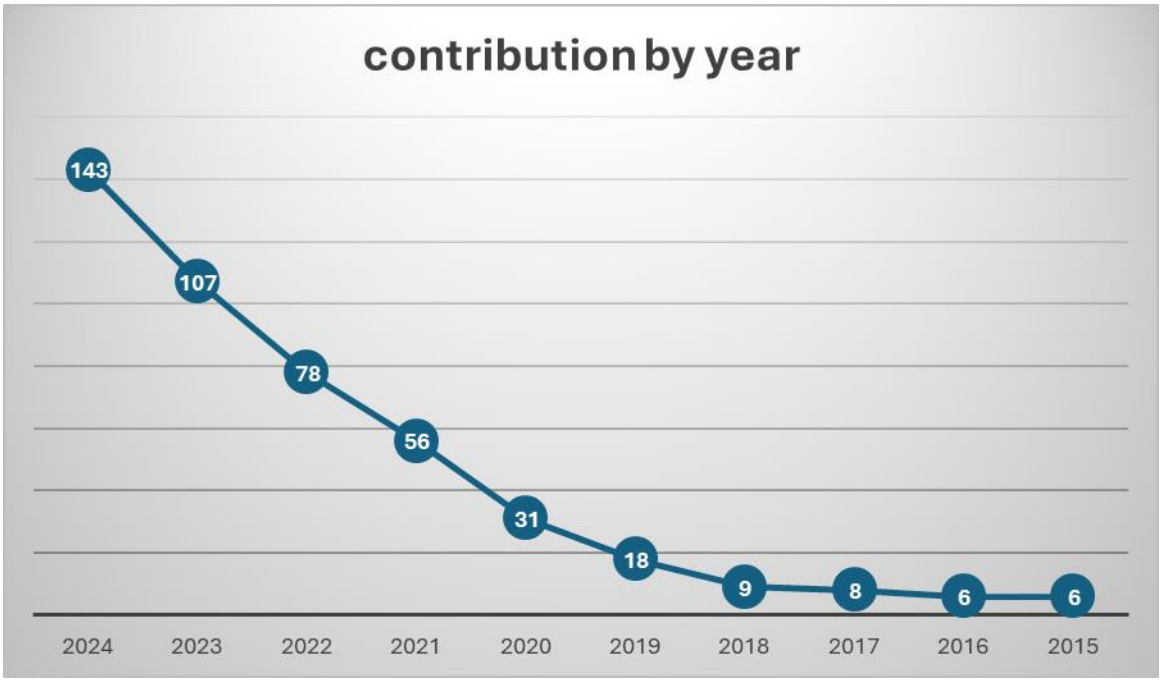
Source: Page MJ, et al. BMJ 2021;372:n71. Doi: 10.1136/bmj.n71

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III- Results and discussion :

RQ1 What has been the yearly E-learning and Digital Transformation research distribution over the last decade?

Figure 2 Contribution by year



Source: Scopus database

In the past decade, e-learning and digital transformation have attracted growing interest from researchers worldwide. Understanding the evolution of scholarly output offers insights into emerging trends, focal areas, and the growing importance of digital solutions in education.
Between 2015 and 2016, the volume of articles was relatively modest, totaling 6 per year, indicating emerging interest.

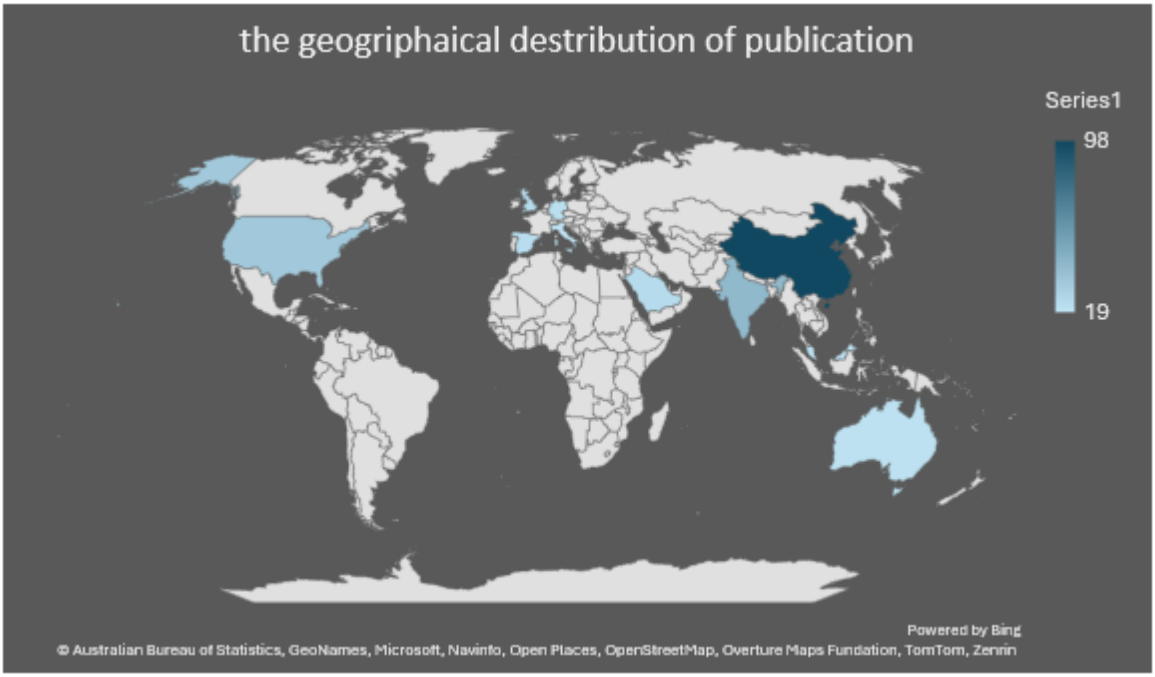
The output progressively escalated in 2017 (8) and 2018 (9), indicating a moderate yet consistent expansion. From 2019 onwards, publications increased markedly, from 18 in 2019 to 31 in 2020, then to 56 in 2021, and 78 in 2022. By 2023, the number had increased to 107, reaching 143 in 2024.

This significant increase, particularly post-2020, corresponds with the worldwide shift towards online learning platforms and the amplified influence of digital technology in education, driven primarily by events such as the COVID-19 pandemic.

The data indicate an expanding research landscape, with the growing volume of publications signaling E-learning's growing significance as a catalyst for digital transformation.

RQ 2: What are the top E-learning and Digital Transformation countries in the last decade?

Figure 3: The geographical distribution of the publication



Source: Scopus database

In the past decade, research on E-learning and Digital Transformation has proliferated across multiple countries, underscoring the global importance of technology-driven educational methodologies. Analyzing the most productive countries reveals the focal points of scholarly interest and innovation.

Data indicates that China tops the list with 98 publications, reflecting a strong and expanding interest in incorporating digital learning platforms into its educational framework. India ranks second with 41 publications, indicating its significant commitment to technological progress in education.

The United States (33) demonstrates a significant commitment, likely influenced by its early adoption of online education frameworks and its extensive research infrastructure.

Significantly, Saudi Arabia (24) and the United Kingdom (24) have similar outputs, highlighting a mutual emphasis on incorporating digital technologies in education. Simultaneously, Spain (23), Germany (22), Australia (21), and Malaysia (21) make substantial contributions, reflecting diverse international efforts in digital transformation.

Italy (19) concludes the list, highlighting its burgeoning position in the global research arena on E-learning.

These data underscore the significant contributions of China, India, and other notable nations to advancing E-learning research and digital transformation. This global distribution underscores the widespread recognition of digital education's capacity to transform learning experiences.

Rq3: What are the top educational institutions in E-learning and Digital Transformation over the last decade?

Table 01: Top 10 Educational Institutions

#	Educational institutions	TP	Country
1	King Saud University	05	Saudi Arabia
2	Al-Balqa Applied University	05	Jordan
3	Prince Sattam Bin Abdulaziz University	05	Saudi Arabia
4	King Abdulaziz University	04	Saudi Arabia
5	Tecnológico de Monterrey	04	Mexico
6	Cairo University	04	Egypt
7	Universidade do Minho	04	Portugal
8	Universidad de Alcalá	04	Spain
9	Griffith University	04	Australia
10	Vietnam National University, Hanoi	04	Vietnam

TP* = Total Publications **Source: Scopus database**

Global institutions have significantly contributed to the burgeoning research on E-learning and Digital Transformation. Identifying premier educational institutions reveals the locations of advanced research and underscores the geographical diversity of study in this field.

From 2015 to 2024, three universities—King Saud University, Al-Balqa Applied University (Jordan), and Prince Sattam Bin Abdulaziz University—were distinguished by their total publications, each having five publications. King Abdulaziz University ranks fourth, highlighting Saudi Arabia's significant involvement in E-learning and Digital Transformation research.

The remaining institutions—Tecnológico de Monterrey (Mexico), Cairo University (Egypt), Universidade do Minho (Portugal), Universidad de Alcalá (Spain), Griffith University (Australia), and Vietnam National University, Hanoi—demonstrate significant engagement, each producing four papers. This distribution indicates broad international interest across the Middle East, Latin America, Europe, Asia, and Australia, underscoring the global importance of digital solutions in education.

The data underscores the significant influence of Saudi Arabian universities, in conjunction with institutions across different continents, on the research landscape of E-learning and Digital Transformation. This global dissemination emphasizes the universal effort to incorporate digital technologies into educational practices and policies.

Rq4: Who are the top authors who contributed the most to E-learning and Digital Transformation for the last decade?

Table 02: Top 10 authors in the field

#	Author	TP*	TC*	H-INDEX	Most cited article*	Times Cited	Country
1	**Aditya, B. R.**	34	225	8	Understanding the challenges of rapid digital transformation: The case of the COVID-19 pandemic in higher education	44	Indonesia
2	**Area-Moreira, Manuel**	26	314	7	Thin-layer gamification in e-learning: Evidence on motivation and self-regulation	14	Spain
3	**Chiu, Mingchuan**	118	1661	26	Developing an explainable hybrid deep learning model in digital transformation: An empirical study	05	Taiwan
4	**De-Pablos-Heredero, Carmen**	139	1287	19	20Relationships among relational coordination dimensions: Impact on the quality of education online with a structural equations model	32	Spain
5	**Diwan, Anjali**	28	76	4	Unveiling Copy-Move Forgeries: Enhancing Detection with SuperPoint Keypoint Architecture	13	India

6	**Iivari, Netta**	187	3048	26	Digital transformation of everyday life – How the COVID-19 pandemic transformed the basic education of the young generation, and why information management research should care?	599	Finland
7	**Kar, Arpan Kumar**	243	12939	53	Understanding the S-Curve of Ambidextrous Behavior in Learning Emerging Digital Technologies	14	India
8	**Lan, Fuyin**	4	18	2	Business model transformation in the digital enablement context through frugal innovation: Learning from the Chinese experience	12	China
9	**Lee, Seungwan**	88	385	10	A denoising model based on multi-agent reinforcement learning with data transformation for digital tomosynthesis	03	South Korea
10	**Liu, Tairan**	65	1259	16	PhaseStain: the digital staining of label-free quantitative phase microscopy images using deep learning	285	United States

TP*=TOTAL PUBLICATIONS, TC*=TOTAL CITATIONS Source: Scopus database

In bibliometric analyses, identifying the top authors helps illuminate who drives key discussions, shapes theoretical frameworks, and generates the most impactful research within a field.

For E-learning and Digital Transformation, these authors bring diverse perspectives from multiple countries, reflecting the global significance of digital education initiatives. Kar, Arpan Kumar (India), stands out among the leading contributors with 243 publications, over 12,000 citations, and an H-index of 53—indicating high productivity and substantial scholarly impact.

Another influential scholar is Iivari, Netta (Finland), with 187 publications, 3,048 citations, and an H-index of 26; notably, her most cited article on the pandemic's role in transforming basic education has amassed 599 citations, underscoring the COVID-19 era's catalytic effect on digital transformation research.

Researchers such as De-Pablos-Heredero, Carmen (Spain), and Chiu, Mingchuan (Taiwan) also demonstrate significant engagement, each with over 100 publications and a robust citation record.

Meanwhile, authors like Aditya, B. R. (Indonesia) and Area-Moreira, Manuel (Spain) contributed a substantial number of works, though on a smaller scale, and have produced articles with notable citation impact in areas ranging from online higher education during COVID-19 to gamification in E-learning.

This breadth of research—from frugal innovation (Lan, Fuyin, China) to deep learning–based models (Liu, Taiwan, United States)—highlights the diverse, interdisciplinary nature of E-learning and Digital Transformation.

These top authors' publication counts, citation metrics, and high-impact studies underscore the rapidly expanding scholarly interest in how digital technologies can reshape educational practices.

Their global distribution reflects a broad-based, international effort to understand and advance E-learning as a catalyst for digital transformation.

RQ5 wishes academic publications were more patient with studying E-learning and Digital Transformation in the last decade.

Table 03: Top 10 journals in the field

#	Journal	TP*(2020-2023)	TC* (2020-2023)	Cite Score	Most cited article*	Times Cited	publisher
01	**Applied Mathematics And Nonlinear Sciences**	756	2.175	2.9	Exploration of Digital Transformation Path of Civic Education Management in Colleges and Universities in the Information Age	02	Walter de Gruyter
02	**IEEE Access, "16"**	49.687	484743	9.8	UTiLearn: A Personalised Ubiquitous Teaching and Learning System for Smart Societies	122	IEEE
03	**International Journal Of Emerging Technologies In Learning, "13"**	1683	8389	5.0	Threats, challenges, and opportunities for open universities and massive open online courses in the digital revolution	37	International Association of Online Engineering
04	**Technological Forecasting And Social Change, "12"**	2602	55382	21.3	Threat or opportunity? A case study of the digital-enabled redesign of entrepreneurship education in the COVID-19 emergency	144	Elsevier
05	**Technology Knowledge And Learning, "12"**	247	2336	9.5	Education Systems in the Digital Age: The Need for Alignment	27	Springer Nature
06	**International Journal Of Advanced Computer Science And Applications, "8"**	4.997	11.686	2.3	Digital transformation in higher education: a framework for maturity assessment	51	Science and Information Organization
07	**British Journal Of Educational Technology, "6"**	450	7.042	15.6	Emergency education effects on teacher abilities and motivation to use digital technologies	109	John Wiley & Sons
08	**Communications Of The Association For Information Systems, "5"**	323	1269	3.9	MaCuDE IS Task Force Phase II Report: Views of Industry Leaders on Big Data Analytics and AI	06	Association for Information Systems

09	**Multimedia Tools And Applications, "5"**	7.082	50.911	7.2	Effective prediction and resource allocation method (EPRAM) in a fog computing environment for an innovative healthcare system	58	Springer Nature
10	**Sustainability Switzerland, "5"**	55.991	381.357	6.8	Evaluation of the functionality of a new e-learning platform vs. Previous experiences in e-learning and the self-assessment of one's digital literacy	21	Multidisciplinary Digital Publishing Institute (MDPI)

Source: Scopus database

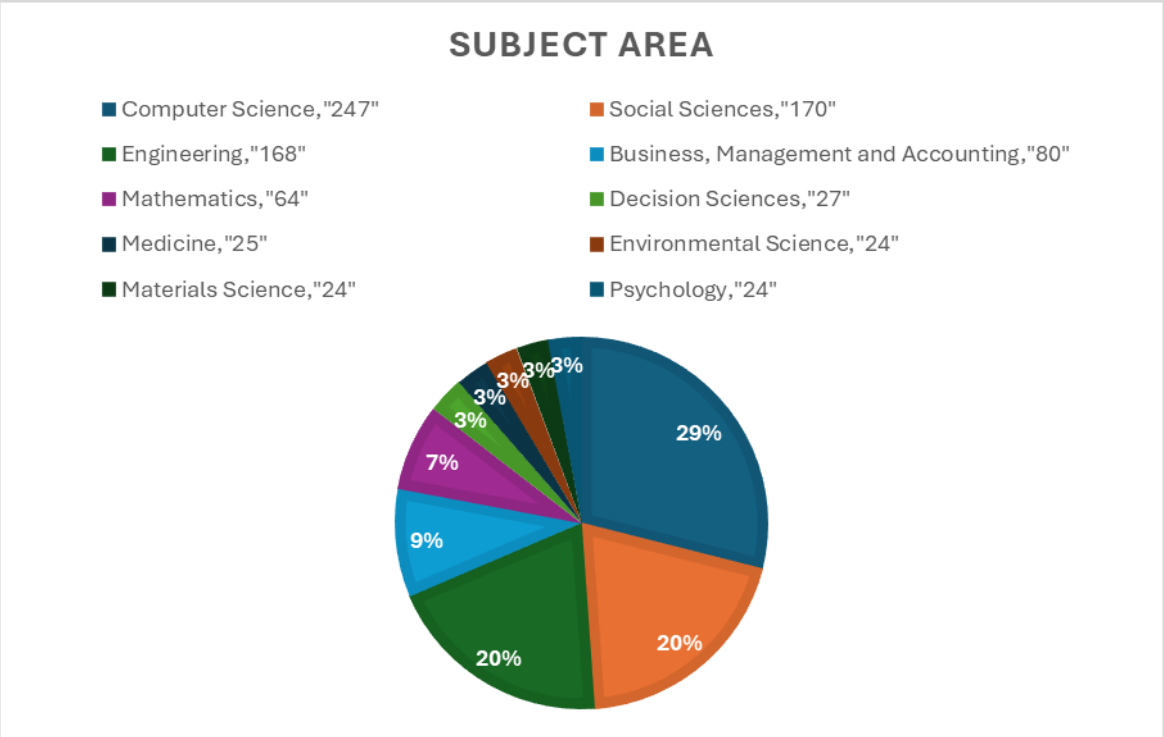
Academic publications are essential in influencing the dialogue surrounding E-learning and Digital Transformation. Analyzing the publication venues of key publications reveals researchers' preferred channels and the convergence of various disciplines and opinions on the subject.
Numerous journals are distinguished by their significant effect and frequent citations on E-learning and Digital Transformation from 2020 to 2023. Technological Forecasting and Social Change (Elsevier) boasts a significant CiteScore of 21.3 and includes a highly referenced paper with 144 citations, highlighting the COVID-19 crisis's role in expediting digital innovation, especially in entrepreneurship education. IEEE Access (IEEE), with a CiteScore of 9.8, is widely recognized for its extensive coverage in engineering and technology; its most-cited article (122 citations) presents a personalized, ubiquitous teaching and learning system, underscoring the growing demand for innovative, adaptive educational platforms.

Education-oriented publications such as the International Journal of Emerging Technologies in Learning (CiteScore 5.0) and the British Journal of Educational Technology (CiteScore 15.6) highlight significant perspectives on open universities, massive open online courses, and the "emergency education" context established by the pandemic. These periodicals highlight pedagogical changes, digital literacy, and the evolution of instructional methodologies. In the interim, multidisciplinary journals like Sustainability (Switzerland) (CiteScore 6.8) and Communications of the Association for Information Systems (CiteScore 3.9) illustrate the intersection of E-learning research with fields such as sustainability, information systems, and organizational studies.

High-impact journals in E-learning and Digital Transformation represent a technology-driven domain focused on educational, organizational, and societal change. The most-cited articles from these channels demonstrate that digital technologies, creative pedagogies, and adaptable systems have become integral to contemporary education—an evolution that academic journals persistently influence and examine.

RQ6: What is the most critical subject area involving E-learning and Digital Transformation

Figure 4 Contribution by Subject Area



Source: Scopus database

Examining the subject areas in which researchers write provides insight into the scope of e-learning and digital transformation studies. This demonstrates the discipline's technological essence and interdisciplinary scope across multiple fields.

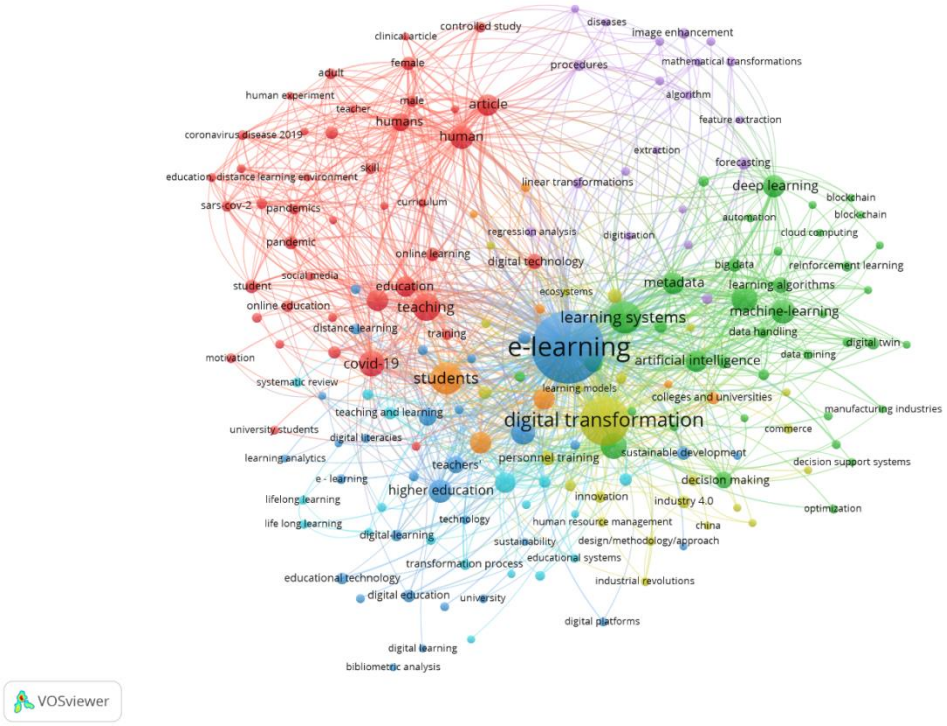
Computer Science dominates with 247 publications, underscoring its pivotal role in advancing the technology frameworks that facilitate online learning and digital innovation. Social Sciences (170) and Engineering (168) closely follow, underscoring the importance of understanding human, societal, and infrastructural factors in delivering digital solutions. Business, Management, and Accounting (80) is also highly included, focusing on organizational strategy, leadership, and financial aspects of integrating E-learning platforms.

The remaining disciplines—Mathematics (64), Decision Sciences (27), Medicine (25), Environmental Science (24), Materials Science (24), and Psychology (24)—despite their lower publication volumes, exemplify the broad and interdisciplinary character of this study domain.

The preeminence of Computer Science underscores the technological basis of E-learning and Digital Transformation. In contrast, the significant presence of Social Sciences and Engineering illustrates the essential systemic, social, and organizational aspects vital for effective digital adoption.

This diverse involvement across academic disciplines highlights E-learning's complexity and extensive influence as a catalyst for digital transformation.

Figure 5 illustrates a map derived from the co-occurrence relationships among all terms.



Source : vosviewer

Figure 5 presents a graphical representation of keyword co-occurrence in the E-learning and Digital Transformation study from 2015 to 2024. The dimensions of each node indicate the frequency of a specific term, whilst the lines and their thickness depict the co-occurrence of those keywords in published literature. The color clusters represent theme groupings, signifying diverse but interconnected study domains.

Multiple significant clusters arise:

Educational and Pandemic-Centric Cluster (Red/Orange):

Terms such as "COVID-19," "distance learning," "online education," "students," and "teaching" are tightly interconnected. This categorization emphasizes the pandemic's significant impact on E-learning, focusing on topics such as emergency remote instruction, virtual classrooms, and evolving teaching methodologies.

Core Education and Transformation Cluster (Blue/Yellow):

"E-learning" and "digital transformation" are intrinsically connected to concepts such as "higher education," "teaching and learning," and "digital education." This suggests that a significant portion of the literature examines the impact of digital technology on conventional educational frameworks, especially highlighting universities and lifelong learning programs.

Technology-Driven Cluster (Green/Purple):

Terminology such as "artificial intelligence," "machine learning," "big data," and "deep learning" is interconnected, illustrating the influence of advanced technology in facilitating digital transformation. These keywords indicate research on how AI and data analytics augment or customize the learning experience, enhance educational management, and enable breakthroughs in E-learning.

Human Factors and Methodological Terminology (Red/Purple):

Terms such as "human," "male," "female," "controlled study," and "algorithm" constitute a more

methodologically focused cluster. This domain frequently emphasizes user studies, clinical or experimental methodologies, and the creation or evaluation of innovative digital learning instruments and procedures.

The map depicts the scope and interrelation of E-learning and Digital Transformation study themes. Although technological advancements are crucial, the pandemic setting and pedagogical factors also significantly impact the situation. The co-occurrence network highlights the interdisciplinary nature of the field, integrating educational theories, technological innovations, and practical implementation issues across higher education and beyond.

Discussion

The bibliometric study indicates a vibrant, swiftly evolving research landscape in E-learning and Digital Transformation over the last decade. The observed rise in publication volume, especially following the COVID-19 pandemic, signals a notable transformation in educational paradigms. As global institutions confronted unprecedented challenges in sustaining educational continuity, the expedited implementation of digital learning strategies emerged as both necessary and a driver of extensive organizational transformation (Bozkurt & Sharma, 2021; World Health Organization [WHO], 2020).

The yearly growth pattern—from a moderate output in the early part of the decade to a significant increase after 2019—reflects the global imperative to transform education in response to the crisis. This trend indicates that scholars have increasingly recognized the potential of E-learning as a revolutionary catalyst, driving innovations that transcend basic remote instruction. The continuous increase in academic engagement indicates the development of digital pedagogies and the incorporation of new technologies, including artificial intelligence and data analytics, into educational practices (Verhoef et al., 2021).

The data highlights a varied geographical distribution of research activity. Countries like China, India, and the United States are prominent donors, each with distinct national agendas and varying levels of technological infrastructure. The significant contributions of these nations indicate that, although the digital transformation of education is a global phenomenon, the intensity and focus of research may be shaped by regional socioeconomic conditions and policy measures. The co-authorship networks underscore the significance of international collaborations, revealing robust relationships across governments across many continents. This global connection is essential for exchanging ideas and creating resilient, flexible educational frameworks (Westerman, Bonnet, & McAfee, 2014).

Institutional and authorial contributions offer additional understanding of the catalysts in this study domain. Prominent educational institutions and prolific authors from across the world have substantially enriched the conversation, demonstrating that skill transcends regional boundaries.

The scattered distribution of contributions highlights the interdisciplinary and collaborative aspects of E-learning and Digital Transformation research. The multiplicity of perspectives enriches the field, providing a more comprehensive understanding of digital education's technological foundations and pedagogical issues (Moore, Dickson-Deane, & Galyen, 2011).

Moreover, the examination of subject domains and journal influence reveals that although Computer Science constitutes the technological foundation of this study, substantial contributions are also emerging from Social Sciences, Engineering, and Business. This multidisciplinary engagement illustrates the intricate relationship between technology and society, underscoring that successful digital transformation in education requires comprehensive strategies that address human, organizational, and technological factors.

Notwithstanding the extensive insights this study offers, several limitations must be acknowledged. The analysis was limited to publications indexed in the Scopus database and written in English, potentially omitting pertinent contributions from non-English-speaking regions or other bibliographic databases. The swift advancement of digital technology and educational

methodologies indicates that this study must continually revise and expand its findings to reflect evolving trends and shifts in academic emphasis.

This study comprehensively analyzes global trends in E-learning and Digital Transformation research. The findings emphasize the revolutionary effect of the COVID-19 epidemic on educational practices and the ongoing evolution of scholarly research in this field. Subsequent research should expand on these findings by fostering interdisciplinary collaborations to investigate the complex interconnections among technology, pedagogy, and organizational transformation in pursuit of resilient, egalitarian, and innovative educational systems.

IV- Conclusion:

This bibliometric analysis provides a comprehensive examination of global research trends in E-learning and Digital Transformation between 2015 and 2024. The findings reveal a significant and sustained growth in scholarly output, particularly after the onset of the COVID-19 pandemic, which served as a pivotal catalyst for rethinking and redesigning educational delivery systems (Bozkurt & Sharma, 2021; WHO, 2020). The observed escalation in academic interest reflects not only the urgency of digital adaptation during crises but also a broader transformation in pedagogical strategies and institutional priorities.

The study identifies China, India, and the United States as leading contributors, highlighting regional disparities in research productivity and investment in digital education. Similarly, prominent educational institutions—especially those from Saudi Arabia and other geographically diverse regions—demonstrate a global commitment to advancing digital learning infrastructure. The recognition of key authors across Asia, Europe, and North America reinforces the international and interdisciplinary character of this research domain.

An analysis of influential journals and academic disciplines underscores the foundational role of Computer Science in driving innovation within E-learning and Digital Transformation. Additionally, the presence of shared keywords and extensive co-authorship networks reflects the interconnectedness of global research efforts and the strategic importance of cross-border collaboration.

Based on the findings, several recommendations emerge for future scholarly and practical engagement:

Expand Research Scope: Future studies should incorporate a broader range of data sources, including non-English publications and alternative databases, to ensure more inclusive and representative insights.

Promote Interdisciplinary Approaches: Integrating perspectives from education, technology, social sciences, and policy will be essential for addressing the multifaceted challenges of digital transformation.

Strengthen International Collaboration: Encouraging global partnerships among researchers, institutions, and policymakers can help develop adaptable, resilient educational systems.

Focus on Equity and Access: Future research should prioritize issues related to digital equity, including infrastructure disparities, learner accessibility, and the design of inclusive technology.

Bridge Theory and Practice: Practical initiatives should align closely with academic findings to ensure the effective implementation of digital strategies in real-world educational contexts.

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