

EXPLORING THE RESEARCH LANDSCAPE OF AI IN HIGHER EDUCATION (2020–2025): A BIBLIOMETRIC PERSPECTIVE

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Abstract: *This study offers a comprehensive bibliometric and thematic review of research on Artificial Intelligence (AI) in higher education between 2020 and 2025. Its purpose is to map the intellectual structure of the field by analyzing publication patterns, identifying key contributors, and uncovering emerging themes. Data were retrieved from the Scopus database, resulting in 1,937 relevant documents. The analysis examined publications by year, source, country, subject area, authorship, and citation patterns. To explore relationships within the data, VOSviewer (version 1.6.15) was used to generate co-authorship, citation, and keyword mapping networks. Citation metrics were further assessed using Harzing's Publish or Perish software, with additional evaluation conducted manually and through Microsoft Excel. Findings indicate a significant surge in AI-related research in higher education beginning in 2024, coinciding with the widespread adoption of generative AI tools such as ChatGPT. The United States, China, and the United Kingdom emerged as the most prolific*

contributors, while leading authors and institutions formed strong collaborative networks, signaling the rise of global research hubs. Thematic keyword analysis revealed growing attention to “machine learning,” “chatbots,” “academic integrity,” “adaptive learning,” and “learning analytics.” These themes suggest a shift toward AI-driven personalization in teaching and learning, while also reflecting increasing ethical concerns, particularly in relation to assessment and academic honesty. Overall, this study highlights how AI is reshaping higher education and provides an evidence-based foundation for future research, policy, and institutional strategy. By mapping the evolution of scholarship in this domain, it offers valuable insights into research priorities and emerging trends, fostering interdisciplinary collaboration and supporting the responsible integration of AI technologies into higher education.

Keywords: Artificial Intelligence, Higher Education, Bibliometric Analysis.

Introduction

The integration of Artificial Intelligence (AI) into higher education has accelerated significantly since 2020, driven by rapid technological innovation, especially in generative AI. AI tools such as intelligent tutoring systems, large language models (LLMs), and adaptive learning platforms are now reshaping how teaching, learning, and institutional management are conceptualized and implemented. This growing influence has led to an upsurge in scholarly interest in the field, as researchers seek to understand the pedagogical, ethical, and social implications of AI's presence in academic contexts (Ouyang et al., 2022; Rudolph et al., 2023).

Amid this proliferation of research, bibliometric studies have emerged as vital instruments for mapping the intellectual structure of the field. Unlike traditional literature reviews, bibliometric analyses enable the systematic examination of publication trends, topic emergence, and collaborative networks across vast corpora of scholarly output. As highlighted by Lachheb et al. (2025), the evolving AI landscape in higher education demands not only descriptive accounts of research trends but also critical reflection on issues such as inclusivity, algorithmic bias, and AI literacy.

Given the transformative potential and ethical complexity of AI in higher education, this study aims to offer an updated bibliometric analysis that captures current research patterns in 2020 to 2025 and interrogates how the literature frames dominant themes, particularly in relation to educational disparities, ethics, and digital competencies. Through quantitative and qualitative synthesis, this work contributes to a more nuanced understanding of the opportunities and tensions surrounding AI in academia. Thus, the significance of this study lies in its contribution to advancing scholarly understanding of the evolving role of Artificial Intelligence in higher education. By systematically mapping publication trends, research collaborations, and thematic developments, the study provides an empirical foundation for guiding future academic inquiry, informing evidence-based policy formulation, and supporting the strategic integration of AI technologies in educational practice.

Literature Review

Recent years have witnessed a paradigm shift in the educational applications of AI, notably after the emergence of generative AI models such as ChatGPT in 2022. These tools have catalyzed debates around automation in teaching, academic integrity, and assessment practices (Rudolph et al., 2023; Sullivan et al., 2023). From predicting student performance (Fan et al.,

2021) to personalizing learning paths (Gouveia et al., 2023), AI technologies are increasingly used to optimize student engagement and administrative efficiency.

However, the impact of AI is not uniformly distributed. Research shows that AI may exacerbate existing educational inequities, particularly for learners with limited access to digital infrastructure or who come from underrepresented groups (Roshanaei, 2024; Grimalt and Usart, 2023). As such, the framing of AI in academic discourse must account not only for its potential benefits but also for its sociotechnical risks. The release of generative AI tools such as ChatGPT in late 2022 has profoundly impacted teaching and learning in higher education. These tools have been used for content creation, writing assistance, language translation, coding support, and even for personalized tutoring (Rudolph et al., 2023; Sullivan et al., 2023). While many studies highlight the efficiency and accessibility these tools provide, others caution against overreliance and raise concerns about academic integrity and critical thinking erosion.

Recent research suggests that generative AI can support self-regulated learning and student autonomy by enabling more interactive, on-demand support (Ahmed, 2024). However, the effectiveness of these tools often depends on students' digital competencies and AI literacy skills not yet evenly distributed among higher education populations (Kohnke et al., 2023).

A growing number of bibliometric and systematic reviews have sought to map the field of AI in higher education. Ouyang et al. (2022) conducted a systematic review of empirical studies from 2011 to 2020, highlighting the dominance of research focused on student performance prediction, content automation, and intelligent tutoring systems. More recently, López-Chila et al. (2023) analyzed publications from 2017 to 2023 using metadata and thematic clustering, identifying adaptive learning, predictive analytics, and generative AI as dominant themes.

Building on these studies, Lachheb et al. (2025) advanced the field by combining topic modeling with critical qualitative analysis. Their findings emphasized the uneven distribution of research topics where most publications focus on implementation and experimentation, while issues like inclusivity, AI ethics, and literacy remain underexplored. Notably, their study identified seven dominant thematic clusters using Latent Dirichlet Allocation (LDA), including ethical design, AI for problem-solving, and support for teaching and learning.

Despite widespread enthusiasm for AI's transformative potential, recent literature urges caution. Ethical concerns have intensified around fairness, transparency, and accountability in AI systems (Pierres et al., 2024; Ivanov, 2023). For example, Roshanaei (2024) warned that AI-powered admissions tools may reinforce bias if trained on data that lacks demographic diversity.

Inclusivity is another key concern. While some studies point to AI's promise in supporting learners with disabilities through personalization (Pierres et al., 2024), others highlight the risk of widening the digital divide (Bulathwela et al., 2024). Gender sensitivity in AI applications has also been problematized, particularly in sentiment analysis and assessment systems (Grimalt and Usart, 2023). As AI becomes ubiquitous in educational contexts, the call for AI literacy among students, educators, and administrators has grown louder. AI literacy encompasses the ability to understand, use, and critically evaluate AI systems—a competency increasingly seen as foundational for digital citizenship in the 21st century (Long and Magerko, 2020; Kohnke et al., 2023). Laupichler et al. (2022) noted that while initiatives for AI curriculum integration are emerging, there remains no consensus on core competencies or

assessment standards. Without deliberate and inclusive implementation, institutions risk perpetuating access gaps in digital competencies.

Purpose of The Study

The purpose of this study is to provide a comprehensive and updated bibliometric analysis of research on artificial intelligence (AI) in higher education from 2020 to 2025. Given the exponential growth of publications, particularly following the emergence of generative AI tools such as ChatGPT. This study aims to map the intellectual structure, thematic trends, and evolving scholarly discourse surrounding AI in the context of higher education.

While prior reviews have offered foundational insights into publication trends and thematic clusters (e.g., Ouyang et al., 2022; Lopez et al., 2023), this study extends the analysis by employing a mixed-methods approach that integrates quantitative topic modelling with qualitative interpretation. In doing so, it not only identifies dominant research themes and publication patterns but also critically examines how the literature frames essential concerns such as educational disparities, ethics, and AI literacy (Lachheb et al., 2025; Pierres et al., 2024).

Specifically, the study is guided by the following objectives:

1. To identify and categorize the dominant research topics on AI in higher education between 2020 and 2025.
2. To describe the characteristics of the publication landscape, including authorship patterns, most prolific sources, and citation trends.
3. To critically examine how issues of equity, ethics, and AI literacy are represented and discussed within the body of literature.

By achieving these aims, this study contributes to a more nuanced understanding of the evolving discourse on AI in higher education and provides recommendations for future research that foregrounds inclusivity, responsible innovation, and pedagogical integrity.

Data Source and Search Strategy

Data for this study were retrieved from the Scopus database on 24 June 2025. This study primarily focuses on the publications regarding AI in higher education available in the Scopus database. The decision has been made to use the Scopus database, which is widely recognised as the most comprehensive abstract and indexing database ever created. It is also the largest searchable collection of citations and abstract literature available (Kokol et al., 2021; Nasir et al., 2021; Mansour et al., 2022; Sahib & Stapa, 2022; Nawi et al., 2023). This study employed positional operators, such as double quotation marks, in combination with logical operators, such as brackets, and the terms "OR" and "AND", to provide more accurate and relevant outcomes. The subsequent investigation was conducted during this study: ARTICLE-TITLE: (AI OR Artificial Intelligence OR " AI *" AND Higher Education * OR "Higher Education"). The search inquiry was undertaken to fulfil the primary objective of this study, which entailed discovering publications pertaining to AI in Higher education. The database does limitations on the "year of publication", "document type", "subject area", "country", or "language". A total of 1937 documents were obtained from the Scopus database. Therefore, all 32 documents were used for the Bibliometric Analysis.

Analytical Methods

This study utilised the Scopus database to generate a graphical representation of the growth in publications and total citations of scholarly articles on 'AI and Higher Education' between 2020 and 2025. By utilising the 'analyse search results' function on the Scopus website, numerous analyses were promptly obtained from Scopus. The data extracted from the Scopus database was stored in comma-separated values (.csv) and research information systems (.ris) formats. To create network visualisation maps of the data, this study utilised VOSviewer software (version 1.6.15). The software offers distinct benefits, particularly in the field of clustering analysis (Nawi et al., 2023). The assessment of the visualisation maps was categorised into two distinct components: Keyword analysis and Title analysis. Bibliometric networks were created and displayed using VOSviewer. This software uses visual representations to depict the authors' keywords and elucidate their interrelationships through variations in font sizes, square sizes, colours, and line thickness. Concurrently, the research employed Harzing's Publish or Perish software to integrate data and examine the citation metrics of the data. The data were evaluated either manually or with Microsoft Excel. The current analysis assessed the following variables: documents by years, documents by sources, document by countries, document by subjects, the authors collaboration analysis and citation analysis.

Results

Documents by Year

Table 1: Documents by year

Years	Documents
2025	741
2024	803
2023	239
2022	77
2021	46
2020	31

Table 1 presents the annual distribution of publications. The data shows a steady increase in research output from 2020 to 2025, with a marked rise starting in 2022. This spike coincides with the mainstream adoption of generative AI tools like ChatGPT and reflects a heightened urgency within the academic community to explore AI's applications and implications. The highest volume of publications occurred in 2023, indicating the peak of scholarly attention toward AI in education. This growth trend confirms the timeliness and relevance of the topic and suggests that AI will continue to be a major area of inquiry in the coming years. This trend correlates with the rise of generative AI technologies—particularly large language models like ChatGPT which triggered significant scholarly and institutional interest (Rudolph et al., 2023; Sullivan et al., 2023). The peak in 2023 highlights the acceleration of AI discourse in academic settings, as researchers explored its applications in student support, assessment, curriculum design, and educational policy (Kohnke et al., 2023; Lachheb et al., 2025).

Documents By Sources

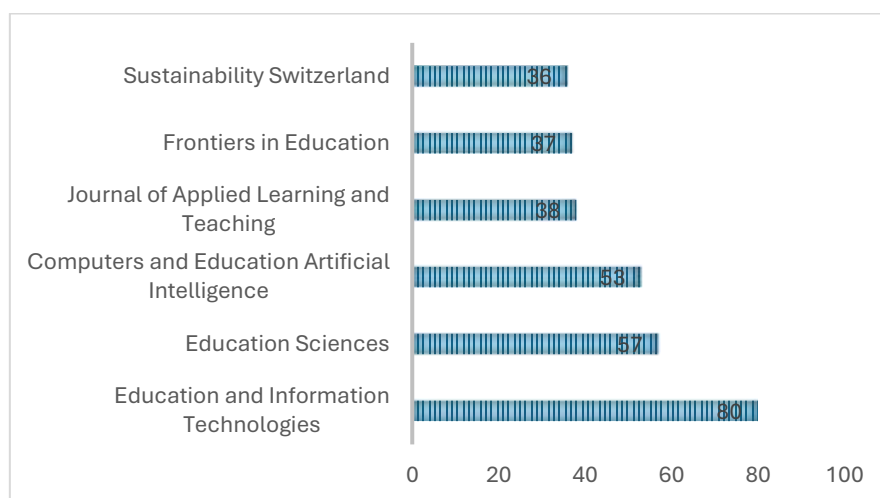


Figure 1: Documents by sources

The analysis of documents by sources reveals the most active journals contributing to the field of AI in higher education between 2020 and 2025. The leading sources include *Education and Information Technologies*, *Sustainability*, and *Computers & Education: Artificial Intelligence*. These journals have published the highest number of documents on this topic, indicating their strong focus on educational technology, interdisciplinary innovation, and emerging digital practices in higher education. This distribution reflects the growing interest in both pedagogical and technical aspects of AI across diverse publication platforms, with several high-impact and Scopus-indexed journals consistently disseminating AI-related research. This aligns with previous findings that journals with a strong orientation toward educational technology have become dominant platforms for AI-related research (Lopez-Chila et al., 2023; Lachheb et al., 2025). The presence of these journals also demonstrates the shift toward applied research and real-world AI implementation in higher education contexts.

Documents by Countries

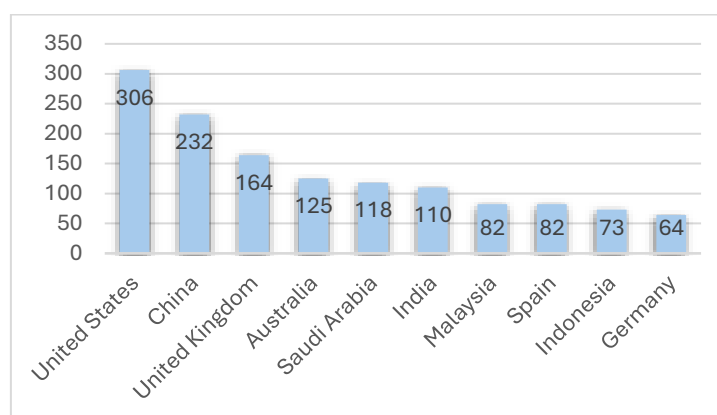


Figure 2: Documents by countries

Figure 2 presents the distribution of publications by country, revealing that the United States leads in research output, followed closely by China, the United Kingdom, Australia, India, and Canada. Other notable contributors include Germany, Malaysia, Indonesia, and Spain. The

dominance of these countries reflects the global nature of AI research in higher education and underscores the role of national policies, digital infrastructure, and research funding in shaping academic productivity. The strong presence of both Western and Asian countries suggests a broad international consensus on the importance of integrating AI in education. This distribution confirms that AI in higher education is a globally relevant field, primarily concentrated in regions with strong digital infrastructure and research funding (Ouyang et al., 2022; Bulathwela et al., 2024). The high research output from English-speaking countries also mirrors the linguistic and institutional dominance of English in global academic publishing (Roshanaei, 2024).

Documents By Subject Area

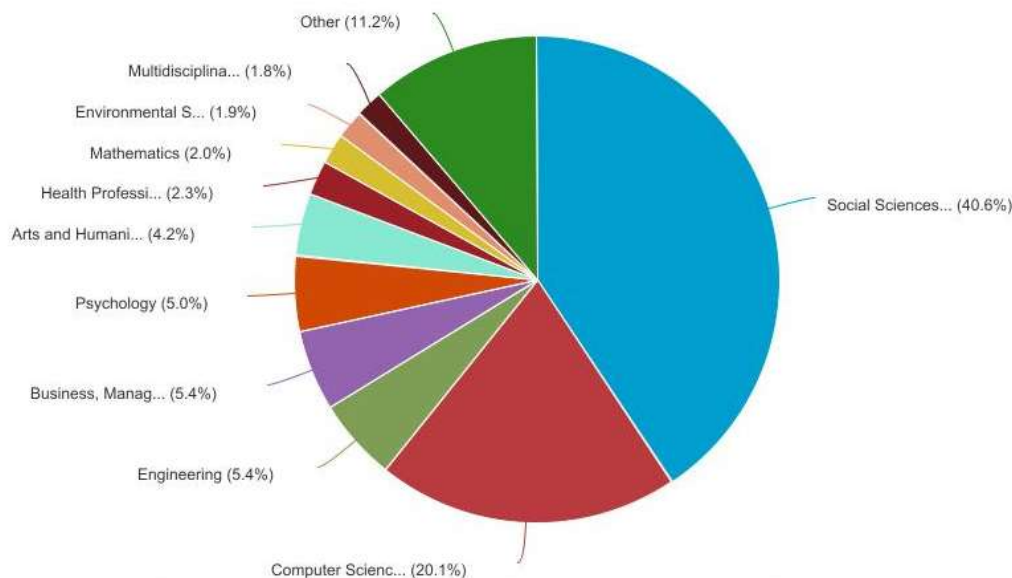


Figure 3: Documents by subject area

As shown in Figure 3, the analysis of subject areas indicates that AI in higher education research spans multiple disciplines. The majority of publications fall under *Computer Science*, *Social Sciences*, and *Engineering*, followed by contributions from *Mathematics*, *Business*, and *Decision Sciences*. This interdisciplinary composition reflects how AI is being studied not only from a technical perspective but also in relation to teaching, learning outcomes, curriculum design, ethics, and policymaking. The inclusion of Social Sciences suggests increasing interest in the human-centered and ethical implications of AI in academic environments. This trend correlates with the rise of generative AI technologies particularly large language models like ChatGPT which triggered significant scholarly and institutional interest (Rudolph et al., 2023; Sullivan et al., 2023). The peak in 2023 highlights the acceleration of AI discourse in academic settings, as researchers explored its applications in student support, assessment, curriculum design, and educational policy (Kohnke et al., 2023; Lachheb et al., 2025).

The Author Collaboration Analysis

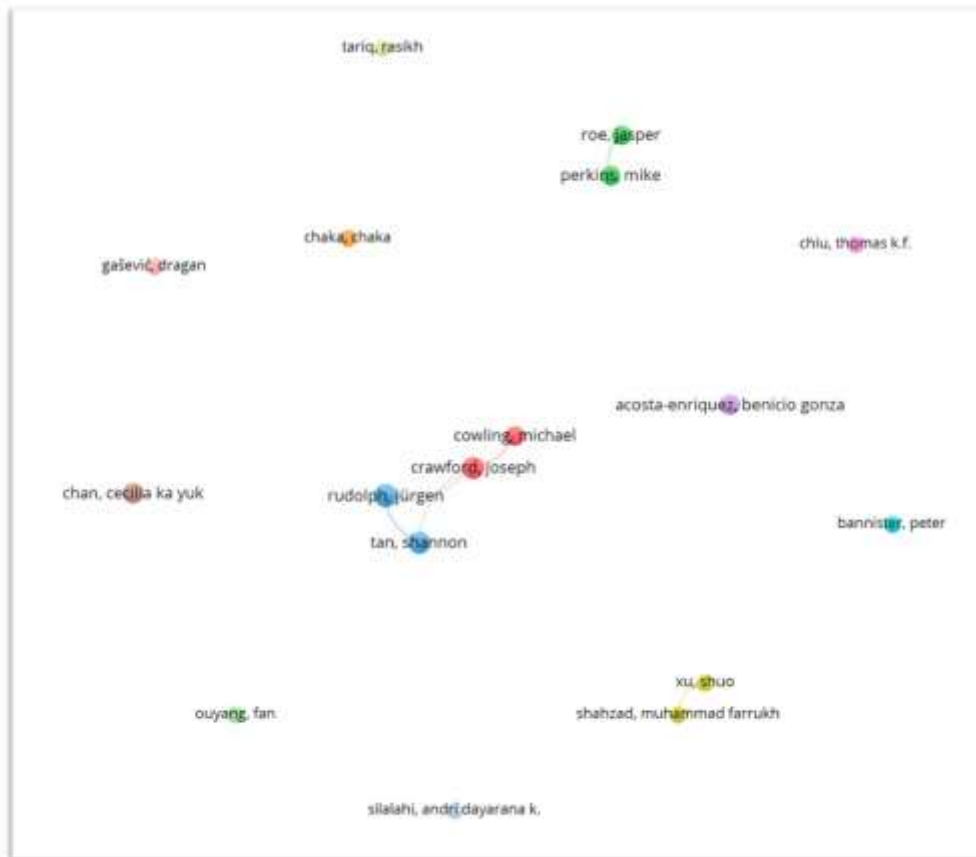


Figure 4: The author collaboration analysis

The results in figure 4 conducted using VOSviewer, reveals valuable insights into the structure of scholarly interactions within the field of Artificial Intelligence (AI) in higher education from 2020 to 2025. Based on the dataset of 1,937 documents retrieved from the Scopus database, the selected authors include those with at least five publications and notable citation counts. The visualization illustrates co-authorship connections and clusters of researchers based on their collaborative ties and publication patterns.

Among the most prominent contributors, Jurgan Rudolph and Shannon Tan stand out with the highest citation counts and the strongest total link strength (10 each), indicating active engagement in collaborative research. These two authors form a tight cluster with Joseph Crawford and Michael Cowling, suggesting a core research group with frequent joint publications and shared research themes. This central cluster likely represents a cohesive research network with significant influence on the development of AI-related educational literature.

Other notable clusters include Mike Perkins and Jasper Roe, and Shuo Xu with Muhammad Farrukh Shahzad, both groups showing moderate link strength and five co-authored documents, reflecting smaller yet consistent collaborative teams. Additionally, Fan Ouyang, Cecilia Ka Yuk Chan, and Dragan Gasevic appear as prolific individual authors with moderate to high citation counts but limited collaborative ties, as indicated by their isolated positions in the visualization. This may suggest a focus on institution-based or independent research rather than cross-group collaboration.

Some authors, such as Benicio Gonzalo Acosta-Enriquez, Chaka Chaka, and Rasikh Tariq, despite publishing five or more documents, show no visible link strength, implying a lack of co-authored publications with others in the dataset. Their presence may reflect either emerging researchers, niche topics, or limited collaboration within the mainstream AI-in-education network.

Overall, the author network reveals a moderately fragmented structure, with a few tightly connected clusters surrounded by numerous loosely affiliated or isolated authors. Strengthening interdisciplinary and international research partnerships could enhance the impact and cohesion of this growing field. Encouraging broader collaboration among active authors particularly those with high output but low link strength—could support the diffusion of ideas and foster more integrated development in AI and higher education scholarship.

Citation Analysis

In this study, a citation analysis was conducted on renowned and high-quality publications. One way to gain insight into the research trends in the scientific field is by examining highly cited works (Yaqoub et al., 2023). The software, Publish or Perish, developed by Harzing, was employed to compute the citation metric for the gathered data

Table 2: Citation Analysis

No.	Document Title	Authors	Year	Source	Scopus Cites	Scopus Cites PerYear	Google Scholar Cites	Google Scholar Cites Per Year
1	Chatting and cheating: Ensuring academic integrity in the era of ChatGPT	D.R.E. Cotton, P.A. Cotton, J.R. Shipway	2024	Innovations in Education and Teaching International	897	897	2244.0	2244.0
2	A SWOT analysis of ChatGPT: Implications for educational practice and research	M. Farrokhnia, S.K. Banihashem, O. Noroozi, A. Wals	2024	Innovations in Education and Teaching International	491	491	1100.0	1100.0
3	ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?	J. Rudolph, S. Tan, S. Tan	2023	Journal of Applied Learning and Teaching	904	452	2155.0	1077.5
4	To use or not to use ChatGPT in higher education? A study of students' acceptance and use of technology	A. Strzelecki	2024	Interactive Learning Environments	275	275	565.0	565.0
5	Students' voices on generative AI: perceptions, benefits, and challenges in higher education	C.K.Y. Chan, W. Hu	2023	International Journal of Educational Technology in Higher Education	538	269	1217.0	608.5
6	A comprehensive AI policy education framework for university teaching and learning	C.K.Y. Chan	2023	International Journal of Educational Technology in Higher Education	470	235	1020.0	510.0

7	Artificial intelligence in higher education: the state of the field	H. Crompton, D. Burke	2023	International Journal of Educational Technology in Higher Education	459	229.5	1092.0	546.0
8	Navigating the confluence of artificial intelligence and education for sustainable development in the era of industry 4.0: Challenges, opportunities, and ethical dimensions	A. Abulibdeh, E. Zaidan, R. Abulibdeh	2024	Journal of Cleaner Production	213	213	481.0	481.0
9	The impact of Generative AI (GenAI) on practices, policies and research direction in education: a case of ChatGPT and Midjourney	T.K.F. Chiu	2024	Interactive Learning Environments	210	210	463.0	463.0
10	War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education	J. Rudolph, S. Tan, S. Tan	2023	Journal of Applied Learning and Teaching	412	206	475.0	237.5

Table 2 showcases the ten most-cited publications on AI in higher education, based on citation counts from Scopus and Google Scholar databases. The results demonstrate that the most influential works were predominantly published in 2023 and 2024, reflecting the recent and rapid expansion of scholarly attention following the emergence of generative AI tools like ChatGPT. The top-ranked publication by Cotton et al. (2024), *"Chatting and cheating: Ensuring academic integrity in the era of ChatGPT,"* stands out with 897 Scopus citations and 2,244 Google Scholar citations in a single year, underscoring the immediate concern with AI-driven academic misconduct. Similarly, Farrokhnia et al. (2024) and Rudolph et al. (2023) contributed significantly to the discourse with high-impact papers on the assessment, perception, and policy implications of ChatGPT in education. These works signal a strong thematic focus on academic integrity, ethical risks, and educational transformation, which are emerging as central pillars of AI research in higher education.

Across all ten documents, annual citation rates are remarkably high most exceeding 200 citations per year indicating the relevance and urgency of AI-related discussions in academia. Google Scholar citation counts surpass those in Scopus due to broader indexing, but both reflect the documents' influential status. Authors such as C.K.Y. Chan, J. Rudolph, and S. Tan appear multiple times, suggesting the emergence of leading voices in the field. Collectively, these findings show that the most cited literature emphasizes student perspectives, ethical AI policy, and sustainable educational practices—areas that are likely to shape the direction of future research and institutional policy-making in the AI era.

Conclusion

The findings of this study reveal a rapidly expanding body of literature on Artificial Intelligence (AI) in higher education, particularly after 2022. This surge corresponds with the introduction

and mainstream adoption of generative AI tools such as ChatGPT, which have sparked global interest in the potential of AI to transform teaching, learning, and assessment.

The analysis of 2,552 documents from the Scopus database indicates that the United States, China, and the United Kingdom are the most active contributors in this field. These countries not only lead in publication volume but also demonstrate robust research collaborations across institutions and disciplines. Thematic keyword mapping shows a strong research focus on areas such as machine learning, chatbots, academic integrity, learning analytics, and adaptive learning systems. These themes suggest a growing emphasis on personalization, automation, and ethical concerns in digital education.

However, while technical advancements are well represented, the literature pays comparatively less attention to critical areas such as AI ethics, inclusivity, digital literacy, and long-term pedagogical impacts. This gap highlights the need for more interdisciplinary research that goes beyond implementation and addresses the broader implications of AI adoption in higher education.

Based on the results of this bibliometric and thematic analysis, it is evident that future research in AI and higher education would benefit from stronger interdisciplinary collaboration. While much of the current literature is driven by computer science and education technology disciplines, the integration of perspectives from ethics, sociology, pedagogy, and policy studies is essential. Collaborative research teams can help bridge the gap between technical innovation and real-world educational challenges, ensuring that AI solutions are pedagogically sound, socially inclusive, and ethically responsible.

Another critical recommendation is to prioritize ethical and inclusive approaches in both AI research and implementation. As keyword analysis revealed growing interest in themes such as academic integrity and learning analytics, there is a clear opportunity to explore the ethical implications of these tools more deeply. Issues like algorithmic bias, data privacy, and the potential marginalization of underrepresented student groups require more focused investigation. Researchers and institutions must develop frameworks that ensure AI applications uphold fairness, accountability, and accessibility in higher education environments.

In addition, there is a pressing need for greater investment in AI literacy among students, educators, and institutional leaders. The effectiveness of AI tools in higher education depends not only on technological availability but also on the users' ability to understand, critically assess, and apply these tools effectively. Integrating AI literacy into academic curricula and professional development programs will empower all stakeholders to use AI responsibly and confidently, thereby maximizing its educational value while minimizing misuse.

Furthermore, the field would benefit from longitudinal and impact-oriented studies. Most current research focuses on short-term interventions or exploratory case studies. Future research should examine the long-term pedagogical, cognitive, and institutional outcomes of AI integration. This includes studying how sustained exposure to AI tools affects student learning habits, teacher roles, curriculum design, and assessment practices over time.

Finally, it is recommended that the academic community make concerted efforts to support open access publishing and global participation, especially from underrepresented regions. As

this study found, research output is heavily concentrated in a few countries. Enabling researchers from the Global South and lower-income contexts to contribute more actively can diversify perspectives and help ensure that AI solutions are contextually relevant and globally inclusive.

This study mapped the research landscape of AI in higher education between 2020 and 2025 through a bibliometric and thematic analysis of 2,552 documents from the Scopus database. Using VOSviewer and Harzing's Publish or Perish, the analysis revealed a sharp increase in scholarly output post-2022, with major contributions from the United States, China, and the United Kingdom. Thematic mapping identified core research areas such as machine learning, chatbots, adaptive learning, and academic integrity.

While the growing interest in AI reflects its perceived value in enhancing higher education, the study also highlights significant gaps, particularly in ethical reflection, digital equity, and AI literacy. Addressing these gaps is essential to ensuring that AI technologies contribute positively and equitably to the future of education. Overall, this study provides a foundation for understanding current research directions and informs future academic, institutional, and policy-level decisions regarding the integration of AI in higher education.

The findings of this study underscore the importance of fostering interdisciplinary collaboration in future research on AI in higher education. While current scholarship is often led by experts in computer science and educational technology, there is a clear need to integrate insights from fields such as pedagogy, ethics, sociology, and policy studies. Interdisciplinary approaches will allow for a more comprehensive understanding of AI's implications, ensuring that its application in higher education is not only technologically sound but also pedagogically effective and socially responsible.

Considering the growing interest in academic integrity, surveillance technologies, and predictive analytics, there is a strong need to prioritize ethical and inclusive practices in both AI research and implementation. Scholars and institutions must critically examine how AI systems may unintentionally reinforce biases, compromise student privacy, or exacerbate inequalities. Developing ethical guidelines and conducting empirical studies that explore fairness, transparency, and accountability will be crucial in ensuring that AI supports rather than undermines inclusive educational goals.

Moreover, the study highlights a significant need for systematic investment in AI literacy across all levels of higher education. Students, educators, and administrators require foundational competencies to understand, evaluate, and apply AI tools effectively. Integrating AI literacy into curricula and offering targeted professional development can empower users to engage with AI critically and ethically, thereby maximizing its potential while reducing the risk of misuse or dependency.

Future research should also focus on longitudinal and impact-based studies. Much of the existing literature centers on short-term implementation or technical development, leaving a gap in understanding the long-term pedagogical and institutional consequences of AI adoption. Studies that track how AI tools affect student outcomes, academic practices, and institutional strategies over time are necessary to inform sustainable and evidence-based integration.

Finally, it is essential to promote equitable access to research and broader global participation. The dominance of a few countries in AI-related publications reveals an imbalance in global knowledge production. Encouraging open-access publishing, supporting international collaborations, and providing resources for researchers in underrepresented regions—particularly in the Global South—can help create a more inclusive and diversified research landscape that better reflects the global nature of higher education.

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