

Knowledge Structure and Trends of Generative AI in Higher Education: A Bibliometric Analysis (2022–2025)

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Abstract: The rapid rise of generative artificial intelligence (GAI) has transformed education, but it also presents obstacles. The integration of GAI into higher education needs further discussion. This review covers GAI in higher education over the past four years. This bibliometric analysis utilized PRISMA to summarise GAI-related higher education studies. The Scopus database was chosen for its vast coverage and reputation for analyzing scholarly papers. Papers with "generative AI" and "higher education" in the title, abstract, or keywords were thoroughly reviewed. A thorough keyword search yielded 1,970 database publications. Inclusion and exclusion criteria limited the findings to 1,334 relevant papers. Since 2022, higher education has published more papers on generative AI, indicating a strong research concentration. This trajectory has grown from its inception to a tremendous leap forward in 2023, reaching a maturity that will create substantial obstacles. The important publications and contributing organizations have a global impact. This study examines the most productive authors and keywords in generative AI research, highlighting its multidisciplinary nature. The high number of publications, diverse authors, and multiple keywords show that research in this area is collaborative and diverse. This study suggests more research on generative AI in higher education and future trends. It also suggests increasing knowledge and developing defined methodological and reference frameworks to reduce the use of generative AI in higher education.

Keywords: Generative Artificial Intelligence (GAI); Higher Education; Bibliometric Analysis; PRISMA Framework; Scopus Database; Future Trends; Rapid Emergence.

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1. Introduction

In recent decades, the rapid advancement of digital technology has influenced almost every aspect of human life, with education being among the most profound and widespread. This technological growth is not new; the Artificial Intelligence in Education (AIED) field was established more than 30 years ago to integrate AI with educational methods [1]. AI can transform teaching

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and learning at all levels, from elementary through higher education, by personalizing instruction, automating administrative processes, and providing predictive analytics [2]. Generative AI is a subset of Artificial Intelligence (AI) technologies that use sophisticated models, such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs), to generate new content. The capacity of these GAI systems to handle complex prompts and produce high-quality outputs has led to widespread use across disciplines, including education, medicine, and the media [3]. Generative AI is artificial intelligence that can produce new material rather than evaluating or acting on existing data, as expert systems do [4].

Generative Artificial Intelligence (AI) can generate new material, emulate human creativity, and produce realistic outputs, transforming a variety of disciplines and enabling the replication of the creative process observed in people [5]. Unlike typical AI models that focus on categorization or prediction, Generative AI learns from large datasets to generate outputs—such as writing, images, and music—that are often indistinguishable from human-generated material [6]. Generative AI has already infiltrated many sectors of higher education, notably teaching and learning, where it has become widely used [7]. The incorporation of Generative AI into higher education is revolutionizing educational processes, providing individualized recommendations, encouraging collaboration and communication, and improving learning outcomes [8]. Furthermore, the growing dominance of generative artificial intelligence (GAI) has led to significant changes in higher education (HE), necessitating intensive research into its repercussions. This development represents a significant transition, as GAI capabilities are incorporated into individualized learning experiences, strengthening teachers' skills and increasing student involvement through novel tools and technology interfaces [9]. Despite its promise, the use of GenAI raises serious ethical concerns, including biased or discriminatory outputs, the dissemination of disinformation, plagiarism challenges, and questions about the credibility of off-campus evaluations [10].

Furthermore, the employment of GenAI in higher education is not without drawbacks. Concerns regarding data security, moral standards, and overdependence on technology are among the issues raised by GenAI users. Educators worldwide are concerned about the potential for increased plagiarism and automation of work. As a result, it is critical to understand how students use GenAI to maximize its capabilities while minimizing the risks of potential abuse [11]. Studies have found that generative AI can facilitate plagiarism and authorship impersonation, raising serious concerns about the validity of student work [8]. Furthermore, when students rely heavily on AI to complete academic assignments, it is essential to balance the use of technology with the development of critical thinking skills [7]. Assessing the potential benefits and drawbacks of incorporating generative AI into higher education is critical, and its integration into educational contexts must be expedited [6]. Universities must quickly investigate the responsible use of Generative AI in teaching to ensure educational quality and fairness. As a result, understanding student and teacher interactions with these technologies is critical to designing effective institutional policies. In the near future, as generative AI is likely to be widely employed in formal academic contexts, institutions should adopt regulations and provide official guidance on its use [12]. Thus, this bibliometric review aimed to answer the following questions:

- What are the annual publication and distribution trends of generative artificial intelligence in higher education from 2022 to 2025?
- Which journals most frequently publish research on generative artificial intelligence in higher education?
- Which countries were the most active and influential in generative artificial intelligence research in higher education from 2022 to 2025?
- What are the leading higher education institutions that are the most productive in the field of generative artificial intelligence?
- Which authors made the most significant contributions to the field of generative artificial intelligence in higher education from 2022 to 2025?
- Which funding organizations are publishing generative AI research in higher education from 2022 to 2025?
- Over the past six years, what have been the key keywords and research trends concerning generative AI in higher education?

2. Related Research

Over the last decade, scholarly interest in artificial intelligence (AI) has shifted dramatically. A retrospective study by Kavitha and Joshith [13] spanning 20 years (2003-2023) reveals a pattern in which traditional AI applications have recently been overshadowed by the rapid rise of Generative AI (GAI) and chatbots, prompting a full rethink of teaching methodologies. This "AI surge" is further highlighted by Omarsaib [14], who identified 2023 as a significant tipping point in higher education research, when it shifted from broad interest to systematic integration. Similarly, Roshi and Kaleel [15] and Lopez Chila et al. [16] affirm this exponential increase, stating that since 2022, GAI has evolved from a technical specialty into a multidisciplinary teaching tool, with research output dominated by the United States and China. A recent study has shifted from merely analyzing technological capabilities to understanding how these tools can be effectively integrated into the classroom. Lg and Ho [17]

depict this process throughout 3,800 pieces, emphasizing a shift toward learner-centered issues and multidisciplinary integration. From a practical standpoint, Sahar and Munawaroh [18] show that post-pandemic digital developments have hastened the adoption of adaptive learning and predictive analytics as key components of modern training. Furthermore, Yang et al. [19] and Sharma and Panja [20] emphasize that effective transformation involves more than just the tools themselves—such as ChatGPT—but also bridging the existing gap between technology affordances and rigorous pedagogical frameworks to improve learning outcomes. As GAI becomes increasingly important for student innovation and production, academic discourse has highlighted the need for ethical management.

Omeneke et al. [21] note that while these technologies promote productivity, their effectiveness depends on addressing algorithmic biases. This concern about academic integrity is shared by Yadav and Anubha [22], who argue that lasting integration requires addressing digital access gaps and ethical quandaries through robust national policy support. Despite the recent surge in research on generative artificial intelligence, a survey of prior studies identified a knowledge and methodological gap that informs the current work. The majority of the available bibliometric analyses, such as the study by Kavitha and Joshith [13], covering long time periods beginning decades ago, and comprehensive studies, such as Ates et al. [23], which have tracked artificial intelligence since 1981, tend to overlook the qualitative characteristics and rapid transformations brought about by the 'generative spurt' after 2022. This may reduce the emphasis on the distinguishing features of the generative surge that began in late 2022. On the other hand, existing bibliometric analyses suffer from 'database bias'. Studies such as those by Yaseen et al. [24] focused solely on the Web of Science. In contrast, studies that focused on the near term, such as Lg and Ho [17], which, while relying on a single database (Scopus), focused on education in general rather than higher education in particular, and the Omeneke et al. [21] study analyzed the scientific output related to generative artificial intelligence in academic research during the period (2017-2025) using bibliometric analysis based on the Scopus database.

The results showed growing research interest, along with the formation of thematic clusters and multidisciplinary research collaborations. Researchers found that the focus was on academic research, and Roshi and Kaleel [15] primarily relied on a bibliometric analysis of 341 Scopus-indexed studies on generative AI and large language models, published between 2023 and 2025. This restricts the scope of the worldwide research landscape. Furthermore, the Sharma and Panja [20] study conducted a bibliometric analysis of research related to generative AI in education from 2019 to 2023, using the Scopus and Web of Science databases. The findings revealed the interdisciplinary nature of the research and variation in citation patterns among authors and institutions, highlighting research trends and their potential impact on educational policies and practices. Therefore, there is an urgent need for comprehensive bibliometric research focusing solely on the period 2022-2025, which symbolizes the 'generational boom' in higher education and saw the birth of new models. Thus, this study seeks to take advantage of the comprehensiveness of the Scopus database in the social sciences, as confirmed by the study Lg and Ho [17] regarding its excellence in this aspect—to provide an updated roadmap that goes beyond merely listing numbers, to provide a 'structural' analysis of the links between emerging concepts, which is lacking in long-term comprehensive analyses that span decades, such as the study Ates et al. [23], and to provide a more accurate analysis.

3. Methodology

3.1. Bibliometric Methodology

This bibliometric study adhered to the PRISMA framework. The primary objective of this analysis was to identify the body of research on generative artificial intelligence in higher education and to examine its development from 2022 to 2025. This included a thorough review, extensive search, and analysis of key countries, educational institutions, popular publications, and authors who have made significant contributions to the field. The study also discovered common trends and key terms in this field that indicate potential future progress. In this study, in addition to the PRISMA bibliometric analysis framework, VOSviewer software was used to construct bibliometric networks and display and visualize the data. VOSviewer is a software tool built primarily for creating and managing bibliometric networks. These networks include journals, publications, and researchers, demonstrating academic interactions such as co-authorship and citation relationships. Vos Viewer's interactive interface and sophisticated data processing, analysis, and visualization features enable researchers across a wide range of disciplines to conduct thorough analyses of academic issues, investigate trends in generative AI, and identify major research patterns. Vos Viewer's geographic organization feature offers a global perspective on generative AI, highlighting key developments and policies in the field through geographic diffusion, institutional collaboration, and authorship. This study is critical for educational decision-makers because it not only enhances their understanding of research trends but also provides valuable, novel ideas and references.

3.2. Data Collection and Search Strategy

This study was conducted on 19/ October/2025. The Scopus database was selected as the primary source for this review due to its extensive coverage and distinguished reputation for evaluating scholarly papers. To ensure the retrieval of the selected

studies, relevant studies were identified by searching for papers containing the key terms "GenAI" and "higher education," which were then utilized to collect all relevant literature. Furthermore, papers were selected from 2022 to 2025. This review was confined to English-language publications, and journals served as the sole source for this research.

3.3. Data Screening Process

This study's screening method for assessing bibliometric data was rigorous. The major keywords utilized were "generative AI" and "higher education," following the PRISMA framework, which separates the literature review process into three stages: identification, screening, and inclusion. This initially produced 1,970 papers. After applying the inclusion and exclusion criteria, 1,334 papers remained. The decrease in the number of papers is due to the removal of 636 papers that did not fulfill the given criteria.

3.4. Inclusion and Reporting

The findings of this bibliometric study are presented according to the PRISMA framework (Figure 1). The next section presents the analysis results in response to the research questions.

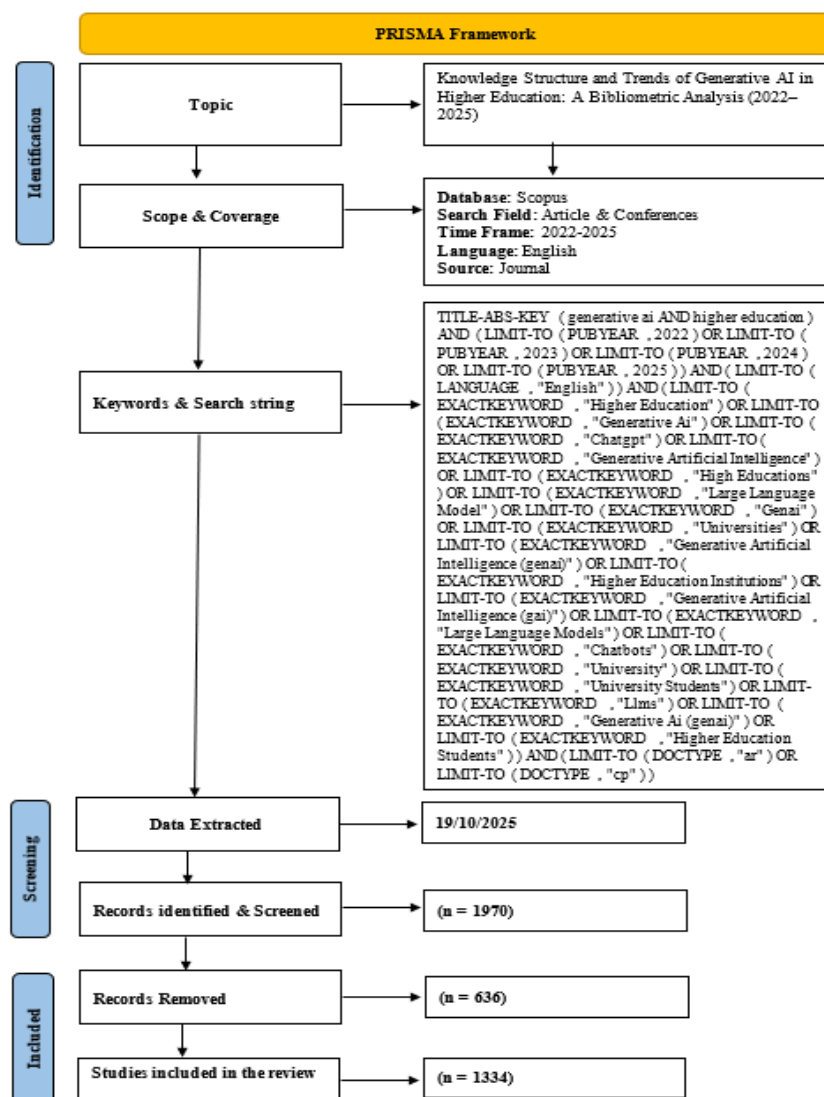


Figure 1: PRISMA framework

4. Results

4.1. The Distributions by Years

Figure 2 shows the yearly scientific publishing and timeline distribution of published papers from 2022 to 2025 in the Scopus database. The vertical axis shows the number of scientific publications, and the horizontal axis shows the number of years. The number of scientific papers reflects the growing role of generative artificial intelligence (GAI) in higher education and its ongoing evolution, as shown in Figures 1 and 2. This increase in the number of papers has been steady since 2022, a year with low scientific publishing production, reflecting GAI's early stages. In 2023, GAI recognition and the proliferation of scientific papers in this field became more evident, with a 106% increase in publications. This trend continued in 2024, with 440 papers indicating an increased interest in this field. In 2025, the number of publications peaked at 787. This year's surge reflects a substantial increase in interest in generative AI in higher education, as well as academics' growing use of these techniques in scientific research.

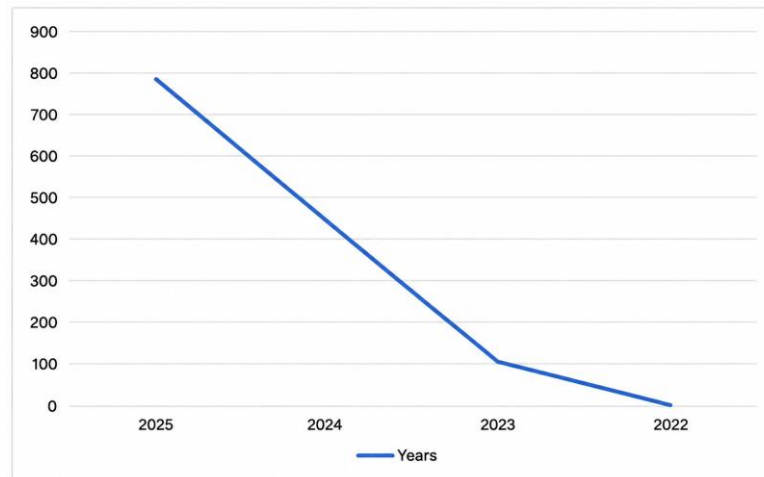


Figure 2: Distributions by year

This rapid upward trend indicates substantial progress and significant accomplishments in higher education's field of generative AI. The development of generative AI has significantly influenced academic interest, resulting in sustained growth in research in this field. This offers the possibility of new vistas, as well as more publications and developments, as this discipline continues to grow. This increase also demonstrates the growing need for generative AI in higher education.

4.2. The Most Relevant Journals

This section will answer the second research question with precision and clarity: Which journals frequently publish research on generative artificial intelligence in higher education? Table 1 lists a wide range of publications that have made significant contributions to this topic.

Table 1: Top 10 journals on generative artificial intelligence in higher education

Journal	TP	TC	Cite Score	The Most Cited Papers	Times Cited	Publisher
<i>Communications in Computer and Information Science</i>	23096	24345	1.1	"Enhancing Sustainable Development Through Machine Learning-Driven Master Data Management"	16	Springer Nature
<i>Education Sciences</i>	4345	23809	5.5	"The Impact of Artificial Intelligence (AI) on Students' Academic Development"	37	Multidisciplinary Digital Publishing Institute (MDPI)
<i>Journal of Applied Learning and Teaching</i>	261	2708	10.4	"Battle of AI chatbots: Graduate students' perceptions of ChatGPT versus Gemini for learning purposes in Egyptian higher education"	4	Kaplan Singapore
<i>Computers and</i>	318	9126	28.7	"Generative AI in higher	61	Elsevier

<i>Education: Artificial Intelligence</i>				education: A global perspective of institutional adoption policies and guidelines”		
<i>Education and Information Technologies</i>	2440	28739	11.8	“Exploring students’ perspectives on Generative AI-assisted academic writing”	110	Springer Nature
<i>IEEE Global Engineering Education Conference (EDUCON)</i>	1125	2712	2.4	“Engineering Educators’ Perspectives on the Impact of Generative AI in Higher Education”	1	IEEE
<i>Frontiers in Education</i>	3670	13418	3.7	“Redefining learning: student-centered strategies for academic and personal growth”	22	Frontiers Media S.A.
<i>Lecture Notes in Computer Science</i>	72867	175620	2.4	“YOLOv9: Learning What You Want to Learn Using Programmable Gradient Information”	402	Springer Nature
<i>ACM International Conference Proceeding Series</i>	23324	46353	2.0	“My AI Wants to Know if This Will Be on the Exam: Testing OpenAI’s Codex on CS2 Programming Exercises”	137	Association for Computing Machinery (ACM)
<i>CEUR Workshop Proceedings</i>	20638	18707	0.9	“A system for assessing the interdependencies of information system agents in information security risk management using cognitive maps”	16	CEUR-WS

TP= Total Publications, TC= Total Citations

Table 1 shows the top 10 prominent journals for research papers in the field of generative artificial intelligence in higher education. These journals have published numerous research papers in this field in recent years. These highly cited journals were analyzed using the following criteria: “Total Publications”, “Total Citations”, “Cite Score”, “Most cited papers”, “Times Cited”, and “Publisher”. It also showcases a diverse range of the most important papers that have made significant contributions to the field of generative artificial intelligence in higher education over the years of research. Among the most productive scientific journals in this field is *"Communications in Computer and Information Science"*, published by “Springer Nature”, with a citation score of 1.1. This journal also has the most published papers, with 23,096 papers and 24,345 citations. Her essay, "Enhancing Sustainable Development Through Machine Learning-Driven Master Data Management", gained 16 citations and attracted a lot of attention. The journal *"Education Sciences"*, published by the “Multidisciplinary Digital Publishing Institute (MDPI)”, ranked second with 4,345 published papers, 23809 citations, and a 5.5 citation score. One significant paper in this journal was "The Impact of Artificial Intelligence (AI) on Students' Academic Development”, which earned 37 citations. Similarly, the *"Journal of Applied Learning and Teaching"*, published by “Kaplan Singapore”, has 261 publications and 2,708 total citations, resulting in a 10.4 citation score. Its popular work, "Battle of AI chatbots: Graduate students' perceptions of ChatGPT versus Gemini for learning purposes in Egyptian higher education", was cited 4 times. The paper "Generative AI in higher education: A global perspective of institutional adoption policies and guidelines", published in the journal *"Computers and Education: Artificial Intelligence"*, distributed by “Elsevier”, contributes to a scholarly body that includes 318 published papers, 9126 citations, a citation rate of 28.7, and has been cited 61 times. *Education and Information Technologies*, a Springer Nature publication with a citation rating of 11.8, has 2,440 papers and 28,739 citations.

Among them is "Exploring students' perspectives on Generative AI-assisted academic writing", which earned 110 citations. Next is IEEE's Global Engineering Education Conference (EDUCON) journal, which has 1,125 papers, 2,712 citations, and a citation impact factor of 2.4. The essay, which had one citation, is titled "Engineering Educators' Perspectives on the Impact of Generative AI in Higher Education". *Frontiers in Education*, published by Frontiers Media S.A., has a citation value of 3.7. The journal has 3,670 papers and 13,418 citations. The most commonly referenced research paper was cited 22 times. The paper that received the most citations, 402 times, was titled “YOLOv9: Learning What You Want to Learn Using Programmable Gradient Information”, published by the journal *"Lecture Notes in Computer Science"*, which is distributed by the publishing

house “Springer Nature”, as this journal published very clear scientific contributions in a large number, as it reached 72,867 published papers, and 175,620 citations, which reached the highest citation based on these journals, with a citation rate of 2.4. The “ACM International Conference Proceedings Series”, published by “the Association for Computing Machinery”, has a citation rating of 2.0 and has an estimated 23,324 papers published and 46,353 citations. A prominent publication in this journal is "My AI Wants to Know if This Will Be on the Exam: Testing OpenAI's Codex on CS2 Programming Exercises", which has 137 citations. Finally, “the *CEUR Workshop Proceedings*”, published by “CEUR-WS”, had 20,638 papers published, earned 18,707 citations, and had a citation value of 0.9, for a total citation rating of 16. A notable publication in this journal is "A system for assessing the interdependencies of information system agents in information security risk management using cognitive maps". From the above, researchers find that scientific journals that have contributed a large and abundant number of scientific publications, have high citations, and important and impactful scientific papers, have clearly influenced the development of scientific research and research related to the field of generative artificial intelligence in higher education, which positively reflects on increasing scientific knowledge and highlighting this vital field, which is developing rapidly.

4.3. The Most Significant Countries

To answer the third question in the study, which countries were the most active and influential in generative AI research in higher education from 2022 to 2025? Figure 3 shows the distribution of publications by country or region, revealing a wide variation in global impact.

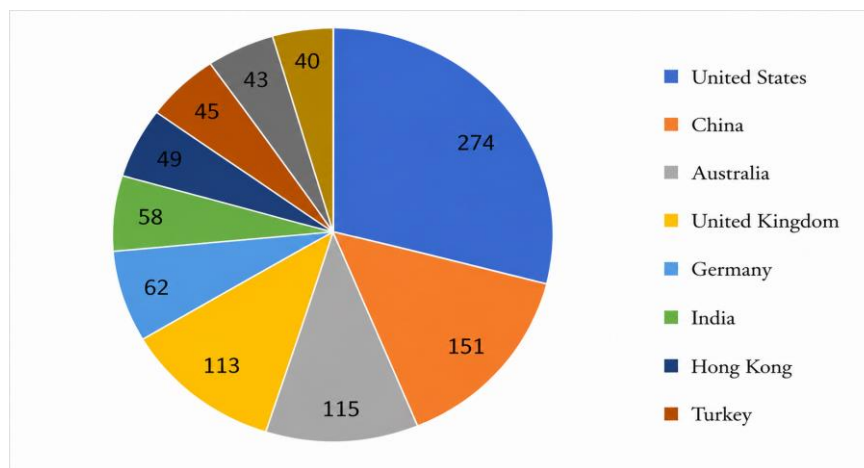


Figure 3: The most significant countries

The research reveals a mixed effect, as shown in Figure 3, which displays the distribution of publications across countries. This graph depicts the top 10 countries by the number of studies on generative artificial intelligence in higher education, from which researchers derive key indicators. The United States emerged as the leading country, with 274 papers, a considerable number compared with other countries. This is due to the large number of researchers and academics from many nationalities residing there, rapid technological breakthroughs, and the presence of multiple prominent institutions, all of which stem from the country's large size. China ranked second to the United States in the number of published scientific papers, with 151. This reflects a broad interest in generative artificial intelligence in higher education, as well as the presence of several institutions that use generative AI tools to conduct scientific research. China is likewise interested in deploying generative AI due to its excellent academic infrastructure and considerable financial expenditures. Australia and the United Kingdom made considerable contributions (115 and 113 published publications, respectively), demonstrating their leadership in using generative AI to improve research in higher education institutions. Germany's 62 papers demonstrate its dedication to adopting generative AI in higher education.

South Asia's involvement is evident, with India, a prominent actor, submitting 58 publications, underscoring its role in the use and development of generative AI tools in higher education. Hong Kong, Turkey, and Canada are also gaining importance, with nearly the same number of scientific publications (49, 45, and 43, respectively), a notable signal given their extensive use across a variety of study fields. Saudi Arabia, a major Arab country in the use of generative AI in higher education, has contributed 42 published works. However, it is worth noting that African nations do not rank among the top 10 in publication rates. In general, the number of publications published across 10 countries indicates an increasing interest in the quantity and quality of generative artificial intelligence (GAI) research in higher education. Given current circumstances, research interest in this field is expected to grow further in the coming years, owing to its relevance to scientific research and the rapid global progress. This geographically broad interest, spanning continents, demonstrates the field's multidimensional nature and helps

define the preferences, contexts, and approaches that will expand GAI's scope. This study also emphasizes the potential for international collaboration in scientific research, not only in the development and publishing of practical research, but also in emphasizing GAI's role in scientific research and higher education institutions. The most sophisticated countries are well-positioned to incorporate GAI technologies into their higher education and research institutions.

4.4. The Most Significant Educational Institutions

The data presented in Table 2 address the fourth research question: Which higher education institutions are the most productive in the field of generative artificial intelligence? It highlights these educational institutions.

Table 2: Top 10 educational institutions on generative artificial intelligence in higher education

Educational Institutions	TP	Country
Emporia State University	274	United States
Hong Kong Baptist University	151	China
Edith Cowan University	115	Australia
University of Leeds	113	United Kingdom
University of Passau	62	Germany
Australian Institute of Business (AIB)	58	India
University of Hong Kong	49	Hong Kong
Bartın University	45	Turkey
Simon Fraser University	43	Canada
American University of Afghanistan (AUAF)	40	Saudi Arabia

Table 2 presents the most prolific higher education institutions in artificial intelligence, ranked by significance and active contributions. Emporia State University in the United States dominates this study area, with 274 publications. It is followed by two Asian universities, Hong Kong Baptist University in China and Edith Cowan University in Australia, which have 151 and 115 publications, respectively, indicating the growth of applied research at these institutions. The University of Leeds in the United Kingdom stands out for 113 notable papers, demonstrating the country's commitment to advancing generative AI. Germany has made great progress in this field, with 62 papers from the University of Passau. The Australian Institute of Business (AIB) in India follows with 58 publications. Interest in this field is especially great in Hong Kong, where the University of Hong Kong leads with 49 publications. Bartın University in Turkey and Simon Fraser University in Canada were at the forefront of generative artificial intelligence in higher education, with 45 and 43 scientific papers, respectively. Following them from the Middle East, the American University of Afghanistan (AUAF) in Saudi Arabia was a major player in this field, with 40 publications. The preceding clearly indicates the significant role that international educational institutions have played in the development of generative artificial intelligence in higher education, as evidenced by their substantial scientific contributions and high-quality publications. Furthermore, the geographical spread of these institutions demonstrates the global interest in this promising field. Given the uniqueness of this pioneering field, universities are encouraged to boost their scientific publications in the future.

4.5. The Most Prolific Authors in Generative AI and Higher Education

Regarding question five, what are the most notable contributions made by authors in the field of generative artificial intelligence in higher education during the period from 2022 to 2025? Table 3 and Figure 4 illustrate the most notable authors who have made contributions in this field.

Table 3: Top 10 authors on generative artificial intelligence in higher education

Authors	Country	Current affiliation	Journal	TC	TP
J. Rudolph	Singapore	Kaplan Higher Education Academy	<i>Journal of Applied Learning and Teaching</i>	1130	10
S. Tan	Singapore	Kaplan Higher Education Academy	<i>Journal of Applied Learning and Teaching</i>	1130	9
C.K.Y. Chan	Hong Kong	The University of Hong Kong	<i>International Journal of Educational Technology in Higher Education</i>	949	8
P. Banister	Spain	International University of La Rioja	<i>Aula Abierta</i>	31	6

T.K.F. Chiu	Hong Kong	Chinese University of Hong Kong	<i>Computers and Education: Artificial Intelligence</i>	236	6
Z.N. Khlaif	Palestine	An Najah National University	<i>Education Sciences</i>	80	6
J. Roe	Viet Nam	British University Vietnam	<i>Journal of Academic Ethics</i>	96	6
M. Bearman	Australia	Deakin University	<i>British Journal of Educational Technology</i>	109	5
A. Bozkurt	Turkey	Anadolu University	<i>Open Praxis</i>	64	5
B. Dang	Finland	University of Oulu	<i>Studies in Higher Education</i>	131	5

TP= Total Publications, TC= Total Citations

Table 3 lists the top 10 authors who have contributed significantly to the field of generative artificial intelligence in higher education. J. Rudolph and S. Tan, both from Singapore and affiliated with Kaplan Higher Education Academy, are among the most notable authors, having received 1,130 citations in the *Journal of Applied Learning and Teaching*. This displays a significant contribution to their university's academic standing. Their presence in Singapore is a significant benefit to the profession, particularly in the rapidly developing field of generative AI. C.K.Y. Chan, from Hong Kong and affiliated with The University of Hong Kong, is the second-most-cited author in the *International Journal of Educational Technology in Higher Education*, with 949 citations. His presence at the University of Hong Kong enables him to conduct further research and positions him as a prominent contributor to the growth of this discipline in Hong Kong. P. Banister of the Universidad Internacional de La Rioja (UNIR) in Spain gained 31 citations. Also notable is T.K.F. Chiu, whose paper in “*Computers and Education: Artificial Intelligence*” received 236 citations, indicating his strong affiliation with the Chinese University of Hong Kong and the substantial research impact he has had there.

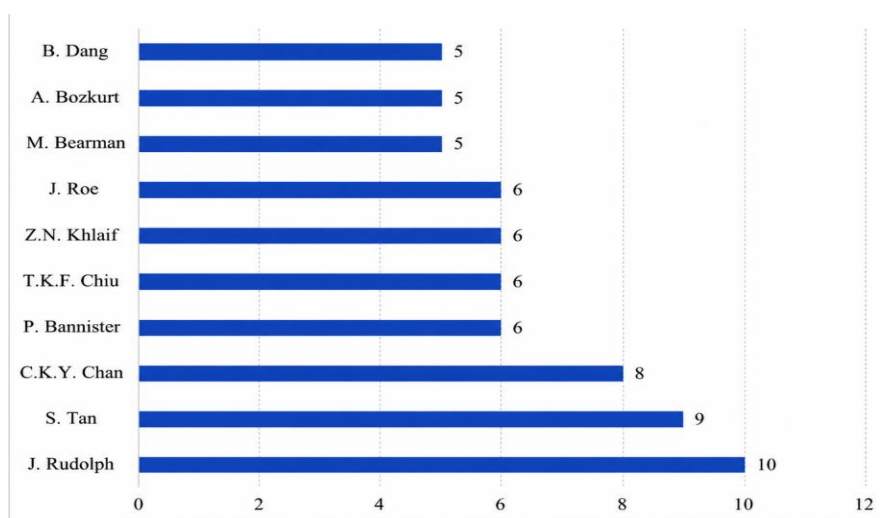


Figure 4: The most prolific authors

The same applies to Z.N. Khlaif from An-Najah National University in Palestine. Furthermore, J. Roe, whose work has been cited 96 times in the “*Journal of Academic Ethics*”, and his relationship with the British University Vietnam in Vietnam, highlight his rising prominence in the field of generative artificial intelligence in higher education. Because of his association with Deakin University in Australia, which has a strong reputation in this field, M. Bearman's study earned 109 citations in the *British Journal of Educational Technology*. Author A. Bozkurt, who is currently affiliated with Anadolu University in Turkey, has garnered 64 citations in *Open Praxis*, underscoring Turkey's emerging leadership in generative AI in higher education. Finally, author B. Dang from the University of Oulu in Finland emphasized the country's substantial development in generative AI research in higher education, as well as academic interest in the field, as evidenced by his paper, which received 131 citations in the *Journal of Studies in Higher Education*. The authors' substantial research and publications have clearly influenced the development of generative AI in higher education. The application of generative AI in higher education has attracted substantial interest across a wide range of academic institutions and geographic regions, underscoring the research's global scope. This will stimulate future scholarly publications to further this rapidly emerging field.

4.6. Distribution of Documents by Funding Sponsor

To answer the sixth research question, which funding organizations are publishing generative AI research in higher education from 2022 to 2025? Figure 5 shows the most important of these funding organizations.

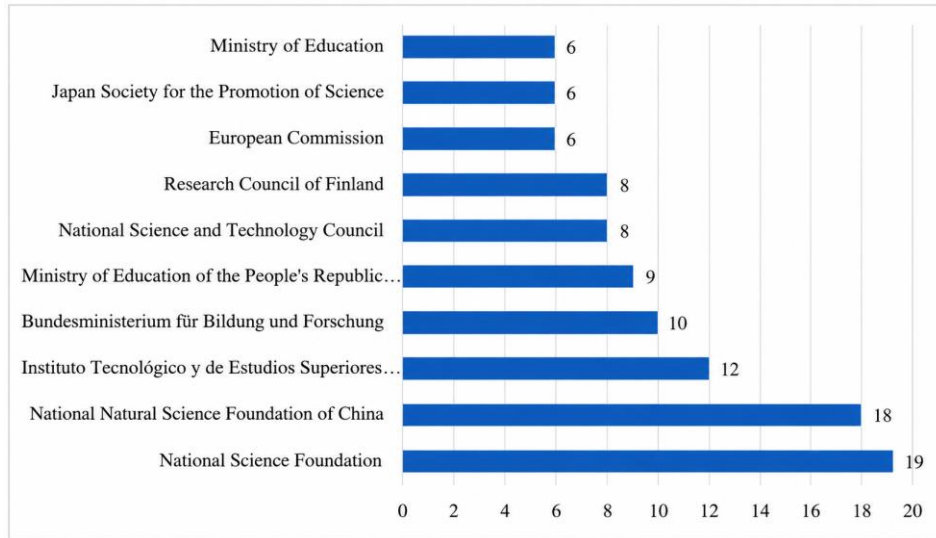


Figure 5: Funding Sponsor with the highest number of research publications

Figure 5 shows the top 10 funding organizations that publish generative artificial intelligence research in higher education. The National Science Foundation in the United States led with 19 papers, followed by the National Natural Science Foundation of China with 18. This reflects the United States' and China's considerable global involvement in sponsoring research in this field, as indicated by the enormous number of published research papers compared with other nations' funding organizations. The results also showed moderate contributions from consecutive publications (12, 10, 9, 8) by some funding bodies, including the Monterrey Institute of Technology and Higher Education, Federal Ministry of Education and Research, the Ministry of Education of the People's Republic of China, and the Research Council of Finland. These were followed by low-budget entities with six papers each, including the European Commission, the Japan Society for the Promotion of Science, and the Ministry of Education. In general, the findings revealed a clear disparity in research funding across institutions worldwide, with the United States and China having the highest budgets for scientific research in this field, indicating their advanced role in supporting global scientific production.

4.7. The Primary Research Keywords and Trends

Concerning the seventh research question, over the past six years, what are the keywords and research trends related to generative artificial intelligence in higher education? Table 4 and Figure 6 present a wide range of keywords and trends in this topic, based on data collected over the study period.

Table 4: Primary research keywords and occurrences

Keywords	Occurrence
Students	357
Generative AI	559
Generative artificial intelligence	371
ChatGPT	470
Higher education	554
Teaching	211
Human	135
Education computing	160
Large language model	106
Artificial intelligence tools	76

Table 4 presents key terms used in the research, along with their frequencies of occurrence, as shown in Figure 6. Table 4 also presents the frequency of words used in the research over the study period. A notable diversity in the terminology related to generative artificial intelligence in higher education was observed, indicating significant interest in this field from multiple perspectives. The term "students" occurred 357 times, while the most common term was "Generative AI", which appeared 559 times.

quality standards, and shaping the future research agenda. This influence reflects the growing reliance on these scientific platforms as the primary sources for researchers and academic decision-makers, as well as their potential to shape educational policies and institutional strategies for the adoption of GAI technologies in universities.

5.3. Prominent Authors and Keywords

The study's findings indicate that the contributions of influential authors have laid the foundation for a scientific understanding of GAI in higher education. These combined research efforts have clarified the current state of the discipline and provided a firm foundation for future theoretical and applied progress. Furthermore, analyzing key terms reveals the topic's breadth and interconnections with topics such as students, GAI, ChatGPT, and higher education, highlighting the field's human and educational dimensions. The frequent association of GAI with higher education, educational computing, and AI ethics demonstrates a growing interest in ethical and regulatory dimensions alongside technological ones. Overall, this bibliometric study provides a thorough examination of the current state and prospects of generative AI research in higher education. Its scientific value lies in its capacity to inform academics, policymakers, and educational leaders in making evidence-based judgments about the effective and responsible use of generative AI. The findings also emphasize the importance of regularly monitoring research breakthroughs in this rapidly changing field to maximize educational benefits while minimizing the ethical and regulatory hurdles associated with the use of new technologies.

6. Conclusion

This study conducts a comprehensive exploration of the emerging research landscape on generative AI in higher education, using bibliometric analysis to map knowledge from 2022 to 2025. The findings show a significant increase in the number of studies in the field and a dramatic shift in scientific output, underscoring the relevance of generative AI in higher education. The global and multidisciplinary nature revealed by keyword analysis, combined with international collaboration of researchers from various countries and institutions, confirms that generative AI is no longer a passing technological tool, but rather a critical and strategic axis reshaping the intellectual structures of modern education. The remarkable increase in the number of academic studies published in Scopus, as well as the collaboration of scientists and researchers from around the world, not only reveals the current state of research but also calls for further investigation into the structural factors influencing the adoption of these technologies in various regions, laying the groundwork for future research. This research is valuable not only for observing the current situation but also for providing researchers and practitioners with insights into integrating generative artificial intelligence techniques and tools into higher education and aligning them with academic performance standards. To summarise, in an era of increasingly prevalent digital platforms, continued study is critical to bridging the research gap in digital equality and human aspects. This provides a strong framework for developing informed educational policies that can keep pace with rapid technological advances while adhering closely to ethical standards that ensure the quality and sustainability of knowledge creation in the digital era.

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References

1. M. Moundridou, N. Matzakos, and S. Doukakis, "Generative AI tools as educators' assistants: Designing and implementing inquiry-based lesson plans," *Computers and Education: Artificial Intelligence*, vol. 7, no. 12, p. 100277, 2024.

2. T. A. Almuqayteeb, "The effectiveness of using GenAI tools for developing digital learning resources: Evidence from educators' perceptions," *International Journal of Learning, Teaching and Educational Research*, vol. 24, no. 4, pp. 28–51, 2025.
3. X. Wei, L. Wang, L. K. Lee, and R. Liu, "The effects of generative AI on collaborative problem-solving and team creativity performance in digital story creation: An experimental study," *International Journal of Educational Technology in Higher Education*, vol. 22, no. 1, pp. 1–27, 2025.
4. E. C. Garrido-Merchán and Á. L. López, "An Automated Survey of Generative Artificial Intelligence: Large Language Models, Architectures, Protocols, and Applications," *arXiv preprint arXiv:2306.02781*, 2023. [Accessed by 05/11/2024].
5. D. G. Takale, P. N. Mahalle, and B. Sule, "Advancements and applications of generative artificial intelligence," *Journal of Information Technology and Sciences*, vol. 10, no. 1, pp. 20–27, 2024.
6. I. Alshamsi, K. F. Sadriwala, F. J. I. Alazzawi, and B. Shannaq, "Exploring the impact of generative AI technologies on education: Academic expert perspectives, trends, and implications for sustainable development goals," *Journal of Infrastructure Policy and Development*, vol. 8, no. 11, p. 8532, 2024.
7. H. Niu and X. Gong, "The role of generative AI in higher education: A decade of current status and future prospects," in *Proceedings of the 5th International Conference on Computer Science and Management Technology*, New York, United States of America, 2024.
8. A. Deroncele-Acosta, R. M. E. Sayán-Rivera, A. D. Mendoza-López, and E. D. Norabuena-Figueroa, "Generative artificial intelligence and transversal competencies in higher education: A systematic review," *Applied System Innovation*, vol. 8, no. 3, p. 83, 2025.
9. J. Batista, A. Mesquita, and G. Carnaz, "Generative AI and higher education: Trends, challenges, and future directions from a systematic literature review," *Information*, vol. 15, no. 11, p. 676, 2024.
10. T. Tillmanns, A. S. Filho, S. Rudra, P. Weber, J. Dawitz, E. Wiersma, D. Dudenaite, and S. Reynolds, "Mapping tomorrow's teaching and learning spaces: A systematic review on GenAI in higher education," *Trends in Higher Education*, vol. 4, no. 1, p. 2, 2025.
11. A. E. Sousa and P. Cardoso, "Use of generative AI by higher education students," *Electronics*, vol. 14, no. 7, p. 1258, 2025.
12. C. K. Y. Chan and W. Hu, "Students' voices on generative AI: Perceptions, benefits, and challenges in higher education," *International Journal of Educational Technology in Higher Education*, vol. 20, no. 1, pp. 1–18, 2023.
13. K. Kavitha and V. P. Joshith, "The transformative trajectory of artificial intelligence in education: The two decades of bibliometric retrospect," *Journal of Educational Technology Systems*, vol. 52, no. 3, pp. 376–405, 2024.
14. M. Omarsaib, S. B. Mitha, A. Vahed, and G. M. Mohamed, "Mapping the AI surge in higher education: A bibliometric study spanning a decade (2015–2025)," *Informatics*, vol. 12, no. 4, p. 137, 2025.
15. R. Doshi and A. Kaleel, "Bibliometric analysis of generative AI and large language models in the Scopus database: Trends, insights, and research landscape," *Applied Data Science and Analysis*, vol. 2025, no. 3, pp. 7–18, 2025.
16. R. López-Chila, J. Llerena-Izquierdo, N. Sumba-Nacipucha, and J. Cueva-Estrada, "Artificial intelligence in higher education: An analysis of existing bibliometrics," *Education Sciences*, vol. 14, no. 1, p. 47, 2024.
17. S. L. Ng and C. C. Ho, "Generative AI in education: Mapping the research landscape through bibliometric analysis," *Information*, vol. 16, no. 8, p. 657, 2025.
18. R. Sahar and M. Munawaroh, "Artificial intelligence in higher education with bibliometric and content analysis for future research agenda," *Discover Sustainability*, vol. 6, no. 1, pp. 1–32, 2025.
19. Y. Yang, X. Wen, and S. S. Maidin, "Generative AI tools in higher education emerging research: A bibliometric analysis of co-citation and co-word analysis," in *Proceedings of the 3rd International Conference on Artificial Intelligence and Education*, New York, United States of America, 2024.
20. R. C. Sharma and S. K. Panja, "Exploring the potential of generative artificial intelligence in education: A bibliometric analysis," *Education and Self Development*, vol. 20, no. 1, pp. 71–88, 2025.
21. A. B. Omenek, N. S. Olajide, A. O. Oriola, A. A. Simeon, I. S. Musa, I. M. Ayinde, and O. A. Abdullahi, "Deployment of generative AI in academic research among higher education students: A bibliometric approach," *International Journal of Academic Research in Business and Social Sciences*, vol. 15, no. 1, pp. 842–855, 2025.
22. B. Yadav and Anubha, "A bibliometric review of role of artificial intelligence in education," *ShodhKosh: Journal of Visual and Performing Arts*, vol. 5, no. 6, pp. 2593–2603, 2024.
23. S. K. Ateş, F. Kaleci, and A. Erdoğan, "Artificial intelligence in education: A bibliometric analysis," *Journal of Ahmet Kelesoglu Education Faculty*, vol. 7, no. 1, pp. 14–36, 2025.
24. S. G. Yaseen, D. M. Dajani, M. Abdulrahman, and I. Elqirem, "Generative artificial intelligence in education: A bibliometric analysis," in *Applied Artificial Intelligence in Business*, Springer, Cham, Switzerland, 2025.

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