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Trends in Research on Artificial Intelligence in Higher Education (1985-2025): A bibliometric analysis

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ABSTRACT: The development of Artificial Intelligence (AI) has brought about significant changes to the higher education ecosystem and spurred growing academic interest in its application. This study aims to map the development, trends, and research areas of Artificial Intelligence in higher education institutions during the period 1985–2025 using a bibliometric analysis approach. Data were obtained from the Scopus database, comprising a total of 1,807 articles meeting the inclusion criteria based on the PRISMA guidelines. The analysis was conducted using VOSviewer software to identify publication trends, country and institutional productivity, the most influential articles, dominant disciplines, and frequently researched keyword networks. The results indicate a significant increase in the number of publications since 2019, peaking in 2025. The social sciences and computer science are the main contributors, with the research focus shifting from the technical implementation of AI to ethical issues, academic integrity, and generative AI. China and the United States dominate research productivity, whilst developing countries such as Indonesia are beginning to show increasing contributions. Keyword network analysis identifies six main clusters of AI research in higher education. The research contributions provide a comprehensive overview of the direction of AI research development and identify research gaps for future interdisciplinary studies.

Keywords: artificial intelligence, bibliometric analysis, education, global research, higher education.

ABSTRAK: *Perkembangan* Artificial Intelligence *(AI) telah membawa perubahan signifikan terhadap ekosistem pendidikan tinggi dan mendorong meningkatnya minat akademik terhadap penerapannya. Penelitian ini bertujuan untuk memetakan perkembangan, tren, dan bidang kajian* Artificial Intelligence *di perguruan tinggi selama periode 1985–2025 dengan menggunakan pendekatan analisis bibliometrik. Data diperoleh dari basis data Scopus yang mencakup 1.807 artikel yang memenuhi kriteria inklusi berdasarkan pedoman PRISMA. Analisis dilakukan menggunakan perangkat lunak VOSviewer untuk mengidentifikasi tren publikasi, produktivitas negara dan institusi, artikel yang paling berpengaruh, disiplin ilmu yang dominan, serta jaringan kata kunci yang paling sering diteliti. Hasil penelitian menunjukkan adanya peningkatan signifikan jumlah publikasi sejak tahun 2019, dengan puncaknya terjadi pada tahun 2025. Bidang ilmu sosial dan ilmu komputer menjadi kontributor utama, sementara fokus penelitian mengalami pergeseran dari implementasi teknis AI menuju isu-isu etika, integritas akademik, dan AI generatif. Tiongkok dan Amerika Serikat mendominasi produktivitas penelitian, sedangkan negara berkembang seperti Indonesia mulai menunjukkan kontribusi yang terus meningkat. Analisis jaringan kata kunci mengidentifikasi enam klaster utama penelitian AI dalam pendidikan tinggi. Kontribusi penelitian ini memberikan gambaran komprehensif mengenai arah perkembangan riset AI serta*

mengidentifikasi kesenjangan penelitian yang dapat menjadi peluang bagi studi interdisipliner di masa depan.

Kata Kunci: *kecerdasan buatan, analisis bibliometrik, pendidikan, penelitian global, pendidikan tinggi.*

INTRODUCTION

The rapid development of Artificial Intelligence (AI) has become one of the hottest and most crucial topics in global discussions today. Artificial intelligence itself is defined as a machine that has human-like cognitive abilities to solve problems, express opinions, interact, generate ideas, and make decisions (Rai et al., 2019). Beyond this, massive AI innovation and its widespread adoption have transformed various sectors, offering solutions to improve efficiency, accuracy, and productivity (Giuggioli & Pellegrini, 2022; Kaur et al., 2022).

In the medical sector, the role of artificial intelligence (AI) has grown significantly by assisting medical personnel in the diagnosis and treatment of diseases, including through the development of advanced medical devices that can improve the accuracy and effectiveness of healthcare services (Knevel & Liao, 2023; Rajpurkar et al., 2022). In addition, the use of chatbot-based AI also contributes to providing initial responses to patients, such as information on symptoms, service schedules, and initial recommendations before direct consultation with a doctor (Bari et al., 2023; M. Chen & Decary, 2020; Cheng & Jiang, 2021; Fletcher et al., 2021). In the industrial sector, AI is increasingly being applied in production processes to improve efficiency, precision, and productivity through automation and data-based quality control (Javaid et al., 2022; Lee et al., 2018; Mathew et al., 2023). Meanwhile, in the field of technology, the development of AI has led to the emergence of various innovative applications and software that offer ease of use and optimisation of technology utilisation, thereby accelerating digital transformation in various sectors of life (Davenport & Mittal, 2022).

In the education sector, the penetration of AI has had a significant impact, particularly in reconfiguring academic workloads. Technologies such as automated grading systems, intelligent academic chatbots, and adaptive learning platforms now serve as catalysts that save time and resources (Luckin et al., 2024; Ng et al., 2023; Srinivasa et al., 2022). This enables educators, both teachers and lecturers, to reduce repetitive administrative tasks and allocate their cognitive focus to more substantial interpersonal interactions and innovative curriculum development (Chiu et al., 2023; Gofman & Jin, 2024).

Currently, artificial intelligence (AI) has entered the world of education extensively, with a number of developed countries such as the United States and the United Kingdom beginning to integrate AI into formal education curricula (Kizilcec, 2024; Salastekar et al., 2023; Taylor & Owusu, 2025; Zahra & Nurmandi, 2021). This step is a strategic effort to adapt to technological developments, so that the education system can be designed to improve the quality of human resources (HR) relevant to the demands of the times. Meanwhile, in developing countries, AI technology continues to be adopted adaptively and is increasingly

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seen as an opportunity to encourage the growth of quality human resources (Aly, 2020; Mannuru et al., 2025). Through the use of AI in more interactive and contextual learning, students can obtain real-life examples, more personalised learning experiences, and strengthen the 21st-century skills needed in the workplace and digital society.

However, the adoption and development of AI content shows unevenness across disciplines. While the surge in the use of AI in learning in Science, Technology, Engineering, and Mathematics (STEM) has grown rapidly, its application in the social sciences is still limited due to the limitations of content and more specific data contexts (J. Chen et al., 2024; Roll & Wylie, 2016). The paradigm regarding AI has also shifted: from initial concerns that AI would replace human resources, AI is now seen as a collaborative partner capable of offering innovative solutions when challenges or obstacles arise in work or academic processes.

Given this transformative potential, a surge in scientific publications examining AI in education is inevitable. However, current literature reviews tend to highlight the use of AI in the macro context of education, often without distinguishing between the dynamics of primary education and higher education. In fact, the higher education ecosystem has far more complex needs, challenges, and patterns of technology adoption than primary and secondary education. This lack of specific focus leads to a limited understanding of how AI operates within the unique ecosystem of higher education.

Bibliometric analysis makes a significant contribution to mapping research trends and understanding their impact on academia and society at large (Donthu et al., 2021; Pradana et al., 2023). Through this analysis, stakeholders obtain systematic and evidence-based data sources to identify publication patterns, scientific collaboration, and the dynamics of artificial intelligence development in higher education. In general, the bibliometric approach plays an important role in determining the future direction of research related to the use of AI in the campus environment, while also evaluating the extent to which AI has been implemented, the dominant topics being researched, the research gaps that remain, and the implications for policy development, curriculum, and learning innovation in higher education.

A similar study, employing a bibliometric analysis approach, examined trends in research on the use of artificial intelligence in higher education, such as frequently cited journals and commonly discussed topics, over the period 2017–2023 (López-Chila et al., 2023). Another study provided insights into the use of artificial intelligence in higher education, covering the period 2007–2017 using the Web of Science and Scopus databases (Hinojo-Lucena et al., 2019). Another study produced similar results the most prolific journals, authors with the most citations, and country networks, covering the period 2000–2022 (Kavitha et al., 2024).

Therefore, this study aims to provide such insights through focused mapping of specific AI implementations at the university level. This mapping is not merely a literature inventory, but a strategic step to understand historical trends, identify unexplored research gaps, and project future research directions. This

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analysis is crucial as an essential reference for future researchers in optimising the integration of relevant and impactful AI in the academic environment.

Research questions

Based on the background and objectives of this study, the following research questions were formulated: RQ1: How productive are countries and institutions in researching the use of AI in higher education? RQ2: Which articles have the most influence on AI research in higher education? 3) RQ3: What are the trends in AI research in higher education? RQ4: Which fields of research frequently conduct AI-related research in higher education? RQ5: What are the most frequently researched domains?

RESEARCH METHOD

Data Collection

The data collection process in this study adopted the steps outlined by Donthu et al. (2021). The first step was to determine the objectives and research topics in a focused manner. Next, VOSviewer software was used to visualise network maps and identify trend patterns (Donthu et al., 2021). As this research is a bibliometric study using secondary data, the next step was to search for data in journal databases. This study decided to use a single database, namely Scopus, because it has proven to be of high quality and provides more complete bibliographic data on articles than Web of Science (WoS), as well as storing data archives with more than 2.4 billion references (Kardiyem et al., 2025; Pranckutė, 2021; Zhu & Liu, 2020). The keywords used in the data search were "Artificial Intelligence AND Higher Education". To ensure consistency with the scope of this study, the inclusion and exclusion criteria are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
Published between 1985 and 2025	Published before 1985
Studies focusing on artificial intelligence and higher education	Studies not relevant to the research focus
Articles published in English	Articles published in languages other than English
Publication types limited to research articles	Publication types such as books, book chapters, and conference proceedings
Open access	Not open access

Figure 1 shows that 6.676 articles were identified through a search of the Scopus database using the specified keywords. However, 4.794 articles were excluded because they were books or conference proceedings, were written in languages other than English, or were not open access. Following the screening process based on inclusion and exclusion criteria, 1.807 articles were identified as eligible for analysis.

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The final step is to analyse the frequency distribution, which includes reviewing the frequency of research each year, scientific disciplines, the most cited articles, research productivity at the country and institutional levels, and the identification of the most frequently used keywords. In the analysis process, VOSviewer is used specifically to map keyword networks, while Microsoft Excel and Microsoft Word are used to present and store research data.

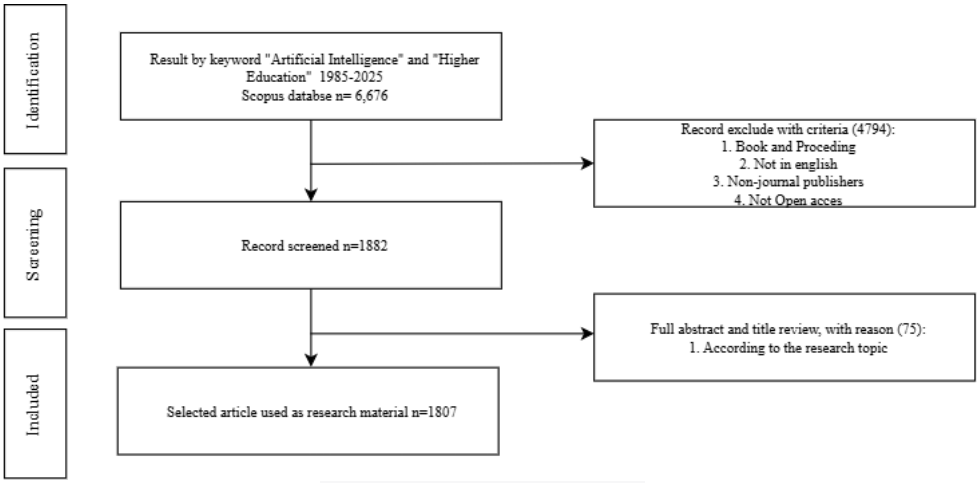

Figure 1. Prisma diagram

Analysis Techniques

This study utilises a bibliometric approach, which is used to identify patterns, trends, and the impact of research (Kardiyem et al., 2025). In this case, bibliometrics is a technique for evaluating the contributions of authors, countries, and institutions to the research topic being studied (Donthu et al., 2021). This approach was implemented using VOSviewer to visualise a map of research networks on artificial intelligence in higher education. This technique is particularly suited to educational research given its established application across interdisciplinary fields. Bibliometrics can also be used as a basis for future research due to its ability to identify research gaps and trend patterns (Donthu et al., 2021). To maintain the quality of the data obtained and as a form of transparency, this study applied data inclusion and exclusion criteria with reference to the PRISMA guidelines.

RESULT AND DISCUSSION

Annual Distribution

Based on literature searches conducted in October 2025, 1.807 articles relevant to the research topic were found. These data show that research on Artificial Intelligence (AI) in the context of higher education has developed rapidly over the past five years. As shown in Figure 2, the number of publications has increased significantly since 2019 and has peaked in 2025 with 747 article publications. This increase was driven by the role of AI as a new technology with great potential to support the learning process in higher education. This phenomenon indicates that the education sector is actively following and

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integrating technological developments to support academic activities. Student involvement in the use of AI is also implied by this data, which shows their awareness of technological advances.

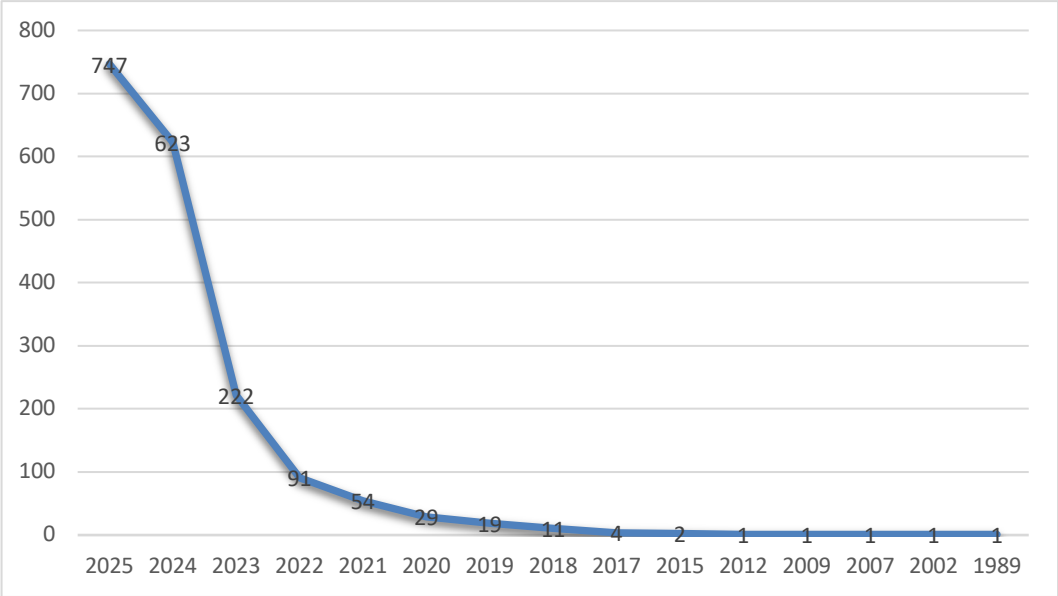

Figure 2. Research trends by year

Furthermore, analysis of publication trends can be classified into three main stages: the initial stage (1985–2015), the development stage (2017–2021), and the peak stage (2022–2025). The number of publications is predicted to continue to grow, given that the topic of AI integration in higher education remains a highly interesting and relevant area of study.

Classification of Research Disciplines

Search results in Scopus show that research on this topic is distributed across ten major disciplines. As presented in the table, social sciences rank highest with 1,157 articles, followed by computer science with 725 articles (Table 2). This data indicates that the application and impact of artificial intelligence is a highly sought-after area of study in the social sciences.

Table 2. Classification of Research Disciplines

Research Disciplines	Total
Social Sciences	1157
Computer Science	725
Engineering	231
Psychology	194
Business Management and Accounting	118
Arts and Humanities	102
Health Professions	100
Multidisciplinary	85
Environmental Science	81
Mathematics	78

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Cited articles

The number of citations an article receives reflects its influence and contribution to subsequent research. In the context of Artificial Intelligence, the ten most cited articles (presented in Table 3) mostly focus on the use of ChatGPT. The dominance of this topic is most likely due to ChatGPT's advantage as the first-mover in the AI chatbot market developed by OpenAI, making it more familiar to researchers and users. Based on these findings, an interesting research gap emerges: Can existing research results, most of which are based on ChatGPT, be generalised for the use of other AI chatbots by students?

Table 3. Cited Articles

Author	Title	Year	Total Citation
Cotton et al., (2024)	Chatting and cheating: Ensuring academic integrity in the era of ChatGPT	2024	1215
Rudolph et al., (2023a)	ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?	2023	1124
Popenici & Kerr (2017)	Exploring the impact of artificial intelligence on teaching and learning in higher education	2017	1032
Crompton & Burke (2023)	Artificial intelligence in higher education: the state of the field	2023	728
Chan (2023)	A comprehensive AI policy education framework for university teaching and learning	2023	716
Farrokhnia et al., (2024)	A SWOT analysis of ChatGPT: Implications for educational practice and research	2024	686
Rudolph et al., (2023b)	War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education	2023	496
Sullivan et al., (2023)	ChatGPT in higher education: Considerations for academic integrity and student learning	2023	484
Dergaa et al., (2023)	From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing	2023	474
Michel-Villarreal et al., (2023)	Challenges and Opportunities of Generative AI for Higher Education as Explained by ChatGPT	2023	472

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National Research Productivity

Based on the geographical analysis of research contributors presented in Table 4, China leads as the country conducting the most research on AI in higher education with 224 articles. The United States ranks second with 193 articles; it is also the country of origin of widely used AI platforms such as ChatGPT.

Table 4. Country research productivity

Country	Total
China	224
United States	193
United Kingdom	158
Spain	122
Australia	113
Saudi Arabia	101
Indonesia	70
India	69
Malaysia	66
South Africa	66

It is worth noting that Indonesia, as a developing country, contributed significantly with 70 research articles. This finding indicates a positive trend, whereby Indonesia is beginning to actively integrate AI into its education system, despite still facing various challenges. The adoption of AI technology projects the nation's potential for progress, not only in the education sector, but also in driving broader economic and technological growth.

Table 5. Classification of Research by Continent

Continent		Total
Asia	Southeast Asia	9
	East Asia	7
	South Asia	7
	West Asia (Middle East)	13
	Central Asia	6
Europe	Western Europe	8
	Northern Europe	8
	Southern Europe	12
	Eastern Europe	7
America	North America	3
	South America	11
	Central America & the Caribbean	5
Africa	North Africa	3
	East Africa	6
	West Africa	2
	Southern Africa	4
Oceania	Oceania	3

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Table 5 shows that Asia has the most diverse range of research countries (42 countries). This figure is not merely a reflection of population size, but an indication of the broad relevance and priority of this topic in various countries. This massive participation, which spans East, Southeast, and South Asia to the Middle East, shows that the adoption and impact of AI in higher education has become a national research agenda across the continent.

Europe follows in second place (35 countries), which can be attributed to its well-established research infrastructure and university collaboration networks. Furthermore, Europe is currently the global leader in the discourse on AI ethics and governance, particularly with initiatives such as the 'EU AI Act'. This strong focus on regulation naturally encourages and stimulates critical academic research to examine the implications of AI in various sectors, including education.

Meanwhile, although the Americas have fewer countries (19 countries), their role as the epicentre or centre of generative AI technology development today must be understood. The launch of ChatGPT by OpenAI in the United States was the catalyst that triggered this wave of global research. This phenomenon then sparked global technological competition, with other countries (particularly in Asia) responding swiftly, as evidenced by the emergence of rival language models such as Qwen (China), DeepSeek (China), and others.

University Productivity

The university that has conducted the most research on the use of artificial intelligence (AI) in higher education is Tecnológico de Monterrey in Mexico, with 44 publications on the topic (Table 6). It is followed by the University of Jordan, which has also shown consistency in AI research in higher education with 19 articles. Tecnológico de Monterrey's dominance is understandable given that this university has a strong focus on technological development, particularly in the application of AI to the learning process. These findings show that various universities around the world are beginning to accept and adopt AI in academic activities.

Furthermore, based on the available data, it is not only universities with a focus on technology that are researching the use of AI. Several universities with a primary focus on economics, science, and medicine are also beginning to explore the impact and potential of AI application in their respective fields. This shows that interest in AI has now reached various disciplines, in an effort to adapt to technological developments and meet the specific needs of each field.

However, discussions about AI in higher education do not only highlight its advantages and development opportunities, but also begin to examine the negative impacts it may have on students. Therefore, it is important to understand both sides so that the use of AI in higher education can be directed wisely, proportionally, and in accordance with the interests of student development.

Table 6. University Productivity

University	Country	Total
Tecnológico de Monterrey	Mexico	44
The University of Jordan	Jordan	19

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University of South Africa	South Africa	18
King Faisal University	Saudi Arabia	17
King Abdulaziz University	Saudi Arabia	14
Monash University	Australia	14
Universidad César Vallejo	Peru	14
Universidad Tecnológica del Perú	Peru	14
University of Johannesburg	South Africa	13
King's College London	United Kingdom	13
University of Leeds	United Kingdom	13
CQUniversity Australia	Australia	13

Network Overview of Articles: Co-occurrence

Bibliometric network visualisation using VOSviewer formed several research clusters related to the use of Artificial Intelligence (AI) in higher education. This analysis was conducted on 1,807 articles by setting a minimum number of occurrences of a keyword to 7 times to maintain the focus of the analysis so that it only included research that specifically discussed the use of AI in higher education. Each colour in the visualisation represents a group or cluster of keywords with specific thematic relevance. Nodes or points in the visualisation indicate the frequency of occurrence of a keyword, where larger nodes represent keywords that appear frequently in the research data set, while smaller nodes represent keywords that are rarely used. Meanwhile, the connecting lines between nodes illustrate the relationship between two keywords, where the closer and more numerous the connecting lines are, the stronger the relationship between topics or concepts in the analysed research. Thus, this visualisation provides a comprehensive overview of the AI research map in higher education and shows the interconnectedness of themes that are often studied together.

The analysis identified (Figure 3) six main clusters formed around the central keywords 'Artificial Intelligence' and 'Higher Education', with each cluster representing a specific research domain. The first cluster (Red, 88 items) is the largest, focusing on the Application of AI in Learning Systems and Media, dominated by keywords such as student, e-learning, and machine learning. The second cluster (Green, 68 items) highlights the Ethics and Impact of Generative AI, with the main keywords being academic integrity, generative AI, and ChatGPT. The third cluster (Blue, 62 items) covers Human, Cognitive, and Research Methodology Aspects, characterised by terms such as human, cognition, and survey and questionnaire. Furthermore, the fourth cluster (Yellow, 50 items) serves as a conceptual foundation regarding Technology Adoption and Conceptual Foundations of AI, covering technology adoption and digitalisation. The fifth cluster (Purple, 12 items) focuses on AI for Future Skills and Educational Innovation, with keywords such as computational thinking, Education 4.0, and Industry 4.0. Finally, the sixth cluster (Orange, 1 item) emerged as an isolated node containing only plagiarism, indicating that this topic is a significant focus of attention but is not yet closely integrated with other research networks at the threshold used.

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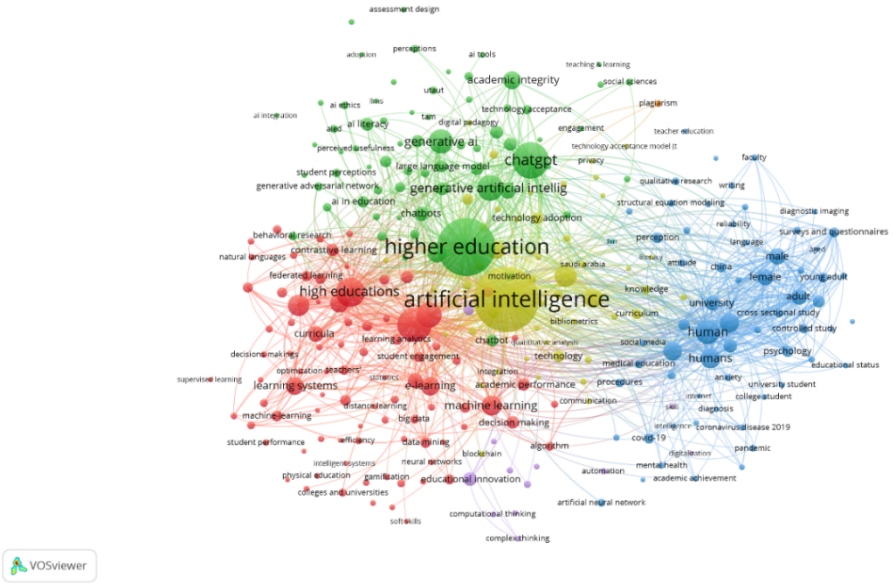

Figure 3. Visualisation map of co-occurrence networks

The visualisation in Figure 4 illustrates the temporal evolution and trends in AI research in higher education through keyword co-occurrence analysis. This map shows that although AI is a massive trend today, its conceptual foundations have long been discussed. Since 1989, Sculley (1989) has outlined a vision of how Artificial Intelligence (AI), along with hypermedia and simulation, will become core technologies that revolutionise higher education. The article is evidence that the transformative potential of this technology was conceived more than three decades before its current popularity.

Prophetically, Sculley (1989) not only focused on the benefits of innovation, but also predicted that the biggest obstacle would not be technology, but rather social and economic issues, specifically highlighting challenges related to 'copyright and royalties'. This early warning provides crucial context for understanding the findings in the visualisation map.

The visualisation shows the early research phase (represented by blue/purple nodes, around 2022) which focused on the technical implementation of AI such as machine learning, e-learning, and education innovation. This trend is clearly a sign of the education world's adaptive response to the urgent need for digitalisation in the wake of the COVID-19 pandemic.

However, as a consequence of this rapid adoption, the map shows a shift in the latest trends (represented by yellow nodes, figure 4) dominated by ethical concerns, exactly as predicted by Sculley (1989). Terms such as academic integrity, ethics, and plagiarism are now the main focus, indicating that the research community is grappling with the social impact of this technology. In addition, the yellow nodes also reveal the diversification of research into new areas that were previously rarely touched upon, such as the impact of AI on student engagement,

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applications in psychology, gender studies (female, male), and the potential for entrepreneurship in higher education.

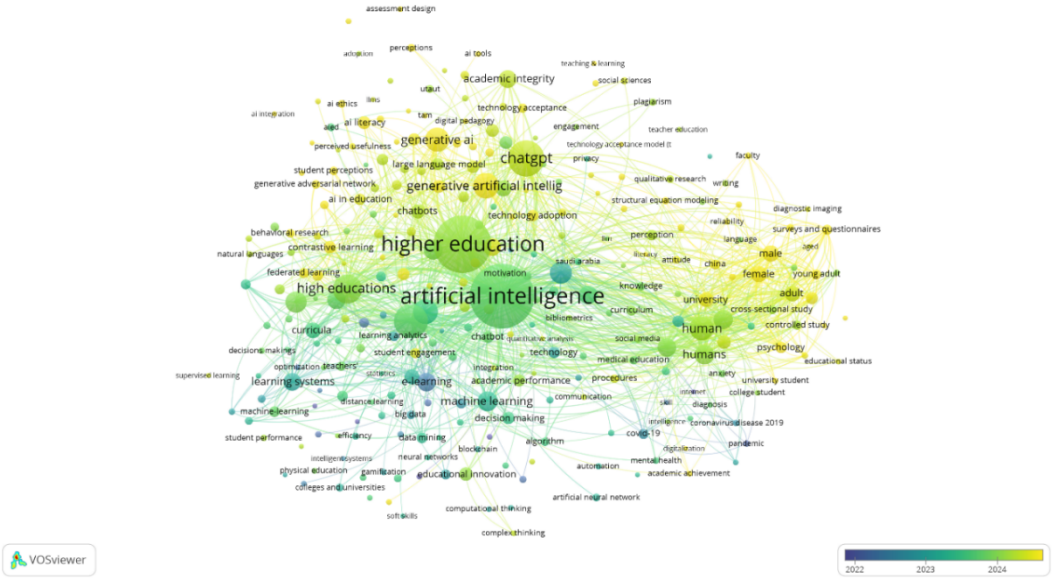

Figure 4. Evolution of AI research trends in higher education institutions

Discussion

RQ1: How productive are countries and institutions in researching the use of AI in higher education?

In response to the first research question, the analysis shows that China is the country with the highest number of publications related to the use of AI in higher education, with 224 studies, followed by the United States with 193 studies. The dominance of these two countries is inseparable from their strategic competition for global AI leadership. In the context of higher education, AI is seen as a strategic sector for developing superior human resources capable of adapting to the artificial intelligence-based industrial revolution (Vorontsova et al., 2025).

The high number of studies in China indicates the serious attention paid by the government and academic institutions to the implications of AI in education, particularly in analysing its impact on cognitive development, learning motivation, and the quality of student learning. Research in China has largely focused on how AI can improve cognitive ability, computational thinking, creative thinking, and academic performance, while also examining potential risks such as technological dependence and a decline in critical thinking skills (Chao & Wright, 2025; Fan et al., 2025; Xie & Wang, 2025). This demonstrates a research approach that is not only oriented towards technological innovation, but also towards evaluating long-term pedagogical impacts.

The United States shows a relatively similar pattern, with research focusing on the integration of AI in classroom learning processes, learning analytics, and the use of AI to support more personalised and interactive learning (Bewersdorff et al., 2025; Habib et al., 2024). However, unlike China, which tends to emphasise

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the effectiveness and scalability of technology, research in the United States is more concerned with linking the use of AI to aspects of pedagogy, ethics, and the readiness of educational institutions to adopt the technology responsibly (Marcinkevage & Kumar, 2025).

Interestingly, developing countries such as Indonesia, Malaysia, and South Africa have also contributed to studies on the use of AI in higher education (Kajiita & Kang'ethe, 2025; Mat Yusoff et al., 2025; Nusivera et al., 2025). These findings show that AI research in education is no longer the exclusive domain of developed countries. Although developing countries generally focus more on accelerating economic growth, the involvement of these three countries indicates an awareness that AI in education is a long-term strategic investment to improve the quality of human resources.

However, AI studies in education in developing countries have different characteristics compared to developed countries, particularly in terms of digital infrastructure readiness, human resource characteristics, and learning culture. Therefore, research in developing countries tends to highlight not only the opportunities for AI utilisation, but also the risks of digital inequality and implementation limitations. These contextual differences open up further research opportunities on how developing countries can optimise the use of AI in higher education as part of their sustainable development strategies and efforts to enhance national economic competitiveness.

RQ2: Which articles have had the most influence on AI research in higher education?

The second research question focused on identifying the articles that had the most significant influence, measured by the number of citations in a collection of articles obtained from the Scopus database. The results of the analysis showed that the most cited article was the study by Cotton et al. (2024), which examined the use of generative AI, particularly ChatGPT, in higher education, highlighting the opportunities and risks faced by students. The high number of citations in the article by Cotton et al. (2024) indicates the relevance and urgency of the topic discussed, especially in the context of the rapid adoption of ChatGPT in academic environments. The main findings of the study show that the use of ChatGPT by students has the potential to increase plagiarism, as demonstrated by a comparison before and after the introduction of AI, where the level of student plagiarism increased from 22%. These findings position ChatGPT as a disruptive technology that not only brings pedagogical benefits but also poses serious challenges to academic integrity.

However, Cotton et al. (2024) also emphasise that ChatGPT has positive potential in supporting more interactive and collaborative learning, as well as assisting educators in designing adaptive and innovative assessments. It is this balance between opportunities and risks that makes the article widely referenced, as it provides a comprehensive and critical perspective on the implications of generative AI use in higher education. In addition, the article by Rudolph et al. (2023) is also an important reference in the study of AI in education, particularly in discussing the paradigm shift in learning and assessment systems due to the

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integration of AI. This study highlights how AI is driving a shift from conventional learning methods to more personalised and technology-based approaches, while also requiring a redefinition of academic evaluation mechanisms in order to uphold honesty and quality in learning.

In general, the ten articles with the highest citations in this study show a consistent trend, namely placing the use of AI in education as an ambivalent phenomenon that presents both opportunities and risks. Most studies recommend the importance of AI literacy, institutional policies, and academic evaluation strategies to minimise plagiarism and other forms of cheating. Although the development of AI technology cannot be stopped, these findings emphasise the need for a prudent and systematic approach from universities in managing the use of AI so that it is in line with educational objectives and principles of academic integrity.

RQ3: What are the 'trends in AI research in higher education?

The dominance of Tecnológico de Monterrey is understandable given that this university has a strong focus on technological development, particularly in the application of AI to learning processes. These findings indicate that various universities around the world are beginning to accept and adopt AI in academic activities. The high productivity of these institutions indicates a strong integration between institutional policies, research capacity, and practical educational needs, especially in the application of AI for personalised learning, learning analytics, and automation of learning evaluation (García-López et al., 2025; Romero-Rodríguez et al., 2023). The significant contributions of the University of Jordan and the University of South Africa reinforce the argument that AI in education is developing rapidly in the context of developing countries because it is driven by gaps in education quality, limitations in teaching staff, and the need for learning system efficiency. In this context, AI is not only positioned as a pedagogical innovation, but as a structural tool to address systemic education problems (Ayyoub et al., 2025). This pattern marks a shift in the orientation of educational AI research from mere technological exploration to contextual and problem-oriented solutions.

Conversely, the relatively moderate but consistent contributions from universities in the UK and Australia indicate a more cautious research approach that focuses on the ethical, regulatory, and pedagogical aspects of AI use (Jin et al., 2025). This indicates a difference in research focus between regions: institutions in developed countries tend to emphasise governance, pedagogical validity, and the ethical implications of AI, while institutions in developing countries place greater emphasis on the potential of AI as a means of expanding access and improving learning effectiveness. Overall, the distribution of these institutions shows that AI studies in education are epistemologically fragmented, with variations in research focus influenced by the socio-economic context of each country. These findings reinforce the need for cross-regional collaboration so that AI development in education is not only technologically innovative, but also pedagogically fair and policy-sustainable.

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RQ4: Which fields of study frequently conduct research related to AI in higher education?

A review of previous studies shows that research on the use of AI in education is dominated by the social sciences, in line with the position of education as a field that is inherently related to human behaviour, interaction and dynamics. In the context of social sciences, AI research focuses more on analysing user behaviour, technology acceptance, changes in learning patterns, and the ethical and pedagogical implications of AI use by students and educators. This approach positions AI not merely as a technological tool, but as a social phenomenon that influences how individuals learn, think, and interact in an academic environment.

This ranking logically reflects the fundamental role in the development and implementation of AI technology. Research in this area highlights the use of AI not only as a technical object of study, but also as a learning tool that has the potential to transform students' core competencies, such as programming, software development, and web-based system creation. The main debate in this discipline revolves around whether AI has the potential to replace the role of information technology professionals or whether it functions as augmenting technology that expands thinking capacity, efficiency, and creativity in the field of computer science.

Furthermore, contributions from the engineering discipline show how AI is utilised to support practice-based learning and complex problem solving. In this field, AI is used to help students understand technical design and simulation through digital projection, data-based modelling, and risk and opportunity analysis in the engineering process. The integration of AI in engineering education not only improves the accuracy and efficiency of planning, but also strengthens students' analytical skills in making data-based decisions.

The differences in focus between disciplines reflect the multidisciplinary nature of AI use in education. The dominance of social sciences emphasises the importance of human and pedagogical aspects, while the contributions of computer science and engineering demonstrate the role of AI as a driver of technical innovation and applied learning. These findings indicate the need for a cross-disciplinary approach so that the development and utilisation of AI in education is not only technologically superior, but also pedagogically and contextually relevant.

RQ5: What are the most frequently researched domains?

Based on the results of analysis using VOSviewer, several nodes or domains were found to appear most frequently in previous studies, particularly ‘Higher Education’ and ‘Artificial Intelligence’. The dominance of these two nodes indicates that the main focus of AI studies is still centred on the context of higher education as the level most ready to adopt AI technology. Higher education institutions are considered to have a higher level of cognitive and academic maturity, so students are expected to be able to use AI critically and reflectively,

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rather than simply passively accepting the output of the technology. In addition, the emergence of nodes related to AI-based learning, such as e-learning and distance learning, confirms that AI is widely used to support independent learning, learning flexibility, and efficiency of the learning process both in and outside the classroom.

However, the mapping results also indicate a research gap in the use of AI in various scientific fields in higher education. The diversity of study programmes in higher education institutions opens up broader opportunities for exploration, such as the use of AI in the arts to support ethical creative processes, in agriculture to increase productivity and sustainability, and in entrepreneurship education to encourage entrepreneurial intent and student business development. Therefore, more comprehensive interdisciplinary research is needed so that the use of AI in higher education is not only technological in nature, but also provides a deeper understanding of social phenomena and future development challenges.

CONCLUSION

A study on the use of AI in higher education from 1985 to 2025 provides insight into trends in AI research in higher education. For future researchers, this article offers suggestions for further analysis of AI use in the arts, entrepreneurship education and agriculture. Furthermore, it encourages researchers in developing countries to contribute to insights on the use of AI in higher education. This study contributes to educational institutions, particularly universities, in conducting research on the use of AI technology and developing strategies to reduce cheating by students.

This study has limitations that need to be addressed in future research. One such limitation is that only one database, Scopus, was used. Although Scopus is a reliable database, it is necessary to diversify the journal databases used in future research, such as by using Web of Science, ERIC, Taylor and Francis, and Emerald. The method used is bibliometric analysis, which only analyses based on relationships between domains. This is not in-depth, so additional analysis is needed, namely a systematic literature review.

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Author Contributions

Yosep Tegar Prameswara contributed to the conceptualisation, data analysis, drafting and editing. Siswandari contributed to the conceptualisation, methodology, supervision and review of the manuscript. Salman Alfarisy Totalia contributed to the conceptualisation, methodology, supervision, review of the manuscript and language editing.

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