Artificial Intelligence (AI) In Higher Education: A Bibliometric Analysis

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ABSTRACT

This study establishes a comprehensive, centralized reference for educators and researchers investigating Artificial Intelligence (AI) in higher education. The three objectives were to evaluate the evolution and dissemination of AI in higher education research, to determine key areas of AI in higher education research and to identify the major players of AI in higher education research. A bibliometric approach was used to analyze 800 publications retrieved from the Scopus database in February 2026, with VOSviewer software employed for data visualization. The analysis revealed that while scholarly interest began around 2018, publications surged from 2023 onwards, peaking in 2025. Despite this upward trend, collaboration patterns suggest the field is still in its early stages of development, as evidenced by the volume of indexed literature. Consequently, this study provides a foundation for future research and facilitates the development of meta-analyses and structured literature reviews.

Keywords: Artificial Intelligence (AI), Bibliometric Analysis, VOSviewer

INTRODUCTION

Although Artificial Intelligence (AI) emerged as a formal scientific discipline in 1956 (Hamet & Tremblay, 2017), the release of ChatGPT in November 2022 represented a transformative milestone. This breakthrough accelerated the development of Large Language Models (LLMs), encompassing a wide array of conversational agents and text-generation tools (Achiam et al., 2023). OpenAI's ChatGPT, a prominent example of these advanced chatbots, leverages AI and Natural Language Processing (NLP) to generate human-like, coherent responses (Kalla & Smith, 2023). Consequently, its integration has sparked significant discourse and interest within the higher education field.

Scholars argue that the escalating influence of Generative AI (GenAI) on higher education is profound, offering the potential to enhance learning experiences and foster innovative educational methodologies (Dempere et al., 2023; Grassini, 2023). By adopting self-regulated learning strategies, students can utilize GenAI tools to inquire, articulate specific needs, and explore diverse subjects (Chiu, 2023; Cooper, 2023; Rasul et al., 2023; Wu et al., 2024).

Given the critical role of AI in shaping future academic inquiry, this study conducts a bibliometric analysis to address the following research objectives:

I. To evaluate the evolution and dissemination of AI in higher education research.

II. To determine key areas of AI in higher education research.

III. To identify the major players of AI in higher education research.

METHODOLOGY

This study utilizes a bibliometric analysis on Artificial Intelligence (AI) in higher education. By introducing a systematic, transparent, and reproducible review process, this approach enhances data quality for future scholarly inquiry (Haustein & Larivière, 2015; Zupic & Čater, 2015). Data were retrieved from the Scopus database, which is widely recognized as one of the most comprehensive sources for peer-reviewed literature, including scientific journals, books, and conference proceedings (AlShehhi et al., 2022). As a premier citation database, Scopus allows for the identification of top-tier publication sources, prolific authors, and the most influential organizations and countries contributing to the field (Madadin et al., 2022).

The methodology follows a four-step framework, adapted and adopted from the bibliometric workflows established by Roslim et al. (2023) in "Learner Corpus Research: A Bibliometric Analysis" and Baharudin and Roslim (2025) in their analysis of Padlet research. This workflow is illustrated in Figure 1.

Step 1: Research Design

Research questions were formulated as follows:

I. How has AI in higher education research evolved and been disseminated?

II. What key areas have been discussed in AI in higher education research?

III. Who are the major players in AI in higher education research?

This study addresses three primary research questions (RQs). RQ1 examines the evolution and dissemination of AI in higher education research by analyzing publications by year, source titles, documents by type and languages used in documents. RQ2 identifies subject area and keyword analysis. Finally, RQ3 investigates the collaborative landscape by identifying countries contributing most to AI in higher education research and authorship analysis.

Step 2: Bibliometric Data

The Scopus database was selected for this study, and the search was conducted using the following query: "AI in higher education". This search string yielded 800 documents. Data retrieval took place on February 26, 2026, with no restrictions placed on publication year, subject area, source titles, document type, or language. A total of 800 documents published between 2018 and 2026 was used in the analysis. All bibliographic data were exported in CSV (Excel) format for further processing.

Step 3: Bibliometric Analysis and Visualization Maps

This study used VOSviewer software (version 1.6.19). VOSviewer is a software tool for constructing and visualizing the bibliometric networks, this study employed VOSviewer (version 1.6.19). The software is specifically designed for mapping journals, researchers, and individual publications based on citation, bibliographic coupling, co-citation, or co-authorship relations (van Eck & Waltman, 2010). Furthermore, its text-mining functionality enables the visualization of co-occurrence networks using key terms extracted from scientific literature.

In this study, VOSviewer was utilized for two primary analyses: (1) co-authorship analysis to examine the collaboration between countries and authors; and (2) co-occurrence analysis of all keywords. The results are presented through network and density visualization maps, which effectively highlight the most influential contributors and the density of research clusters within the field of AI in higher education.

Step 4: Results Interpretation

The final stage involved the systematic description and interpretation of the findings. The comprehensive research workflow adopted for this study is illustrated in Figure 1.

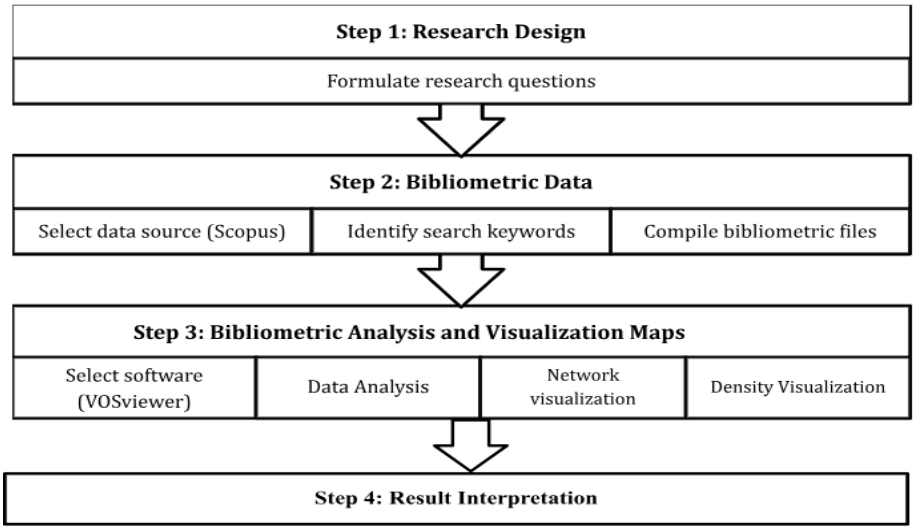

Figure 1. Bibliometric Analysis Workflow for AI in Higher Education Research

RESULTS

This section presents the results of the bibliometric analysis, structured to address the three primary research questions:

(i) Evolution and Dissemination of AI in Higher Education Research

To evaluate the evolution of AI in higher education research and the trend in its dissemination, this study analyzed the following data: (a) number of publications by year, (b) source titles, (c) document by types, and (d) languages used in documents. The analysis was conducted using data directly extracted from the Scopus database through the "analyze search results" function.

a. Publications by year

Table 1 presents publication statistics for AI in higher education research from 2018 to 2026, illustrating a significant upward trend. The first indexed publication appeared in 2018 entitled, "Higher education and artificial intelligence: Euphoria and alarmism". From 2018 to 2022, a total of 21 documents were recorded, with annual outputs ranging from one to nine. However, publication volume surged between 2023 and 2025, from 42 to 435 documents signifying a clear indicator of escalating interest in the field. Since this data was collected on February 26, 2026, the figures include early 2026 releases already indexed by Scopus. Figure 2 illustrates the publications of documents from 2018 to 2026.

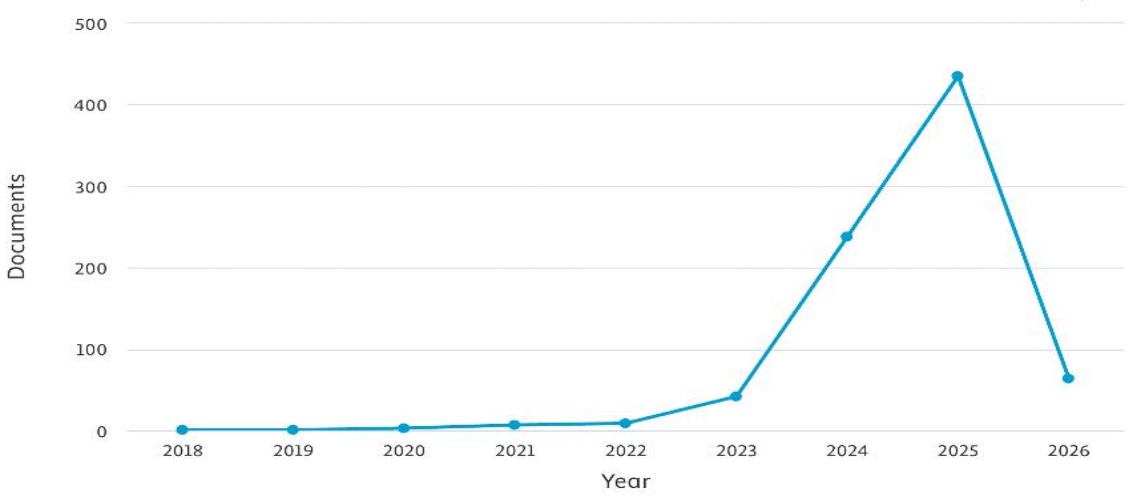

Figure 2. Documents by Year (2018-2026)

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Table 1 provides a detailed annual breakdown of AI-related publications in higher education research.

Table 1. Number of AI in Higher Education Research Publications by Year

Year	Documents
2018	1
2019	1
2020	3
2021	7
2022	9
2023	42
2024	238
2025	435
2026	64

b. Source titles

Table 2 shows the top 10 publication source titles for AI in higher education. Lecture Notes in Networks and Systems accounts for the highest volume of research (n = 29), followed by Frontiers in Education (n = 20). Communications in Computer and Information Science (n = 18) and Education and Information Technologies (n = 12) also represent significant contributors. A similar output was observed for Cogent Education, Computers and Education Artificial Intelligence, and Sustainability Switzerland, each contributing 10 publications. Finally, Education Sciences (n = 9) followed by Interactive Learning Environments and Lecture Notes in Computer Science, each with eight publications.

Table 2. Top 10 Sources for AI in Higher Education Research

Source	Documents
Lecture Notes in Networks and Systems	29
Frontiers in Education	20
Communications in Computer and Information Science	18
Education and Information Technologies	12
Cogent Education	10
Computers and Education Artificial Intelligence	10
Sustainability Switzerland	10
Education Sciences	9
Interactive Learning Environments	8
Lecture Notes in Computer Science	8

c. Documents by Type

This study also aimed to categorize the publication sources of AI in higher education by analyzing document types. As shown in Table 3, article was the most prevalent document type, accounting for 389 publications (48.6%), followed by conference paper with 183 (22.9%). Book chapter represented 140 documents (17.5%), while review accounted for 43 (5.4%). Other categories included book (20 documents; 2.5%) and conference review (15 documents; 1.9%). Errattum and note each contributed three documents (0.4%), followed by editorial (2 documents; 0.3%). Finally, short survey and other document types each represented a single entry (0.1%).

Table 3. Documents for AI in Higher Education Research

Document type	Number	Percentage (%)
Article	389	48.6%
Conference Paper	183	22.9%
Book Chapter	140	17.5%
Review	43	5.4%
Book	20	2.5%
Conference Review	15	1.9%
Errattum	3	0.4%
Note	3	0.4%
Editorial	2	0.3%
Short Survey	1	0.1%
Other	1	0.1%

The distribution of AI in higher education research by document type is further illustrated in Figure 3.

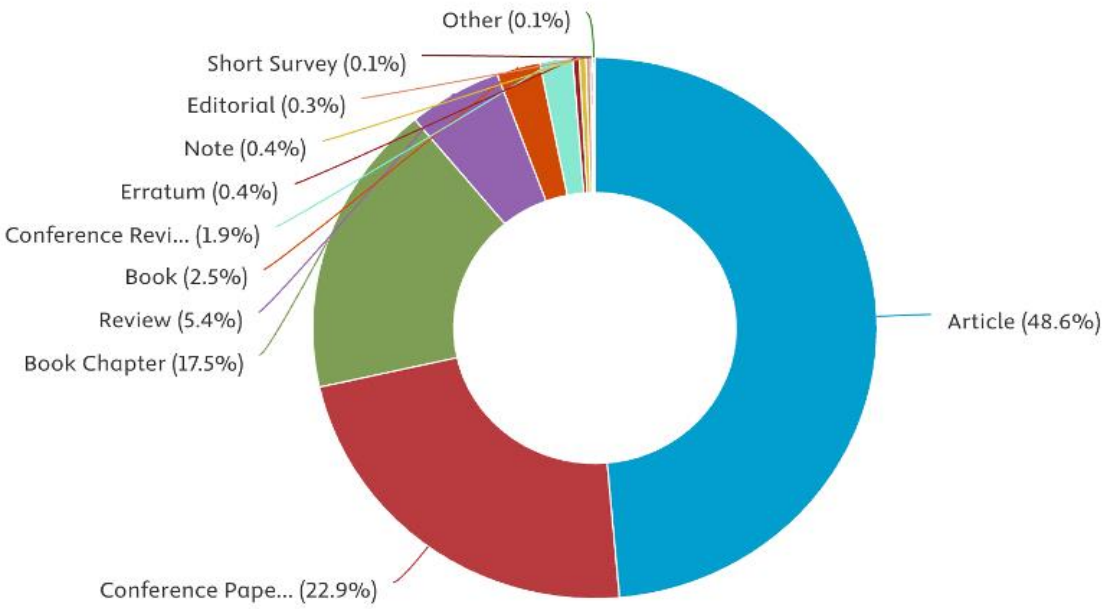

Figure 3. Documents by Type

d. Languages used in documents

As detailed in Table 4, English was the predominant language of publication, accounting for 92.4% of the 256 documents on AI in higher education. Spanish ranked second with 16 documents (5.8%). The remaining publications were distributed across Portuguese (4 documents; 1.4%), Korean (2 documents; 0.7%), and French (1 document; 0.7%).

Table 4. Language distribution of AI in higher education research publications.

Language	Number of documents	Percentage (%)
English	256	92.4%
Spanish	16	5.8%
Portuguese	4	1.4%
Korean	2	0.7%
French	1	0.7%

(ii) Key Areas of AI in Higher Education Research

The primary research areas of AI in higher education were analyzed through two lenses: (a) subject area distributions and (b) keyword co-occurrence analysis.

a. Subject area

This study categorized the identified documents by subject area, as illustrated in Figure 4. The data were retrieved directly from the Scopus database using the "Analyze Search" function. Results indicated that research on AI in higher education spans diverse disciplines, with Social Sciences emerging as the most prominent field at 32.5%, followed by Computer Science at 27.3%. Engineering contributed 10.0% of the total, followed by Business, Management and Accounting (4.8%), Mathematics (4.5%) and Psychology (3.5%). Other notable areas included Decision Sciences (3.1%), Economics, Econometrics and Finance (2.3%), and Medicine (1.5%). The remaining 8.4% of publications were distributed across various other subject areas.

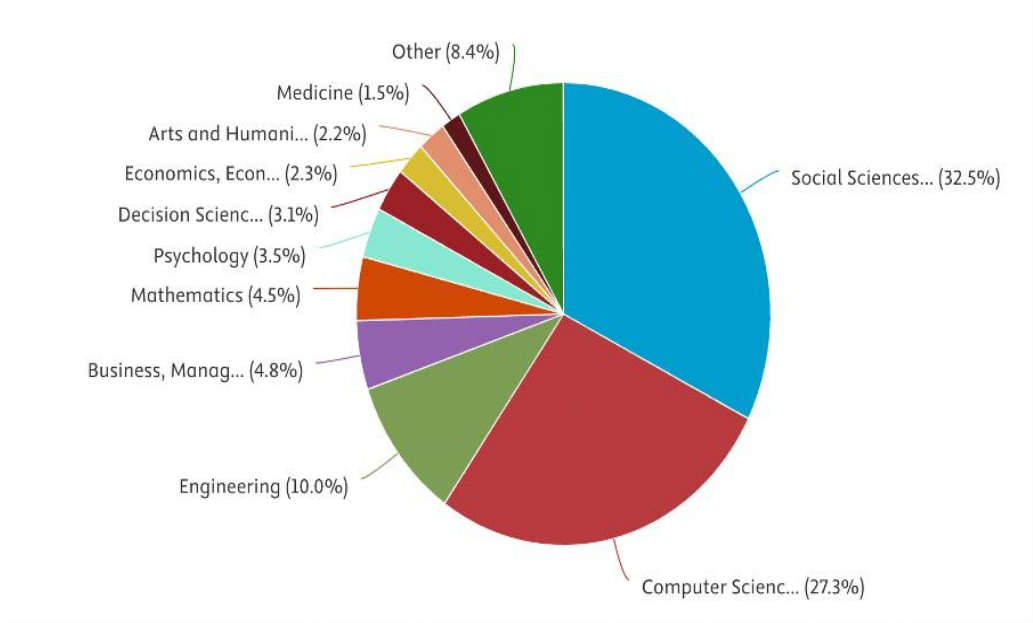

Figure 4. Documents by Subjects

Table 5. Subject Areas of AI in Higher Education Research

Subject area	Number of Documents	Percentage (%)
Social Sciences	518	32.5%
Computer Science	435	27.3%
Engineering	159	10.0%
Business, Management & Accounting	77	4.8%
Mathematics	71	4.5%
Psychology	56	3.5%
Decision Sciences	49	3.1%
Economics, Econometrics & Finance	37	2.3%
Medicine	24	1.5%

b. Keyword analysis

The fundamental principle of keyword analysis is that author-provided keywords adequately represent the thematic content of an article (Comerio & Strozzi, 2019). Figure 5 presents a network visualization of author keywords with a minimum of 10 occurrences. Using VOSviewer, a specialized software for constructing and visualizing bibliometric networks, the study mapped these keywords to identify core research themes. In this visualization, the node size (circle) and font size indicate the frequency of the keyword, while the thickness of the connecting lines represents the strength of the relationship between terms. Furthermore, keywords assigned the same color belong to the same cluster, indicating they are frequently co-listed in the literature. For instance, the clustering of terms such as learner corpus, corpus linguistics, learner corpus research, second language acquisition, and error analysis suggests these topics are conceptually interrelated and commonly co-occur (Sweileh et al., 2017).

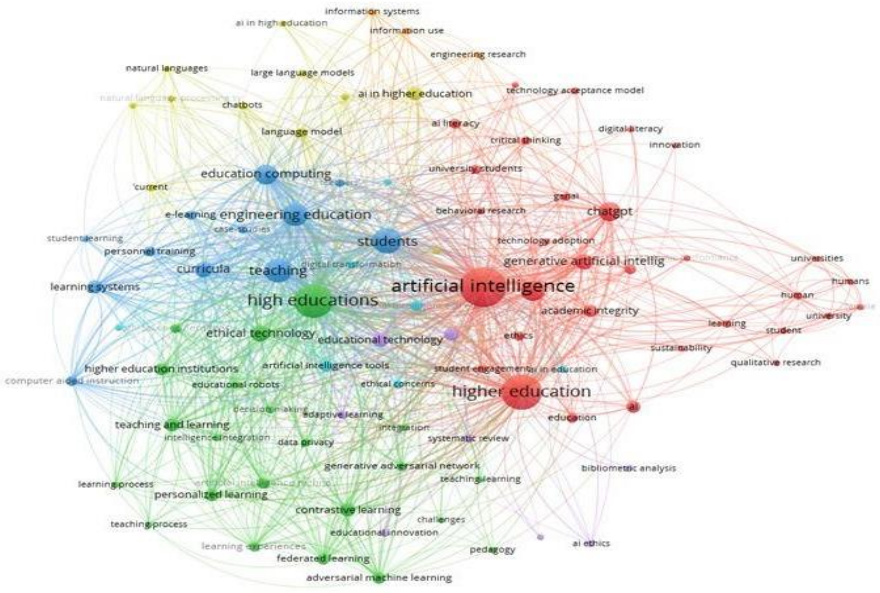

Figure 5. Network Visualization Map of Author Keywords with a Minimum of 10 Occurrences

For the keyword analysis, a co-occurrence analysis was performed using all keywords as the unit of analysis within VOSviewer. To ensure thematic relevance, the minimum threshold for keyword occurrences was set at 10. Out of a total of 3,045 keywords identified across 800 publications, 94 met this threshold. The keyword "artificial intelligence" emerged as the most frequent term in the dataset. The top twenty keywords identified in this research area are detailed in Table 6.

Table 6. Top Twenty (20) Keywords in AI in Higher Education Research

No	Keywords	Occurrences	Total link Strength	No	Keywords	Occurrences	Total link Strength
1	Artificial Intelligence	424	2725	11	chatgpt	100	458
2	High educations	308	2683	12	Generative artificial intelligence	66	426
3	Higher education	341	1572	13	Learning systems	46	426
4	students	170	1310	14	Contrastive learning	45	364
5	Teaching	150	1199	15	Educational technology	53	364
6	Engineering education	133	1123	16	Personalized learning	44	344
7	Education computing	105	915	17	Teaching and learning	45	332
8	Ethical Technology	74	629	18	Adversarial machine learning	35	303
9	Generative AI	118	598	19	Federated learning	32	290
10	Curicula	62	553	20	Computer aided instruction	27	283

(iii) Major Players in AI in Higher Education Research

This study explored the characteristics of scientific collaboration in AI in higher education research by analyzing: (a) the countries with the highest contribution, and (b) the analysis of authorship.

a. Countries contributing most to AI in Higher Education Research

Regarding geographical distribution, a diverse range of nations has contributed to the literature on AI in higher education. As shown in Table 7, the United States leads the global output, followed by the United Kingdom and China. The list of the top 15 contributors also includes Spain, Australia, Germany, and India, alongside significant representation from Malaysia, Mexico, and Saudi Arabia. The inclusion of countries such as Italy, Pakistan, the United Arab Emirates, Greece, and South Africa underscores the global footprint of this research area, reflecting its relevance across various socioeconomic and regional contexts.

Table 7. Geographic Origins of AI in Higher Education Research

No.	Country	Documents	Total Link Strength
1.	United States	108	53
2.	United Kingdom	61	41
3.	China	68	38
4.	Spain	39	34
5.	Australia	40	27
6.	Germany	29	24
7.	India	60	24
8.	Malaysia	29	24
9.	Mexico	27	24
10.	Saudi Arabia	27	23
11.	Italy	13	18
12.	Pakistan	10	17
13.	United Arab Emirates	26	17
14.	Greece	12	16
15.	South Africa	20	15

Figure 6 presents the network visualization of international collaboration among the top contributing countries, generated using VOSviewer. To determine the thresholds for this analysis, the maximum number of countries per document was limited to 25, while the minimum number of documents per country was set to five. Out of 102 total countries identified, 55 met these criteria. For each of these 55 nations, the Total Link Strength (TLS) of co-authorship was calculated to measure the intensity of international scientific cooperation. The resulting map illustrates the interconnectedness of these 55 countries, highlighting the primary hubs of global research collaboration in AI for higher education.

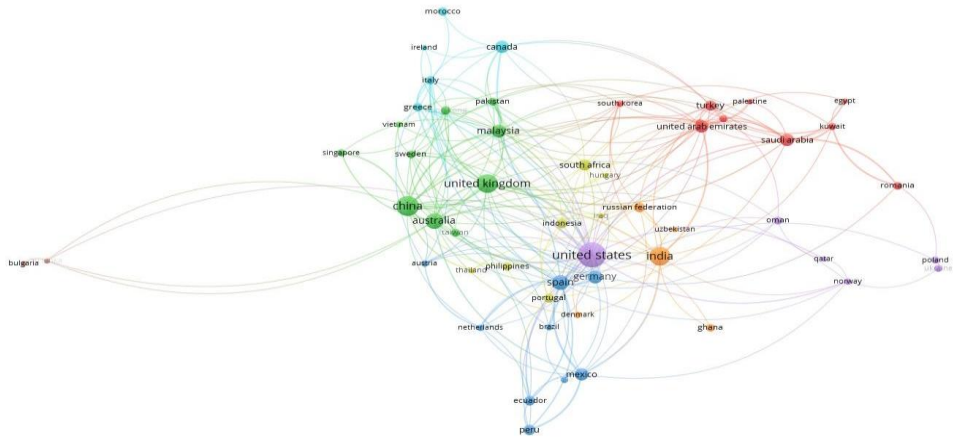

Figure 6. Network Visualization Map of Countries Contributing Most to AI in Higher Education Research

b. Authorship analysis

A co-authorship analysis was conducted to examine the collaboration patterns of researchers in the field of AI in higher education. Within VOSviewer, the maximum number of authors per document was limited to 25, and a minimum threshold of two documents per author was applied. Of the 771 identified authors, 12 met these criteria and were included in the final analysis. The most productive authors, based on these metrics, are detailed in Table 8, illustrating the key contributors to the current body of literature.

Table 8. Most Productive Authors in AI in Higher Education Research

Author	Number of Documents
Kayyali, M.	3
Nartey, E. K.	3
Burneo-arteaga, P. et. al	2
Farinosi, M. et. al.	2
Al-zahrani, A. M. et. al	2
Lytras, M. D. et. al	2
Memarian, B. et. al	2
Asrifan, A.	2
Pierres, O. et. al	2
Pierres, O. et. al	2
Sabbaghan, S.	2
Al-zahrani, A. M. et. al	2

The VOSviewer density visualization in Figure 7 illustrates the concentration of productive authors in AI in higher education research, highlighting the primary contributors within the field's collaborative network.

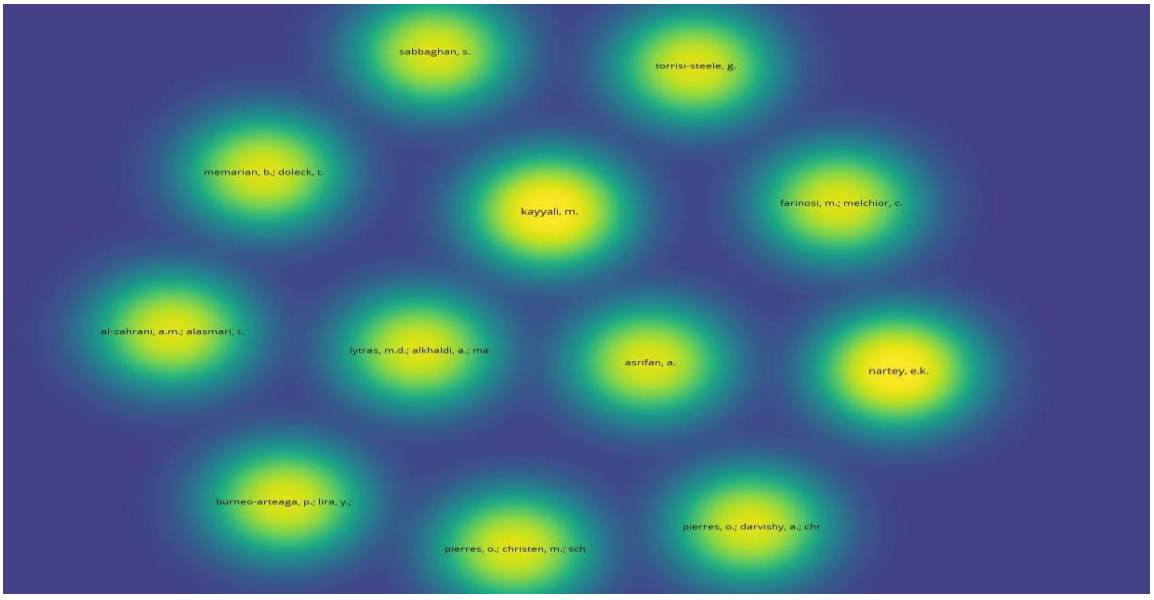

Figure 7. Density Visualization of Productive Authors in AI in Higher Education Research

The density visualization in Figure 7 highlights the 'hotspots' of research activity. Areas in yellow represent the highest concentration of publications and citations, identifying the most influential scholars in the field. The proximity of these 'clouds' to one another indicates strong collaborative ties or shared research interests among these core authors.

DISCUSSION

This bibliometric analysis provides a comprehensive overview of the research landscape concerning AI in higher education. Addressing the first research question, the study tracked the evolution and dissemination of the field, identifying 800 relevant documents within the Scopus database. Research in this area emerged in 2018 with the inaugural publication, "Higher education and artificial intelligence: Euphoria and alarmism." Since then, output has accelerated significantly, peaking in 2025, a trend reflecting a sharp increase in academic interest. Linguistically, the field is dominated by English (92.4%), followed by smaller contributions in Spanish, Portuguese, Korean, and French.

Regarding the second research question, the thematic focus was examined through subject area and keyword analysis. Social Sciences emerged as the leading discipline, followed by significant contributions from Computer Science and Engineering. VOSviewer analysis identified "artificial intelligence" as the most frequent and central keyword, boasting the highest total link strength.

Finally, the third research question identified the major players in the field. The United States led global contributions, while Kayyali, M. and Nartey, E.K. were identified as the most prominent authors.

CONCLUSION

This study contributes to the emerging field of AI in higher education by synthesizing current research trends through a systematic bibliometric approach. Given the accelerating interest in this domain, such comprehensive investigations are vital for mapping the evolving academic landscape. By establishing a robust foundational overview, this research enables future scholars to identify thematic gaps and expand their inquiries to include broader metadata sources from alternative global databases. Consequently, these findings offer critical insights for researchers, practitioners, funding agencies, and policymakers, facilitating a deeper understanding of both current research trajectories and future priorities.

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