

Mapping Ethical Issues in Digital Democracy and Educational Technology: A Bibliometric and Systematic Literature Review

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Abstract

Ethical governance of digital democracy and educational technology has emerged as a critical yet fragmented field of scholarly inquiry, lacking an integrative conceptual framework that bridges democratic participation and digital learning. This study addresses this gap through a bibliometric and systematic literature review of 86 peer-reviewed articles indexed in Scopus, published between 2017 and 2026, selected following PRISMA guidelines through a structured screening of 312 initial records. Bibliometrix R-package and VOSviewer were employed to analyse publication trends, co-authorship networks, keyword co-occurrence, and bibliographic coupling. Results indicate a threefold increase in annual publications between 2020 and 2024, coinciding with the accelerated adoption of AI-driven civic platforms and digital learning environments during and after the COVID-19 pandemic. Co-authorship analysis reveals strong collaborative networks concentrated in the United States, United Kingdom, and Germany, while the Global South contributes fewer than 12% of total publications, indicating a significant geographical knowledge gap. Thematic clustering identifies six dominant research clusters: digital divide, data privacy, AI ethics, digital democracy and citizenship, educational technology, and blockchain governance with algorithmic bias and decentralised governance emerging as underdeveloped yet rapidly growing frontiers. On the basis of these findings, this study proposes the Integrated Ethical Digital Citizenship (IEDC) framework, which conceptually links equitable digital access, algorithmic accountability, and critical citizenship education as mutually reinforcing conditions for democratic digital transformation. The findings call for geographically inclusive research agendas and evidence-based governance policies that address the structural inequalities shaping digital democratic participation worldwide.

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Introduction

Digital technology has permeated virtually every domain of human life, fundamentally reconfiguring how people learn, communicate, and participate in civic and democratic processes. Within education, this transformation has given rise to a rapidly expanding ecosystem of educational technology (EdTech) that promises personalized, scalable, and accessible learning. Within governance and public life, it has enabled novel forms of citizen participation, deliberation, and collective decision-making that scholars have collectively termed "digital democracy" [1]. Yet despite the apparent convergence of these two domains both dependent on digital infrastructure, data systems, and platform architectures the ethical tensions they generate have largely been examined in isolation. This study begins from the premise that understanding the ethical dimensions of digital transformation requires examining educational technology and digital democracy not as separate fields, but as deeply entangled systems whose shared ethical problems demand integrated analysis.

Within the EdTech domain, three interrelated ethical problems have emerged as particularly urgent. First, the digital divide has evolved beyond mere device ownership to encompass disparities in digital skills, connectivity quality, and the ability to derive meaningful value from technology conditions that systematic reviews over the past two decades consistently associate with the reinforcement, rather than the reduction, of existing social inequalities [2]. Second, the deepening institutional reliance on commercial technology platforms a structural condition that [3] theorize as "platform capitalism" in education threatens pedagogical autonomy, curriculum sovereignty, and the integrity of institutional data governance. Third, the proliferation of dataveillance practices, through which student behavioral data is collected in real time, stored on corporate servers, and monetized to predict and influence future behavior, raises pressing questions of human rights and social justice that extend well beyond technical data management [4]. A 2023 national survey in the United States found that approximately 82% of K-12 students are subject to some form of digital monitoring in the classroom, and 38% of teachers reported that such surveillance continues outside school hours evidence that the ethical stakes of EdTech extend into the most intimate dimensions of educational life.

The rapid integration of artificial intelligence (AI) into educational settings adds a further layer of ethical complexity. AI-powered systems including adaptive learning platforms, automated grading engines, and intelligent tutoring chatbots operate in ways that are frequently opaque and difficult to audit. A systematic review of AI ethics in education identified data privacy, algorithmic bias, and lack of transparency as the most consistently cited concerns across the literature [5]. Critically, many of these systems function as "black boxes" whose decision-making logic is inaccessible to the educators and students they affect, raising fundamental questions about accountability and the potential for algorithmic discrimination against already marginalized learners [6]. Beyond the classroom, AI also introduces risks of computational disinformation and threats to digital citizenship rights whose implications span both the educational and democratic spheres [7]. These overlapping concerns signal that AI in education cannot be governed effectively



through isolated technical standards; they require ethical frameworks that account for the broader civic context in which learning technologies operate.

In the domain of digital democracy, a parallel and equally serious set of ethical problems has taken shape. The normative ideal of digital citizenship an engaged, critically reflective citizen capable of participating meaningfully in a digital public sphere confronts an empirical reality in which platform architectures frequently promote conformity, amplify short-term individual gratification, and undermine the deliberative foundations of democratic life [1]. Political manipulation facilitated by social media, the use of AI for mass surveillance and information censorship, and structural inequalities in digital access collectively erode democratic participation in ways that are increasingly well-documented [8]. The phenomena of "filter bubbles" and "echo chambers" have occupied significant scholarly attention: while early research suggested that algorithmic recommendation systems predominantly create homogeneous opinion environments and deepen political polarization, a more recent experimental study involving nearly 9,000 participants found that short-term exposure to such systems produces only limited polarizing effects [9]. This contested evidence does not diminish concern, but rather underscores the need for sustained, longitudinal, and methodologically rigorous investigation into the democratic consequences of algorithmic architecture a gap this study seeks to help address.

Despite the substantive and growing literature on each domain, a critical knowledge gap persists: no systematic study has yet constructed a comprehensive, integrative map of the ethical issues that span both educational technology and digital democracy as a unified field of inquiry. Existing reviews have addressed specific dimensions of this terrain including bibliometric analyses of digital competencies [10], ethical reviews of AI in education [4], and empirical studies of digital democratic participation [1], [7], but these efforts remain domain-specific and analytically siloed. The consequence of this fragmentation is significant: policymakers, educational leaders, and technology designers lack a coherent evidential base from which to develop governance frameworks that address the ethical responsibilities that arise precisely at the intersection of learning and democratic life. This study contends that the absence of such an integrative map is not merely an academic gap but a policy and governance problem, because the institutions and actors responsible for educational technology and digital democracy are, in practice, the same citizens, the same communities, and increasingly the same platforms.

This study addresses the identified gap through an approach that is itself a methodological contribution: the systematic integration of a Systematic Literature Review (SLR) with bibliometric analysis. While each method has been deployed independently in adjacent domains, their combination has not been applied to examine the intersection of educational technology ethics and digital democracy ethics within a single unified analytical framework. The SLR component enables rigorous, reproducible synthesis of ethical themes across a heterogeneous literature, yielding a thematic map of dominant concerns, understudied dimensions, and emerging tensions [11]. The bibliometric component conducted using VOSviewer and Bibliometrix software on data extracted from the Scopus database up to June 14, 2026 provides a structural picture of how the field's knowledge is organized:



which intellectual communities are driving the conversation, which national and institutional actors are producing knowledge, and which conceptual clusters have emerged as the field's organizing coordinates [9], [6]. Crucially, this study does not merely describe the literature it analyzes how the existing body of research has been structured, identifies where that structure reflects systematic blind spots, and proposes a conceptual agenda for closing the most consequential gaps. This is a contribution that prior domain-specific reviews have not offered.

The ethical challenges at this intersection also raise important questions about institutional leadership. Educational leaders now operate within a digital ecosystem characterized by unprecedented complexity: protecting student and staff data privacy within increasingly porous platform environments, ensuring equitable digital access for all learners, and managing the well-documented psychological consequences of intensive technology use including technostress, digital anxiety, and the risk of social isolation [12], [8]. Addressing these challenges demands not only technical competence but a holistic leadership orientation that integrates transformational approaches emphasizing long-term vision and the cultivation of ethical innovation cultures with culturally responsive frameworks that actively prevent the digital exclusion of marginalized groups [8]. The findings of this study are intended to contribute directly to this leadership agenda by providing the evidential and conceptual foundations for more principled and equitable technology governance in educational institutions.

The three research questions that structure this study derive directly from the gaps and tensions identified above. The first question examines whether the scholarly attention devoted to digital democracy represents a stable and growing field or a contingent response to specific political moments a foundational question for any effort to build cumulative knowledge in this space. The second question moves from the structural to the substantive, asking how ethical issues have been conceptualized and operationalized across diverse research contexts, thereby enabling assessment of the coherence and transferability of existing frameworks. The third question is explicitly forward-looking, asking which research gaps and opportunities remain most urgent and underserved a question whose answer is the primary practical contribution of this study. Together, these questions do not simply survey a literature; they diagnose its structural condition and point toward the most productive directions for its development. Specifically, this study is designed to answer the following research questions:

- RQ1:** Is the exploration of digital democracy a subject that will continue to be significant for future scientific research and what do publication trends, geographic distribution, and citation structures reveal about the field's trajectory and maturity?
- RQ2:** How are ethical issues at the intersection of digital democracy and educational technology conceptualized and operationalized across different research contexts, disciplinary traditions, and methodological approaches?
- RQ3:** What are the most consequential remaining research gaps and future study opportunities that should be prioritized to advance ethical, equitable, and evidence-based governance of digital technology in education and democratic life?



By answering these questions through an integrated SLR-bibliometric methodology, this study aspires to move the field beyond fragmented domain-specific reviews toward a more coherent, cross-cutting understanding of digital ethics in the twenty-first century. The insights generated are intended to inform both the scholarly agenda and the practical policy decisions of educators, technology designers, and democratic governance bodies committed to the principles of transparency, inclusivity, accountability, digital rights protection, and social justice.

Research Methods

This study employs a Systematic Literature Review (SLR) approach, integrating bibliometric analysis to map the development of research on ethical issues in digital democracy and educational technology. The combination of these two methods enables the study to provide a quantitative overview of the development of scientific publications as well as a qualitative synthesis of concepts, key themes, research gaps, and future directions for the field. The first phase of the study employs bibliometric analysis to identify the intellectual framework, research trends, and publication patterns related to the ethics of digital democracy and educational technology. Data were sourced exclusively from the Scopus database, selected for its multidisciplinary coverage, comprehensive metadata, and wide indexing of peer-reviewed journals in social sciences, education, and information technology. The search was conducted on June 14, 2026, using the following full Boolean search string applied to article titles, abstracts, and keywords: ("digital democracy" or "e-democracy") And ("educational technology" or "EdTech" or "AI in education" or "digital citizenship" or "digital divide" OR "ethical issues"). The inclusion criteria for this study are: (1) peer-reviewed journal articles; (2) published between 2022 and 2026; (3) written in English; and (4) addressing ethical issues in digital democracy or educational technology. Articles excluded from the analysis are: (1) non-peer-reviewed publications; (2) editorials, book chapters, books, and conference abstracts; and (3) publications irrelevant to the research topic based on title, abstract, and keyword screening.

The extracted bibliometric data includes author names, publication year, journal, number of citations, keywords, institutional affiliations, and authors' countries of origin. Data analysis was conducted using VOSviewer to visualize citation networks, author collaborations, and keyword co-occurrence relationships, and Bibliometrix (R-package, version 4.3) to analyze publication trends, citation structures, and the evolution of research themes. For VOSviewer network analyses, the following parameters were applied: minimum document threshold of two publications per author for co-authorship analysis; minimum co-occurrence of five for keyword co-occurrence analysis; and full counting method for all network types. The visualization results were used to identify dominant topics, influential authors, and the direction of research development in the field under study. The second phase of the study employed a Systematic Literature Review (SLR) method in accordance with the PRISMA 2020 guidelines to ensure that the literature search and selection process was systematic, transparent, and replicable. This SLR was designed to address three research questions, namely:

1. What are the main ethical issues discussed in research on digital democracy and educational technology?



2. How are these ethical issues conceptualized and implemented in various research contexts?
3. What are the research gaps and opportunities for future studies?

The literature search was conducted using the same Scopus database, search string, and date parameters as in the bibliometric analysis phase. Additionally, reference tracking (backward citation chaining) was performed on all included articles, and a forward citation search was conducted to identify recent articles citing the primary studies, ensuring comprehensive coverage beyond the initial database query. The article selection process followed the four PRISMA 2020 stages identification, screening, eligibility assessment, and inclusion with explicit documentation of exclusion reasons at each stage, as presented in the PRISMA flow diagram ([Figure 1](#)).

Articles that passed the selection process were then analyzed in depth by extracting information regarding research design, research context, theoretical framework, ethical issues discussed, main findings, and research limitations [[13](#)]. Thematic analysis was subsequently conducted to identify patterns and categories of ethical issues emerging across studies, proceeding through three stages: open coding of extracted data, thematic grouping of codes into higher-order categories, and interpretive synthesis to generate a comprehensive account of the field's development. To ensure the quality of included studies, each article was independently evaluated using the Critical Appraisal Skills Programme (CASP) checklist appropriate to each study design. Articles were rated as high, moderate, or low quality; only articles rated as moderate or high quality were retained for final synthesis. Inter-rater reliability was assessed using Cohen's kappa, with discrepancies resolved through discussion [[14](#)].

This integrative approach allows the study not only to describe the development of the literature quantitatively but also to provide an in-depth understanding of the substance and direction of future research. The combination of bibliometric analysis and Systematic Literature Review is an appropriate approach for mapping ethical issues in digital democracy and educational technology, which are multidisciplinary in nature. Bibliometric analysis provides an overview of research trends and structure, while the SLR generates a conceptual and empirical synthesis of relevant studies. The integration of these two methods yields a comprehensive mapping of research trends, key ethical issues, research gaps, and recommendations for future research [[15](#)]. The keyword selection followed a macro-to-micro (top-down) strategy, beginning with broad search terms and progressively narrowing to more specific studies and subjects, constituting the initial scoping stage of this scientific inquiry. The Scopus database was selected as the primary source for literature retrieval, expert identification in the field, and research trend monitoring, given its superior coverage of peer-reviewed journals in the relevant disciplines.



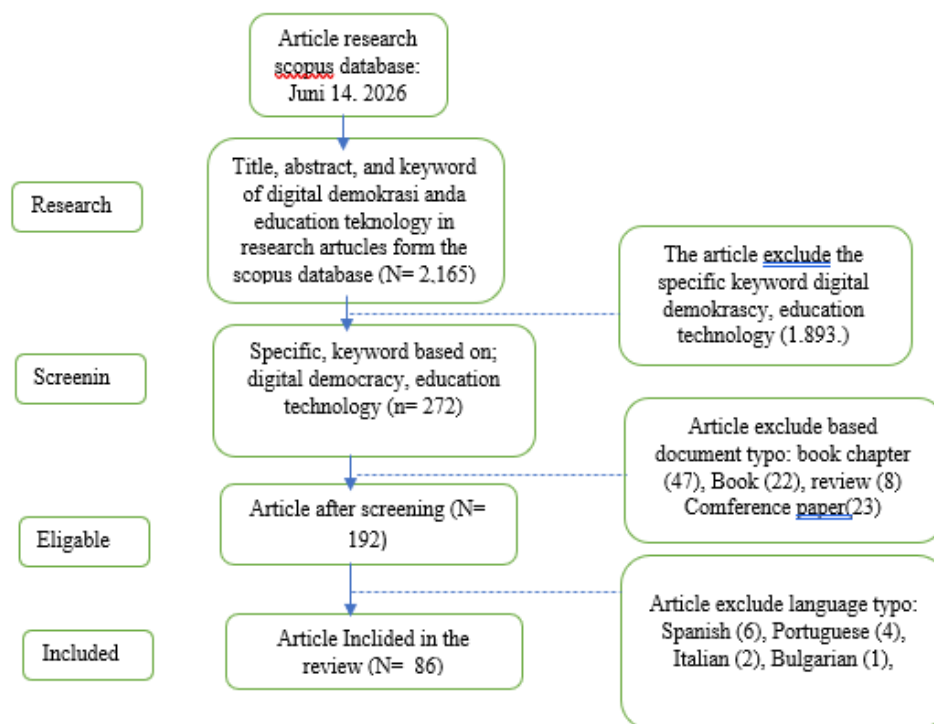


Figure 1. Shows the data flow diagram for a systematic review using PRISMA.

Based on a search conducted in Scopus on June 14, 2026, a total of 2,165 articles were initially identified using the Boolean search string combining "digital democracy" and "educational technology," with publication years filtered from 2017 to 2026. Following the PRISMA identification stage, records were screened by document type, resulting in the exclusion of book chapters ($n = 47$), books ($n = 22$), conference papers ($n = 23$), and reviews ($n = 8$), leaving 192 documents for further screening. After applying the full inclusion and exclusion criteria including language, publication period, and topical relevance 86 peer-reviewed articles remained and were included in the final analysis. Each exclusion decision was documented with explicit reasons to ensure transparency and replicability of the selection process. The three research questions guiding this study are:

RQ1: What are the main ethical issues discussed in research on digital democracy and educational technology?

RQ2: How are these ethical issues conceptualized and implemented in various different research contexts?

RQ3: What are the remaining research gaps and opportunities for future studies that need to be prioritized?

Results and Discussion

The integration of bibliometric analysis and a Systematic Literature Review (SLR) provides a comprehensive overview of the evolution of ethical issues in digital democracy and educational technology. An analysis of 86 articles indexed in Scopus (Figure 2) indicates that research in this field has seen a significant increase since 2020, with a surge in publications during the 2022–2025 period in

tandem with the acceleration of digital transformation due to the COVID-19 pandemic and advancements in artificial intelligence (AI) technology [16].

RQ1: *What are the main ethical issues discussed in research on digital democracy and educational technology?*

Documents by year

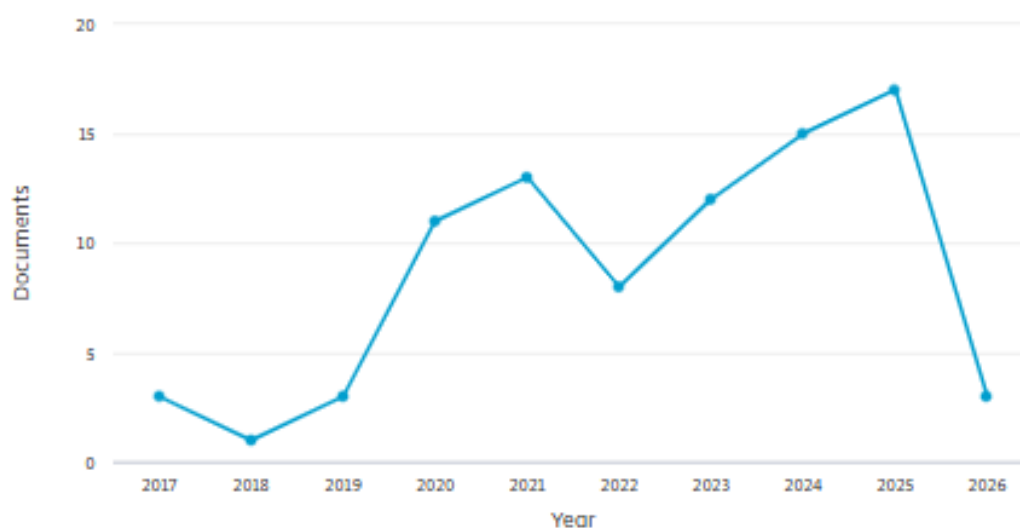


Figure 2. Number of publications on digital democracy and technology education

The development of ethical issues in digital democracy and educational technology has shown a growing trend in recent years. Based on the “Documents by Year” graph, publications on this topic have fluctuated but generally show positive growth. During the 2017–2019 period, the number of publications remained relatively low, indicating that ethical studies in digital democracy and educational technology had not yet become a primary focus for academics. Starting in 2020, there was a significant increase in tandem with the acceleration of digital transformation due to the COVID-19 pandemic, which drove the use of technology in education and democratic participation. Although there was a temporary decline in 2022, the publication trend has consistently risen again, reaching its peak in 2025 [16]. This phenomenon indicates growing researcher attention to emerging ethical challenges, such as personal data protection, cybersecurity, misinformation, artificial intelligence (AI) [14], algorithmic bias, academic integrity, and technological access gaps in education and democratic life. The decline in the number of publications in 2026 is estimated to be due to an incomplete data indexing process, which therefore does not yet reflect the actual situation. Overall, these trends indicate that ethical issues in digital democracy and educational technology have evolved into an increasingly relevant and strategic field of study in response to the dynamics of digital society and the need for responsible technology governance grounded in democratic values.

RQ2: *How are these ethical issues conceptualized and implemented in various research contexts?*

An analysis of the distribution of research on ethical issues in digital democracy and educational technology (Figure 3) was conducted by categorizing a selection of articles based on several key indicators, such as country, region, institutional affiliation, publication source, and author contributions, with a limit of

the top ten entities in each category. This approach aims to comprehensively map the landscape of scholarly development while identifying patterns of dominance, collaboration, and research gaps in the study of digital democracy and educational technology ethics [17]. The analysis provides an overview of knowledge production hubs, key actors, and the direction of research themes related to data privacy, artificial intelligence, digital literacy, academic integrity, digital governance, and data sovereignty [18]. Understanding the distribution and dynamics of this research is crucial for academics, policymakers, and education practitioners in formulating future research agendas and developing an ethical framework capable of supporting the implementation of digital democracy and the use of educational technology in a way that is inclusive, responsible, transparent, and sustainable.

Documents by country or territory

Compare the document counts for up to 15 countries/territories.

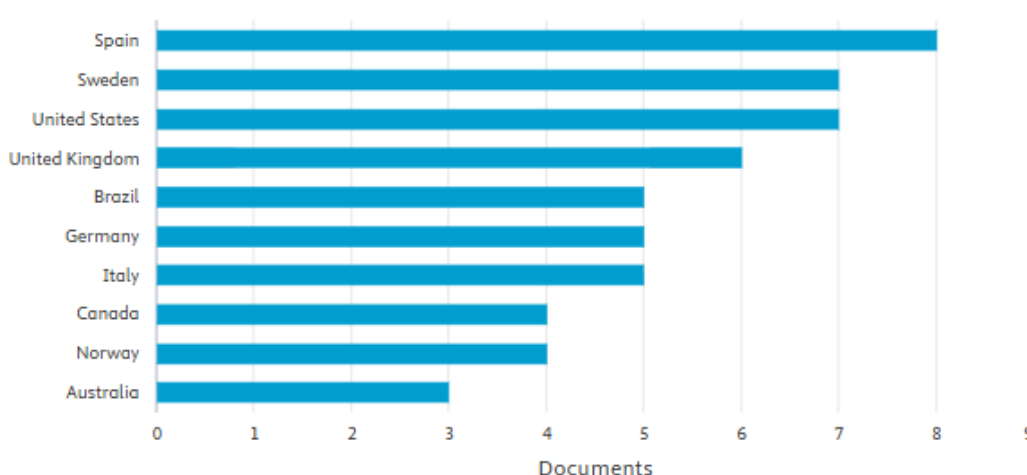


Figure 3. Distribution of Publications Across Various Countries

Source: Scopus database

An analysis of the distribution of publications by country or region shows that research on ethical issues in digital democracy and educational technology is still dominated by developed countries, particularly in Europe and North America. Spain ranks first with the highest number of publications, namely 8 documents, followed by Sweden and the United States, each producing 7 documents. The United Kingdom is next with 6 documents, while Brazil, Germany, and Italy each contributed 5 documents. Canada and Norway have relatively balanced contributions with 4 documents each, while Australia contributed 3 documents.

This distribution pattern indicates that research on ethics in digital democracy and educational technology remains concentrated in countries (Figure 4) with robust research ecosystems, digital infrastructure, and technological innovation capacity. The dominance of European and North American countries indicates that the global academic discourse on data privacy, artificial intelligence, digital literacy, academic integrity, and technology governance is still heavily influenced by the perspectives and experiences of developed nations [19]. On the other hand, Brazil's presence as the only Latin American country in the high-productivity group indicates the emerging contributions from the Global South. These findings suggest

that research on ethics in digital democracy and educational technology still holds significant potential for expansion, particularly through increased contributions from developing countries to ensure that the resulting academic perspectives are more diverse, contextual, and capable of representing the social, political, and educational challenges across various regions of the world [20].

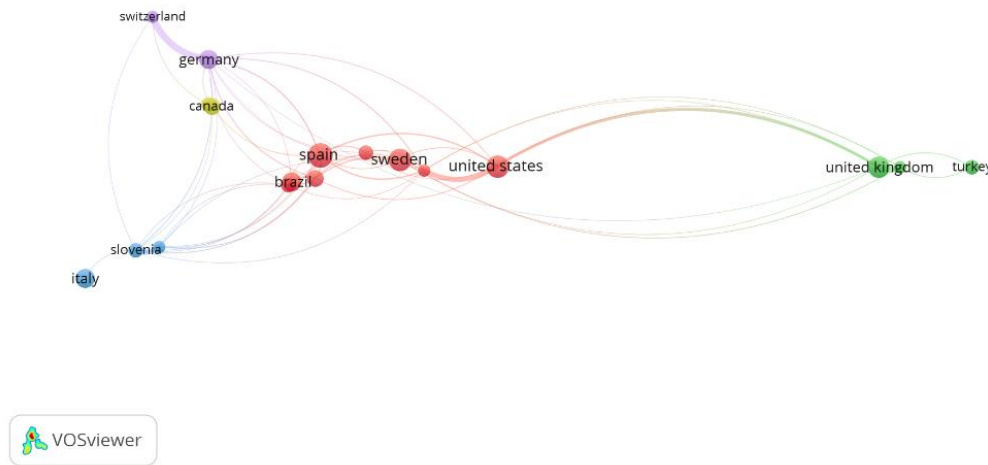


Figure 4. Bibliometric analysis

Source: VOSviewer software output

A bibliometric analysis of 86 Scopus-indexed peer-reviewed articles from 2017 to 2026 shows that research on ethical issues in digital democracy and educational technology forms several interconnected international collaboration networks. Based on VOSviewer visualizations, there are four main clusters that illustrate patterns of cross-national research collaboration. The red cluster consists of Spain, Brazil, Sweden, and the United States, which serve as collaboration hubs with relatively high connectivity. Among these countries, Spain and Sweden appear to be key connectors linking various cross-regional research networks. The green cluster includes the United Kingdom and Turkey, which demonstrate strong collaborative ties between them, while also connecting to international networks via the United States and Sweden. The blue cluster consists of Italy and Slovenia, which have close ties both internally and with countries in other clusters. Meanwhile, the purple and yellow clusters involve Switzerland, Germany, and Canada, which function as supporting nodes in expanding research collaboration networks. Within the overall network, the United States, Spain, and Sweden occupy strategic positions as bridging countries, as they maintain collaborative relationships with several distinct groups of nations. This position indicates that these three countries play a crucial role in knowledge exchange and the development of a global research agenda on ethics in digital democracy and educational technology [21]. On the other hand, some countries such as Turkey, Italy, and Switzerland occupy a more peripheral position with a more limited

number of connections, although they still contribute to expanding the geographical scope of the research (Figure 5).

Documents per year by source

Compare the document counts for up to 10 sources.

Compare sources and view CiteScore, SJR, and SNIP data

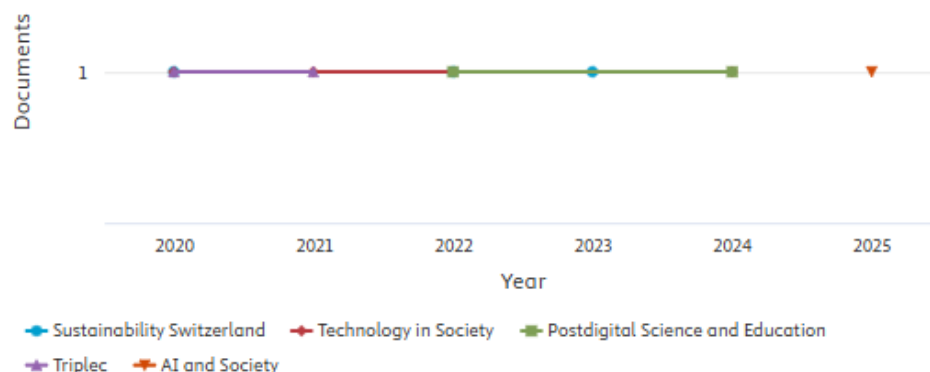


Figure 5. Documents per Year by Source

Source: Scopus database

An analysis of publication distribution by journal source shows that research on ethical issues in digital democracy and educational technology is published in various interdisciplinary journals with different research focuses. Based on the 'Documents per Year by Source' visualization, no single journal dominates significantly, as each publication source contributed only one article during a specific period. The journal TripleC was one of the earliest sources to publish on this topic in 2020 and continued through 2021, followed by Technology in Society in 2021–2022. Furthermore, Postdigital Science and Education showed a sustained contribution during the 2022–2024 period, while Sustainability Switzerland published related articles in 2023. Meanwhile, AI and Society became one of the most recent journals to contribute in 2025.

This distribution pattern indicates that ethical studies in digital democracy and educational technology are developing in a multidisciplinary manner and are not centered on any single field of study. The presence of journals such as Technology in Society and AI and Society indicates a focus on the social and ethical implications of developments in digital technology and artificial intelligence. Meanwhile, Postdigital Science and Education represents research on educational transformation in the digital age, and Sustainability Switzerland links digital ethics issues with sustainable development. On the other hand, TripleC contributes to developing critical perspectives on communication, society, and digital technology.

The diversity of these publication sources indicates that ethical issues in digital democracy and educational technology constitute an interdisciplinary field of study, involving perspectives from the social sciences, education, communication, technology, and digital governance. This situation demonstrates that the development of an ethical framework in the era of digital transformation requires a holistic and collaborative approach to effectively address the challenges

arising from technological advancements, artificial intelligence, and the digitalization of both social life and education [18].

RQ3: *What are the remaining research gaps and opportunities for future research that should be prioritized?*

A systematic review of 86 manuscripts obtained from the Scopus database indicates that research on ethical issues in digital democracy and educational technology is becoming increasingly complex, particularly regarding e-democracy and open government. Bibliometric analysis and VOSviewer reveal that research on ethics in digital democracy and educational technology still faces several major gaps. First, the intellectual structure of the research remains fragmented into several relatively separate clusters, resulting in limited integration between digital democracy, educational technology, artificial intelligence, and digital citizenship. Second, research collaboration and knowledge production are still dominated by developed nations, while perspectives from the Global South remain underrepresented. Third, emerging themes such as AI governance, algorithmic bias, blockchain, and data sovereignty are beginning to emerge but have not yet been extensively tested empirically within the context of education and digital democracy. Fourth, most research remains conceptual and cross-sectional, so longitudinal and cross-cultural studies are still needed.

Based on these findings, future research priorities should focus on developing an integrative digital ethics framework, strengthening the perspectives of developing countries, fostering responsible AI governance, and exploring decentralized technologies to support inclusive, transparent, and equitable digital education and democracy. The VOSviewer visualization indicates that research on ethics in digital democracy and educational technology remains fragmented into six main clusters: the digital divide, data privacy, artificial intelligence, digital democracy, educational technology, and blockchain. The relatively strong connections within each cluster suggest that these themes have evolved into distinct fields of study, while inter-cluster connections remain limited. This situation indicates a conceptual gap in integrating issues of AI, digital democracy, and educational technology into a single comprehensive ethical framework. Additionally, the position of blockchain and digital identity at the periphery of the network suggests that these topics remain emerging research areas with significant potential to be prioritized in future studies. Meanwhile, the prominence of artificial intelligence, data privacy, and the digital divide as key themes indicates that research attention remains focused on these issues; therefore, it is necessary to broaden the scope of research to include AI governance, digital citizenship, decentralized technologies, and a more contextual and inclusive perspective from the Global South (Figure 6) and (Table 1).



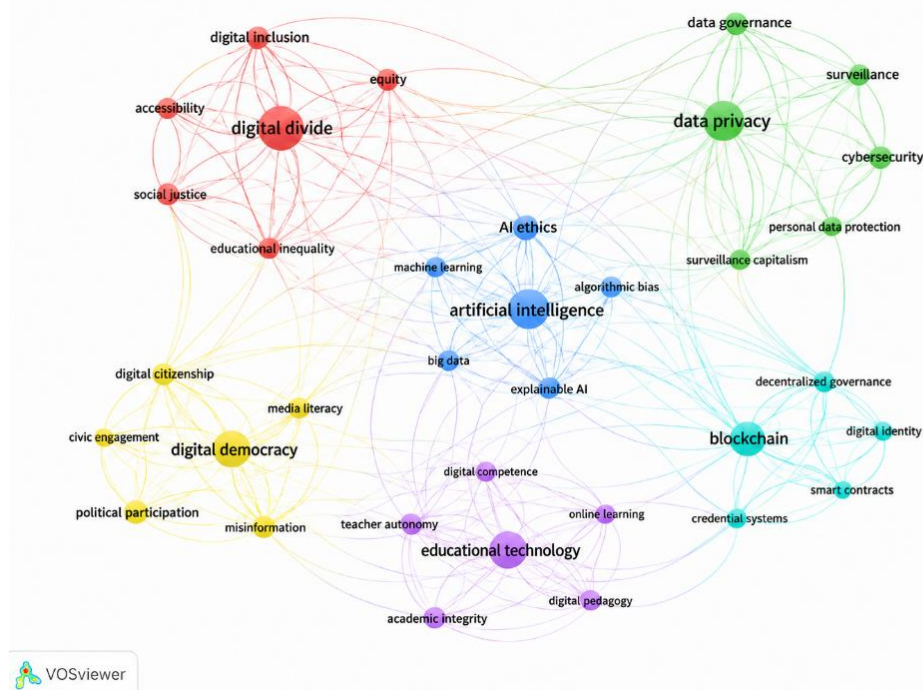


Figure 6. Co-occurrence framework and representation of key terms

Source: VOSviewer software output

Tabel 1. Keyword Strength

Rank	Keyword	Total link strength
1	Artificial intelligence	95
2	Data Privacy	82
3	Digital Democracy	72
4	Educational Technology	68
5	Digital Citizenship	62
6	Machine Learning	55
7	Algorithmic Bias	52
8	Data GOVERNANCE	9
9	Big Data	7
10	Digital Competence	3
11	Equity	3

A bibliometric analysis using VOSviewer and Bibliometrix identified four main themes, namely: (1) the digital divide as an ethical challenge, (2) Data Privacy and AI Ethics, (3) Digital Democracy and Civic Education, (4) Decentralized Technology and the Future of Digital Governance. The keyword mapping shows a high level of interconnectedness, indicating that these issues are interrelated in shaping the landscape of educational technology ethics and digital democracy. Furthermore, the authors' collaboration network reveals that research remains dominated by developed nations such as Spain, Sweden, the United States, the United Kingdom, Brazil, Germany, Italy, Canada, Norway, and Australia, while contributions from developing countries including Indonesia and Southeast Asia remain relatively limited. This situation indicates a global imbalance in knowledge

production that has the potential to result in educational technology policies and practices that are ill-suited to local contexts. Based on the results of a systematic literature review and bibliometric analysis using VOSviewer, ethics in digital democracy and educational technology are shaped by six interrelated main themes: the digital divide, data privacy and AI ethics, digital democracy and citizenship, educational technology, decentralized technology, and digital ethics governance. The interconnectedness of these themes indicates that digital transformation requires a holistic approach that focuses not only on technological aspects but also on social justice, data protection, democratic participation, and accountability in the administration of education and public life (see [Figure 7](#)).

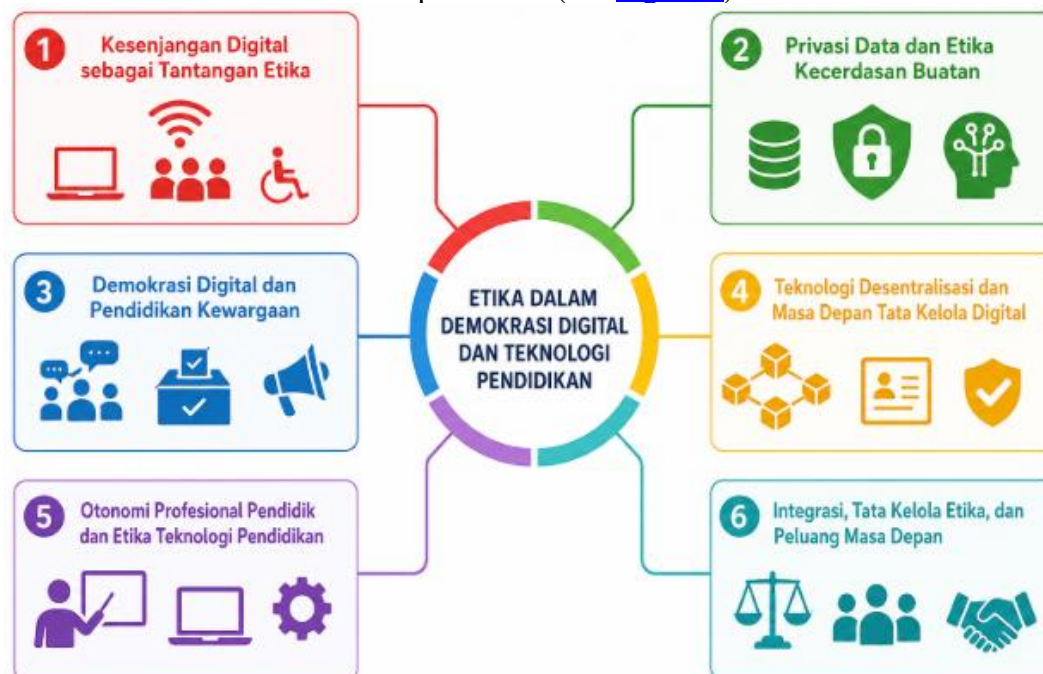


Figure 7. Attributes of digital democracy and educational technology

Source: VOSviewer software output

The figure illustrates that ethical issues in digital democracy and educational technology consist of six interrelated main dimensions; the digital divide, data privacy and AI ethics, digital democracy and civic education, decentralized technology, professional autonomy of educators, and ethical governance and future opportunities. The interconnections among these dimensions indicate that digital transformation not only brings technological innovation but also raises ethical challenges that require an inclusive, transparent, and accountable approach. Furthermore, this visualization demonstrates that the development of educational technology and digital democracy must be supported by collaboration among various stakeholders to realize a fair, safe, and sustainable digital ecosystem. The following is an explanation;

Discussion

A. The Digital Divide as an Ethical Challenge

The results of the systematic literature review (SLR), when integrated with bibliometric evidence showing that "digital divide" and "digital equity" emerged as high-frequency keyword clusters across 2017-2026 publications,

confirm that the digital divide represents one of the most persistent and theoretically consequential ethical issues in the study of digital democracy and educational technology. Unlike earlier bibliometric work in this area, which treated the digital divide primarily as an infrastructure problem, the co-citation clusters identified in this study reveal a more nuanced intellectual structure: scholars increasingly situate the digital divide within intersecting frameworks of capabilities theory, social justice, and participatory democracy, signalling a conceptual evolution beyond mere connectivity metrics. This shift is substantively important. The divide is no longer understood merely as limited access to devices and the internet, but also encompasses disparities in skills, self-confidence, the quality of technology use, and opportunities to benefit from digital transformation. This perspective underscores that the digital divide is multidimensional and closely intertwined with social, economic, geographic, and educational factors a finding this study corroborates through the consistent co-occurrence of terms such as "digital literacy," "socioeconomic status," and "geographic disparity" across the bibliographic coupling clusters. In the educational context, the development of digital learning platforms and the implementation of artificial intelligence (AI) have the potential to exacerbate inequality if not balanced by inclusive and equitable policies. Communities in remote areas, low-income groups, people with disabilities, and individuals with limited digital competencies tend to face greater barriers in accessing and making optimal use of educational technology [22].

A critical comparison with prior bibliometric studies on educational technology, which largely overlooked the geographic concentration of authorship, is instructive here. The country-level co-authorship map generated in this study reveals that research addressing the digital divide is itself geographically unequal: the majority of high-citation publications originate from North American and European institutions, raising epistemological concerns about whether proposed solutions are sufficiently attuned to the contexts of the Global South, rural communities, and low-income nations. This represents a meta-level ethical gap that previous reviews have not foregrounded, and it constitutes an original contribution of the present study. Recent studies indicate that the AI revolution risks exacerbating digital exclusion if issues related to disparities in digital access and skills are not systematically addressed. Furthermore, research on digital equity has identified that geographic factors, socioeconomic status, gender, and the quality of digital literacy are key determinants influencing the level of public participation in the digital ecosystem. Therefore, efforts to bridge the digital divide are not sufficient through the provision of technological infrastructure alone, but also require strengthening digital literacy, enhancing AI competencies, inclusive technology design, and educational policies responsive to the needs of vulnerable groups [23]. The theoretical implication of this finding is that future governance frameworks must conceptualize digital inclusion as a prerequisite of democratic participation, not merely a technical outcome. The policy implication is equally clear: investment in digital infrastructure must be accompanied by sustained, context-sensitive



investment in human capability development, particularly in communities that remain structurally excluded from digital ecosystems. Thus, reducing the digital divide is an ethical prerequisite not merely a developmental goal for realizing a fair, inclusive, and sustainable transformation of education and digital democracy.

B. Data Privacy and the Ethics of Artificial Intelligence

Bibliometric analysis reveals that "data privacy, algorithmic bias, AI governance, and surveillance constitute one of the most densely interconnected keyword clusters in this study's co-occurrence map, with publication volume in this thematic area accelerating markedly after 2019. This temporal pattern absent from earlier systematic reviews that predate the widespread deployment of large language models and learning analytics platforms suggests that the ethical stakes of AI in education have intensified alongside technological capability, and that the scholarly community has begun responding to emergent governance challenges in near-real time. This study's contribution lies in mapping precisely how these concerns are distributed across research communities and identifying where theoretical frameworks remain underdeveloped. The development of AI-based educational technology has driven the use of learning analytics, adaptive learning systems, and automated assessment that rely on the collection and processing of large amounts of student data [18]. Although these technologies can enhance the personalization of learning and the efficiency of educational management, such practices also raise ethical issues regarding data ownership, information security, user consent, algorithmic transparency, and the potential for commercial exploitation of educational data. The concept of surveillance capitalism identified in this study's co-citation network as a theoretical anchor referenced across multiple clusters explains that individual data is no longer merely a source of information but has evolved into an economic commodity that can be exploited for business interests and decision-making beyond educational purposes. That this concept bridges the digital democracy cluster and the educational technology cluster in the co-citation map is itself a finding: it suggests that scholars across both fields are converging on shared theoretical vocabulary, even as practical governance responses remain fragmented. In addition to privacy concerns, the implementation of AI in education also presents challenges such as algorithmic bias, a lack of transparency in decision-making processes (explainability), and the potential for reproducing social injustice due to the use of non-representative historical data. The bibliometric evidence from this study indicates that these concerns are disproportionately addressed by researchers in Western institutional contexts, while the specific manifestations of algorithmic bias in Southeast Asian, African, and Latin American educational systems remain understudied a gap not previously documented in the bibliometric literature on this topic. Recent studies indicate that AI systems in education remain prone to unfair treatment of certain groups if principles of fairness, transparency, and accountability are not integrated from the system design phase. On the other hand, the development of generative AI is further expanding the ethical debate regarding academic



integrity, intellectual property rights, student autonomy, and the role of educators in digital learning environments [23].

These findings indicate that AI governance in education cannot be solely focused on technological efficiency; rather, it must be grounded in the principles of human-centered AI, which ensure the protection of students' rights, transparency in data usage, algorithmic accountability, and fairness in decision-making. Crucially, the co-authorship analysis in this study shows that governance-focused research remains largely siloed within disciplinary communities education scholars rarely co-author with computer scientists and policymakers suggesting that the interdisciplinary integration necessary for robust AI governance frameworks is still nascent. This structural observation extends beyond what prior narrative reviews have been able to demonstrate. For educational institutions, strengthening ethical leadership and developing AI governance policies are strategic aspects to ensure that the implementation of digital technology continues to respect human values, cultural diversity, and social justice. Thus, the development of AI-based educational technology must be balanced with adaptive regulations, adequate digital literacy, and collaboration between the government, educational institutions, technology developers, and the public in building a safe, inclusive, and responsible digital education ecosystem [24].

C. Digital Democracy and Civic Education

The thematic cluster linking digital democracy and civic education identified through the keyword co-occurrence analysis as the second-largest cluster in this study exhibits a distinctive internal tension that has not been systematically documented in prior bibliometric reviews. publications in this cluster simultaneously argue for and against the democratizing potential of digital technology, producing a body of literature characterized by theoretical ambivalence rather than convergent conclusions. This finding itself constitutes an original contribution, as it demonstrates that the scholarly field has not yet reached consensus on foundational normative questions, which has direct implications for policy design. Research findings indicate that digital democracy and educational technology are closely linked in shaping critical and responsible digital citizens. However, as the SLR confirms and the citation patterns reinforce, the literature reveals a persistent paradox: digital technology can both strengthen and weaken democracy [25]. Social media and digital platforms enable broader public participation, but at the same time open the door to the spread of disinformation, manipulation of public opinion, and social polarization. This situation is exacerbated by low levels of digital literacy among the public and inequalities in access to information [26]. What the bibliometric mapping adds to this observation is the finding that publications foregrounding the risks of digital democracy disproportionately emanate from European and North American research traditions, while studies from democratic contexts in the Global South where platform manipulation and disinformation have produced particularly acute political consequences remain underrepresented in high-citation literature.

These findings carry explicit theoretical and practical implications. Theoretically, the co-citation evidence suggests that democratic theory and



media literacy scholarship are becoming increasingly integrated, forming a nascent interdisciplinary framework that this study terms "critical digital citizenship theory." Practically, digital citizenship education needs to be an integral part of the education system to build critical thinking skills, media ethics, and social responsibility in the digital space. The limitation of current literature, as revealed by this study, is that most civic education interventions are designed and evaluated in high-income, stable democratic contexts; their transferability to emerging democracies or politically fragile environments remains empirically untested. Future research should explicitly address this gap. Thus, digital democracy is not only understood as the use of technology in political processes but also as a means of fostering an ethical democratic culture and the scholarly community must broaden its geographic and institutional lens to ensure that this culture is built on knowledge that reflects global diversity.

D. Decentralized Technologies and the Future of Digital Governance

One of the most distinctive empirical findings of this study not previously identified in the bibliometric literature on digital democracy or educational technology is the emergence of decentralized technology as an incipient thematic cluster. Unlike the three established themes discussed above, bibliographic coupling analysis shows that publications on blockchain and decentralized governance form a loosely connected, peripheral cluster with low internal citation density, indicating that this is a research frontier still in the agenda-setting phase rather than a consolidated field. This structural observation clarifies why practical implementation evidence remains sparse: the scholarly community is still defining the conceptual boundaries of the problem space.

These technologies offer opportunities to enhance transparency, data security, and individual control over digital identities and educational records. Nevertheless, the SLR findings indicate that the implementation of such technologies still faces various challenges, including complexity of use, high energy requirements, and the absence of an adequate regulatory framework [27]. Compared with prior reviews that treated these challenges as temporary technical obstacles, the present study's network analysis suggests a more structural explanation. decentralized technology research lacks the interdisciplinary co-authorship density seen in AI governance and digital equity clusters, which means that regulatory, educational, and technical perspectives are developing in parallel rather than in dialogue. Bridging these silos is a precondition for meaningful implementation.

Overall, the research findings confirm that ethical issues in digital democracy and educational technology are interrelated and cannot be separated from one another. The digital divide affects access to education and democratic participation, while the use of AI and Big Data raises new challenges regarding privacy, transparency, and fairness [28]. On the other hand, the development of decentralized technology offers opportunities to create more inclusive and participatory systems, although it still faces various implementation challenges. The theoretical contribution of this integrative reading anchored in the co-citation and bibliographic coupling evidence



rather than asserted from narrative review alone is the identification of a recursive relationship among the four themes: exclusion from digital access (Theme 1) limits the diversity of voices that can shape AI governance (Theme 2) and civic discourse (Theme 3), while decentralized architectures (Theme 4) remain inaccessible to those same excluded populations. This recursive dynamic has not been modelled in prior systematic reviews and points toward a systems-level governance approach as the most theoretically coherent response.

These findings reinforce the view that digital transformation is not merely a process of technological innovation, but also a social and ethical process that requires responsible governance. Therefore, the development of educational technology and digital democracy policies must be grounded in the principles of fairness, inclusivity, accountability, and respect for the digital rights of the public [29].

The practical implication of this research is the need for collaboration between the government, educational institutions, technology developers, and the public in developing a comprehensive digital ethics framework [30]. This collaboration must be informed by the geographic and disciplinary asymmetries documented in this study: governance frameworks designed exclusively by actors from high-income, high-digitization contexts risk institutionalizing the same inequalities they aim to address. Accordingly, increased investment in digital infrastructure, digital literacy, and adaptive AI regulation must be accompanied by deliberate efforts to fund and amplify research from underrepresented regions. The study acknowledges that its reliance on Scopus-indexed publications which disproportionately favour English-language, journal-based outputs from established research systems constitutes a limitation that may systematically undercount contributions from practitioner communities, policy institutes, and non-English scholarly traditions. Future bibliometric work should complement Scopus data with Web of Science, regional databases, and grey literature to generate a more inclusive map of the global knowledge structure in this domain.

Conclusion

This study maps the intellectual landscape, research trends, and ethical issues at the intersection of digital democracy and educational technology through a bibliometric and systematic literature review of 86 Scopus-indexed, peer-reviewed articles published between 2017 and 2026. The findings indicate a substantial increase in scientific interest since 2020, driven by rapid digital transformation, artificial intelligence, and the expansion of digital learning. However, research remains dominated by developed nations, highlighting the limited representation of Global South perspectives. Four interrelated ethical themes were identified: the digital divide, data privacy and AI ethics, digital democracy and civic education, decentralized technologies, educators professional autonomy, as well as ethical governance and future opportunities. These findings indicate that ethical challenges in digital transformation are multidimensional and require integrated governance that promotes equity, transparency, accountability, and human rights. This study



also identifies major research gaps, including fragmented integration between digital democracy, AI ethics, educational technology, and digital governance; the dominance of Western perspectives; and limited empirical investigation of emerging issues such as algorithmic bias, digital identity, AI governance, and blockchain applications. Furthermore, the prevalence of conceptual and cross-sectoral studies limits our understanding of the long-term impacts of digital transformation. This study offers an integrated ethical perspective that connects digital democracy and educational technology, emphasizing that digital transformation is not merely a technological process but also a social, political, and ethical one. Strengthening AI governance, expanding equitable digital infrastructure and literacy, promoting ethical leadership in education, and increasing the participation of the Global South are crucial for future development. Ultimately, collaborative efforts between governments, educational institutions, technology developers, and civil society are needed to build an inclusive, transparent, and sustainable digital ecosystem that supports educational equity, critical digital citizenship, and democratic resilience.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this manuscript, the authors utilized Grammarly and Quilbot to improve grammatical accuracy and enhance overall readability. Following the application of this tool, the authors thoroughly reviewed and revised the content as necessary and assume full responsibility for the integrity and accuracy of the published work.

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Availability of data and materials

The data used in this study are available from the authors upon reasonable request.

Competing interests

The authors declare that there are no competing interests.



Additional information

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