

A Bibliometric Analysis of AI in Higher Education: Current Status and Development

Vijender Pal Saini¹, Poonam²

¹Assistant Professor, Haryana School of Business, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India
Email: vijenderhsb[at]gmail.com

²Research Scholar, Haryana School of Business, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India
Email: aryapoonam4008[at]gmail.com

Abstract: *The usage of artificial intelligence has drawn great attention in education and learning. This study examines the association between AI and higher education by analyzing metadata from 1,394 Scopus-indexed papers (2019-2025) using the string ("AI" OR "Artificial Intelligence" AND "Higher Education"). The study identifies major publication sources, trends, and volumes by conducting citation, co-citation, and keyword co-occurrence studies using VOSviewer software. This analysis focuses on the most influential journals, organizations, nations, keywords, international collaborations, and publications in this subject. The 'Education and Information Technologies Journal' has the highest growth rate, with 66 publications. The author 'TAN S' has published the most documents (12), 'The School of Engineering and Sciences University' has the most contributions in this field with 42 publications. 'The United States' has the most publications (565) and total citations (1879). The VOSviewer program visualizes mapping based on co-citation, bibliographic coupling (BC), and co-occurrence (CO). The study's main constraint is its reliance on Scopus data. Linking and analyzing this data can help track the evolution of the topic. This study offers useful understandings for researchers and academics for promoting the development of approaches to enhance the efficient use of AI in higher education and establishing a research agenda for further exploration in this critical area.*

Keywords: AI, Artificial Intelligence, Higher Education, Bibliometric Analysis

1. Introduction

AI has become an inseparable part of today's generation and is being hailed as a tool that can be helpful in all sectors of our lives (Oliveira and Sliva, 2023). The global surge in academic interest is evident in the rising volume of peer-reviewed publications exploring the educational implications of AI, particularly in the post-pandemic digital transformation era (Zhang et al., 2025). Higher education (HE), which is greatly impacted by the advancement of information and communication technology, has shown a considerable deal of interest in the use of AI (Alajmi et al., 2021). AI is utilised in a variety of areas i.e., education related to medical (Winkler-Schwartz et al., 2019), engineering (Shukla et al., 2023), mathematics (Hwang & Tu, 2021), and language (Liang et al., 2022). From individualized learning platforms and intellectual training systems to AI-powered administrative support and plagiarism detection tools, AI is reshaping pedagogical methods and institutional operations (Educase, 2025).

The story of AI in our schools isn't as new as you might think. It's been a long journey, from clunky digital flashcards to the smart assistants we have today. In the Beginning (60s-90s): The Digital Textbook. Early on, "AI" in education was essentially a computer that could provide lessons and quizzes. It wasn't smart or personal, but it was ground-breaking. For the first time, a machine could teach someone (Rahim et al., 2022; Sullivan, 2023). Getting Smarter (90s-2010s): The Adaptive Tutor: Then, AI began to become a bit cleverer. Imagine a math program that noticed you were struggling and gave you an easier problem, or a language app that focused on the grammar you kept getting wrong. It wasn't just delivering content; it was starting to adapt to you, like a patient tutor. AI Everywhere (2010s-2020s): The Campus

Helper: This is when AI went mainstream in universities. It started working behind the scenes to make student life easier—powering learning platforms like Khan Academy, checking for plagiarism, and running 24/7 chatbots to answer questions about deadlines. The goal was to give thousands of students more personal support (King & ChatGPT, 2023; Stohr et al., 2024). The Game-Changer (2022-Now): The Creative Partner. When tools like ChatGPT arrived, everything changed. AI was no longer just a tool; it became a study buddy you could talk to. Students can now brainstorm ideas, get instant feedback on their writing, or ask it to explain complex topics. This also sparked big debates: Is it a tool for learning or cheating? And how do we keep the human connection in teaching? (Chan Ckya, 2023; McGarh et al., 2024; Ma et al., 2025)

McCarthy, who built on Turing's work (Turing, 1950), first used the phrase "artificial intelligence" in 1956 (Cristianini, 2023). Turing explained how intellectual thought and reasoning may be included in machines. Since then, as AI capabilities have advanced meaningfully, the definition of AI has changed and grown. According to Popenici et al. (2017), artificial intelligence is now defined as "computer systems that can engage in human-like processes such as learning, adapting, synthesising, self-correction, and the use of data for complex processing tasks." The relationship between AI and the education system can be articulated as a transformative connection where AI works as an instrument to redefine the teaching, learning and research in Higher education. AI has brought about significant changes in traditional methods of learning in higher education (HE), including personalized learning, innovative teaching and learning methods, and data-driven decision-making (Abrons et al., 2025; Grimus, 2020). Another exciting use of AI in education is the virtual learning assistant, which helps keep students engaged. These assistants

are great because they offer students instant help whenever they're stuck and also improve the lines of communication between them and their instructors (Wang et al., 2021; Feikema et al., 2024). Also, these adaptive learning systems can be altered and create a tailored system of learning according to the requirements of students' availability, styles, preferences, and abilities to enhance their learning and educational experiences. The tutorial system fuelled by the use of AI helps to get simultaneous feedback on learning and attain enhanced learning results (Indrawati and Kuncoro, 2021).

The adoption of many synthetic AI tools such as ChatGPT, Gemini, and Claude has significantly increased in content creation, creating study material, students' learning support and academic writing as these offer efficient results and convenience. Despite these uses and advantages, many researchers suggested that they may pose cognitive risks. The adoption of AI in teaching and learning in higher education has redefined the way of education in 21st century. Bringing AI into universities offers a huge opportunity to streamline how things are run, making them more efficient and affordable, as research shows (Klutka et al., 2018; Cotton Dre 2024; Kuhn et al., 2025). Think about all the routine administrative tasks- like processing applications, managing class sign-ups, and handling financial aid- AI can automate these, letting staff concentrate on bigger-picture initiatives. Furthermore, AI-powered predictive tools give universities a crystal ball of sorts, allowing them to analyze data to make well-informed decisions. This helps with everything from creating budgets and allocating resources effectively to providing timely help to students who might be struggling (Oliveira and Sliva, 2023). For academics, AI can also supercharge the research process. It helps by automating data analysis, spotting new areas for investigation, and drawing meaningful conclusions from vast amounts of scholarly articles, which helps drive academic discovery (Rafik, 2023).

On one hand, integrating AI into university administration could revolutionize day-to-day operations, creating a smarter and more streamlined future for higher education. But on the other hand, it's a move filled with serious hurdles (Konecki, et al., 2023). For starters, there's a real risk that biased AI programs could reinforce unfairness, which forces us to ask tough questions about equity and accountability. Then there's the critical issue of keeping student data private and secure; this means universities must have solid governance and security measures in place and be transparent with students about how their data is used (Kelly, 2021). We also have to consider the human element- faculty are concerned about their roles and job security, so institutions need a plan to help them adapt (Grimus, 2022; Villarreal, 2023). While AI could be great for things like student support and sustainable education, the list of worries is long: algorithmic bias, data privacy, unequal access to technology, and academic dishonesty are all major issues (Baidoo-Anu & Owusu Ansah, 2025). Essentially, we are still navigating the ethics of it all, debating big questions around cheating, who truly owns AI-assisted work, and the validity of AI-generated content in academia (Stelmaszczyk & Saqr, 2024).

This fast-paced move towards AI makes us stop and ask some critical questions: Is it an effective teaching tool? How do we

protect academic integrity? Can we make sure all students have equal access? And what does this mean for the changing roles of educators and learners? To navigate this new territory successfully, everyone involved needs a solid grasp of AI's true impact. Therefore, this research will dive into the complex effects of AI on universities. We'll explore its current applications, the good it could do, and the ethical roadblocks we must clear to guarantee a fair and responsible transformation. The goal is to provide valuable insights that can help teachers, leaders, and policymakers harness AI to build a better future for education (Grimus, 2020; Chouhan & Khasnobish, 2025; Liao et al., 2019).

2. Materials and Methods

2.1 Research Methods

To progress, every academic field must review its prior research. Summarising published research can be done in various ways, including qualitative and quantitative literature reviews. Scientific mapping utilising meta-analysis and bibliometric analysis are two quantitative analysis methods that provide an objective overview of the literature. Using bibliometric techniques, science mapping investigates the connections across topics, disciplines, publications, and authors. When two documents refer to a third document, this is known as bibliographic coupling. Bibliographic coupling sums up the number of sources that deuce published papers have in shared to govern the extent of their similarity. The degree of resemblance is correlated with the number of mutual referrals.

Citation, co-occurrence, and journal evaluation are the main bibliometric analysis techniques used in this work. By outlining the research space, building a citation catalog, and assessing citation linkages and measures, citation analysis explores inter-citation dynamics (Rousseau et al., 2018). By analysing the rate of recurrence and background of common keywords, topics, or writers, co-occurrence analysis identifies focal points and field linkages, resulting in the creation of matrices and relationship visualisation (Kiili et al., 2023). By recognizing significant journals and examining their metrics and tendencies, journal examination evaluates the tendencies of publication and networks (Mongeon & Paul-Hus, 2016). In order to identify research priorities and hotspots in an area, bibliometrics analysis examines citation linkages, author partnerships, and theme advancement tendencies. This methodology clarifies the connections between issues and offers a thorough study perspective. According to Zupic and Čater (2015), this technique offers a broad and wide-ranging research viewpoint, elucidating the connections between themes as well as the present and future tendencies of subjects.

2.2 Database

The publications were found using the Scopus database. The Social Sciences' greatest peer-reviewed research database is Scopus. The repository is well-known and frequently utilised for analytical and quantitative analyses, claim Donthu et al. (2020). "((TITLE-ABS-KEY ("AI" OR "Artificial Intelligence" AND "Higher Education") AND PUBYEAR > 2019 AND PUBYEAR < 2025))" was the search query.

Journals were the only source type employed in the study, which was exclusively focused on articles and review documents.

Following the selection of search terms, the writers searched the bibliometric literature. One of the most popular databases, Scopus, offers a comprehensive summary of the worldwide study yield and is also a popular search engine.

It was used to collect data for the current exploration. A search using the keywords "AI" OR "Artificial Intelligence" AND "Higher Education" yielded 6613 papers. The research records were collected in 2025, but as the Scopus database is updated frequently, the results could alter later. The articles were selected from 2019 to 2025, and 536 articles were published before 2019. This resulted in 6077 documents. After filtering, the subject ranges were selected as Social Sciences and Business Management and Accounting, 2435 documents were removed, and document types articles were filtered, and 1557 documents were removed. Only English-published journal articles and reviews were considered. This

process eliminated 5219 extra papers. Lastly, 1394 articles were left after all filtration.

RStudio is an open-source software that is widely used for statistical computing, data analysis, and data visualization. It delivers an operator-friendly edge that combines a script editor, console, environment/workspace viewer, and powerful tools for plotting and debugging. RStudio enhances productivity by allowing users to write, test, and visualize code efficiently within one platform (Verzani, 2011). By making it possible to use packages like bibliometrix, which enable thorough scientific mapping using data from Scopus and Web of Science, RStudio has revolutionised the area of bibliometrics (Aria & Cuccurullo, 2017). Key bibliometric research methodologies such as authorship networks, topic evolution, keyword co-occurrence, and co-citation analysis are supported by these tools. Because it provides transparency, repeatability, and scalability in the study of academic literature, RStudio's open-source and script-based environment has thus become essential to contemporary bibliometric investigations.



Figure 1: Main information on the data source: Analysis of Scopus data with Biblioshiny
Source(s): Authors' own computation using Biblioshiny Software with Microsoft Excel

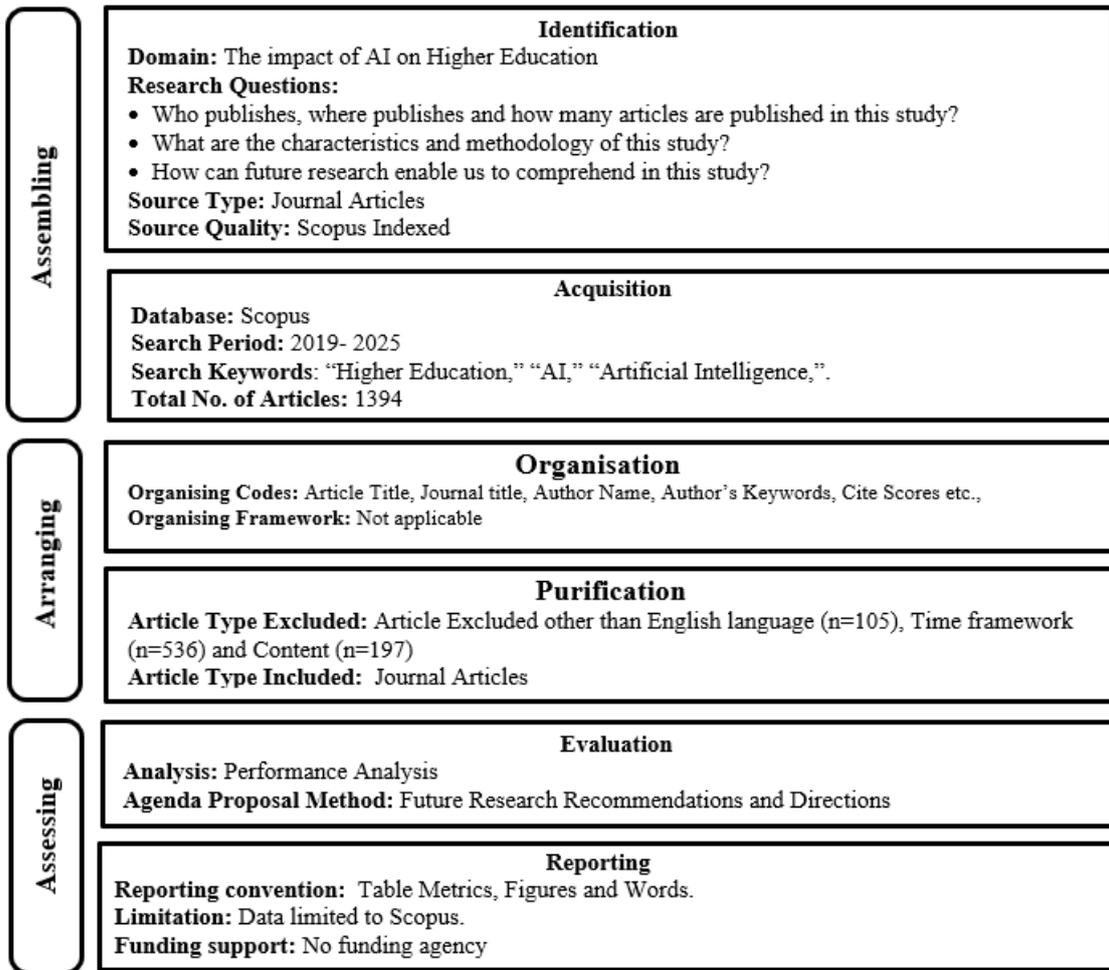


Figure 2: SPAR-4-SLR described by "Paul et al., 2021"

As a consequence, 1394 articles were gathered and analyzed using the SPAR-4-SLR described by "Paul et al., 2021". In addition, limitations were imposed on the year (documents produced between 2019 and 2025), subject area (Social Sciences and Business Management and Accounting), document kind (articles), keywords (Higher Education, ChatGPT, and AI), and language (English only). Finally, 1394 papers were selected for data analysis. Rai et al., (2020) used R-studio (version 4.3.2)-Biblioshiny, VOSViewer, and Microsoft Excel to examine and envisage the data.

3. Results

3.1 Publication Trends

Over the period 2019-2025, publications surged steadily. In 2019, only eighteen publications were published. Over time, the number steadily grew, with significant increases in the next years. By 2025, the publications reached an impressive 540, indicating a substantial rise. The observed growth suggests that there is a rise in academic interest as well as the widespread use of AI in higher education (Figure 1).

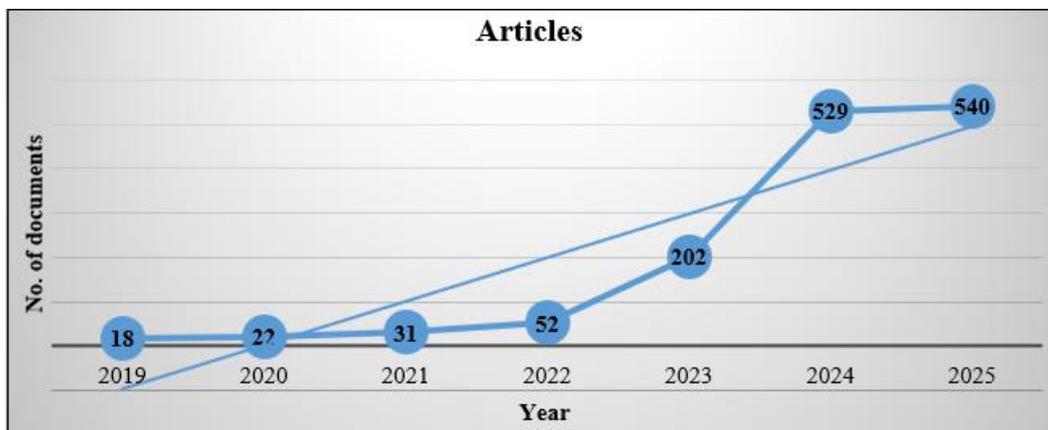


Figure 3: Annual publications

Source(s): Authors' own computation using Biblioshiny Software with Microsoft Excel

3.2 Geographical Distribution Trends

The geographic distribution of scientific publications on AI and higher education are shown in Figure 4. According to the figure, the most creative countries in this bibliometric analysis are the USA (565), China (326), and Australia (312). Peru is the least-producing country, with 128 publications only. When developing nations like India, China, Bangladesh, and Brazil are compared with developed nations like the USA, Australia, Canada, Germany, and the UK, it becomes clear that the majority of research is done in these regions. Researchers can now carry out more studies in emerging and less developed countries due to regular technology improvements.

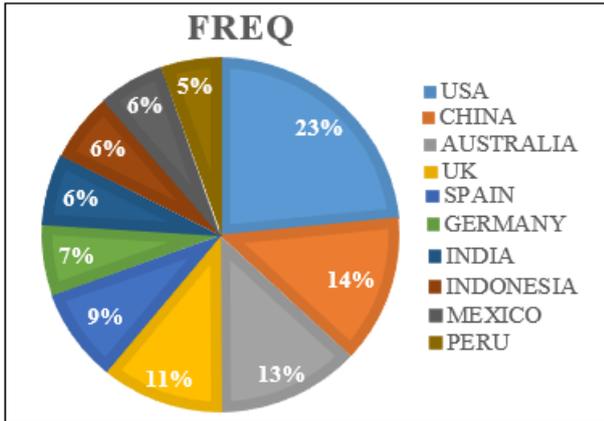


Figure 4: Geographical Distribution Trends

Source: Authors' own computation using Biblioshiny Software with Microsoft Excel

3.3 Analysis of influential authors

Examining the repercussions of AI in higher education, this part explains the influential authors from the knowledge base indexed by Scopus. This study sheds light on how knowledge is generated and disseminated regarding social networking sites, including their impact on mental health. Figure 5 depicts the top ten authors on annual publications and citation counts. Ta has the highest number of publications during the tenure. Griffiths MD's main contribution in 2023 is seven publications. Yitong Wang published his first paper in 2020 and continues to publish. Furthermore, the emergence of some authors in subsequent years suggests a more recent engagement with the area. The different bubble sizes indicate variations in the number of publications, and their temporal distribution suggests possible partnerships and changing research priorities. The graph illustrates an overall increasing trend in scholarly contributions, with several writers emerging as significant contributors to advances in the field.

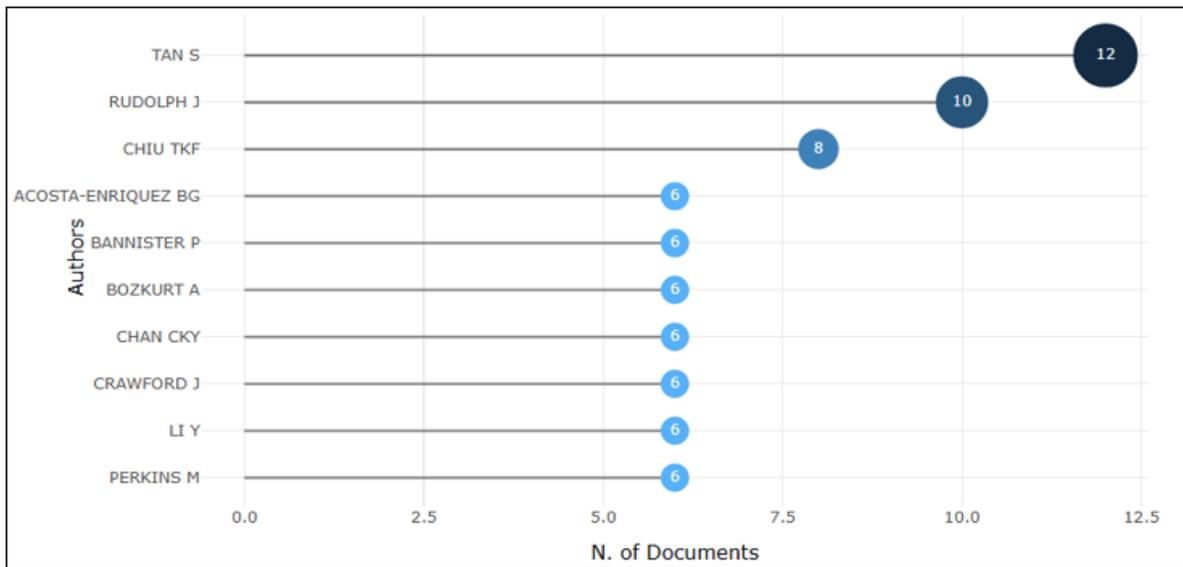


Figure 5: Production of top-authors over time

Source(s): Authors' own computation using Biblioshiny

Table 1 displays important publication metrics for prominent scholars, such as h-index, g-index, year of first publication, total citations (TC), and number of publications (NP). With the most publications (12) and a substantial citation impact (3012), Tan S is particularly notable for their steady research contributions since 2019. Rudolph J comes next with 10 publications but a far greater number of citations (1577), indicating that he has a significant impact in his field even though he has written fewer papers. Their consistent

publishing records and solid citation counts demonstrate the expanding importance of other prominent authors, like Bannister P, Bhaskar P and Chen J.

The findings show that while some authors have more publications, others have a greater impact per article. The combination of total citations, h-index, and g-index reveals information on both productivity and influence in the study field.

Table 1: The most creative authors

S. No.	Author	h-index	g-index	m-index	TC	NP
1	TAN S	8	12	2.667	3012	12
2	RUDOLPH J	7	10	2.333	1577	10
3	CHAN CKY	6	6	2	1521	6
4	BUCEA-MANEA-TONIŞ R	5	5	1	300	5
5	CHIU TKF	5	8	1.667	509	8
6	COWLING M	5	5	1.667	419	5
7	CRAWFORD J	5	6	1.667	437	6
8	BANNISTER P	4	6	1.333	50	6
9	BHASKAR P	4	4	0.667	132	4
10	CHEN J	4	5	1.333	79	5

Source(s): Authors’ computation using Biblioshiny Software
 Abbreviations: Number of publications (NP), Total Citations (TC)

3.4 Relationship between sources, authors, and keywords

Figure 6. displays three field studies of the connection between sources, authors, and keywords. The left column contains source names, the middle column contains author names, and the right column contains keywords. The majority of authors used higher education, ChatGPT, and artificial intelligence as keywords. However, other authors employ phrases such as creative ai, generative artificial intelligence, higher education, teaching etc., and many others. British Journal of Educational Technology has a main contribution in this field.

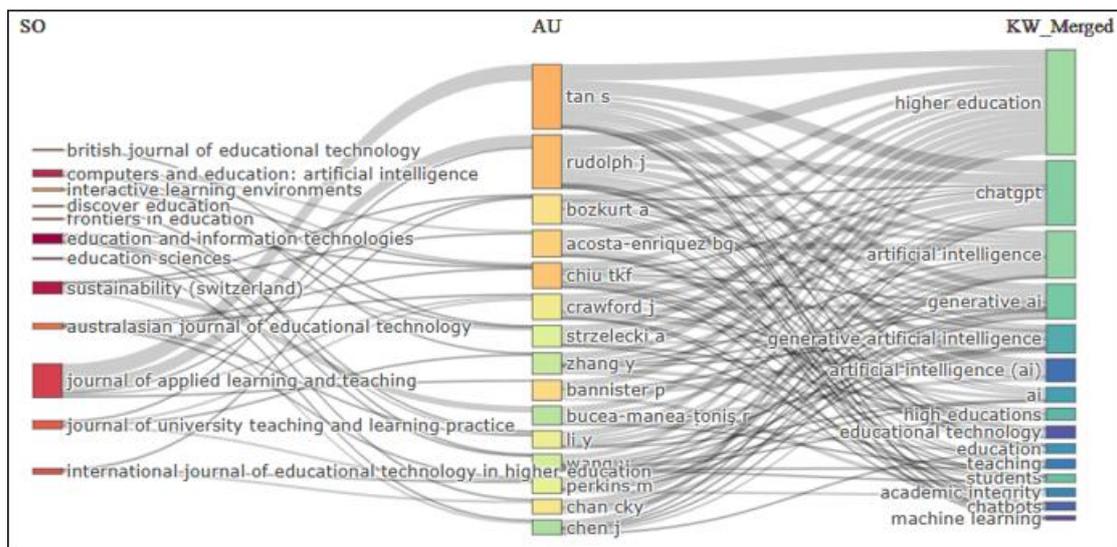


Figure 6: Three field analyses on AI and its impact on Higher Education

Source(s): Authors’ computation using Biblioshiny Software

The impact of AI on higher education was examined in 1394 publications by the researchers. For important publication sources in the field of AI research, Table 2 lists the top 10

journals. The authors evaluated the “Impact Factor”, “Scopus Cite Score”, “h-index”, “g-index”, quartile grade, and annual publishing rate of the journal.

Table 2: Top 10 most cited journals in the field of AI and its importance in higher education

Paper	Total Citations	TC per Year	Normalized TC
Cotton Dre, 2024, “Innovations in Education and Teaching International”	1001	500.5	58.66
Rudolph J, 2023, “Journal of Applied Learning and Teaching”	1001	333.67	16.69
Chan Cky, 2023, “International Journal of Educational Technology in Higher Education”	678	226	11.3
Farrokhnia M, 2024, “Innovations in Education and Teaching International”	566	283	33.17
Crompton H, 2023, “International Journal of Educational Technology in Higher Education”	556	185.33	9.27
Chan Cky, 2023, “International Journal of Educational Technology in Higher Education”	545	181.67	9.09
Rudolph J, 2023, “Journal of Applied Learning and Teaching”	445	148.33	7.42
Sullivan M, 2023, “Journal of Applied Learning and Teaching”	423	141	7.05
Perkins M, 2023, “Journal of University Teaching and Learning Practice”	404	134.67	6.74
MicheL-Villarreal R, 2023, “Education Sciences”	365	121.67	6.09

Source(s): Authors’ computation using Biblioshiny Software

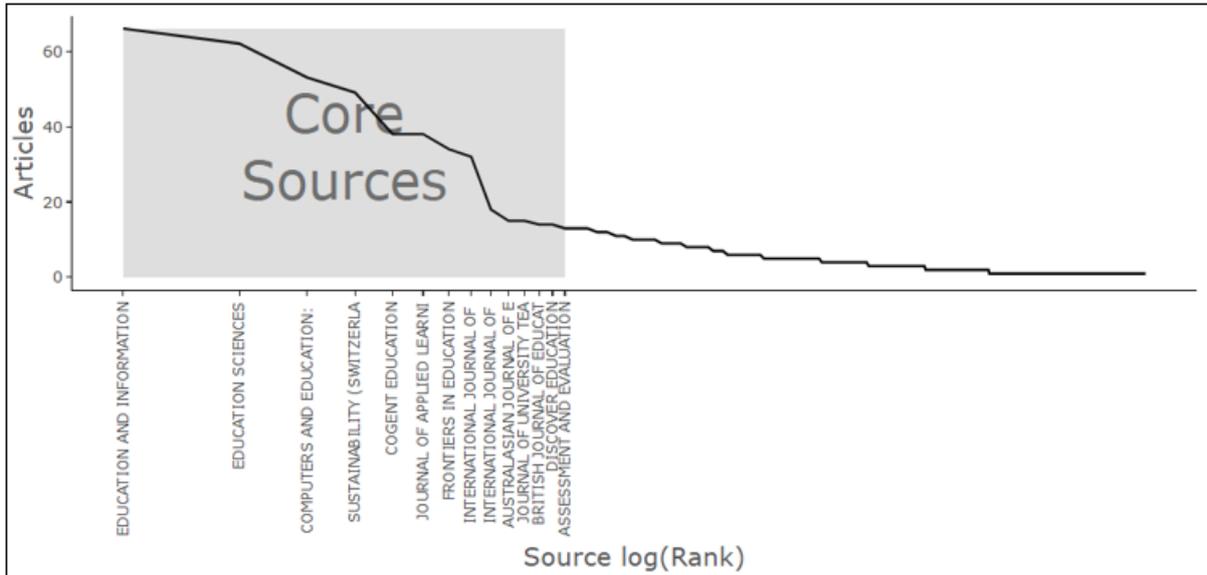


Figure 7: Most productive Journals

Source(s): Authors’ computation using Biblioshiny Software

Bradford’s law: Bradford's scattering law (1: n: n²), which predicts an increase in journal production as one moves from one zone to the next, can be used to divide the total number of citations into three parts (Bradford, 1985). It was

discovered that the top 14 journals were located in the first zone, also referred to as Bradford's zone of core sources or trace 2 journals. They go by the following names (Table 3).

Table 3: Bradford’s Trace 2 Journals’ Name

Rank	Source	f	cf	Zone
1	“Education and Information Technologies”	1	66	Zone 1
2	“Education Sciences”	2	62	Zone 1
3	“Computers and Education: Artificial Intelligence”	3	53	Zone 1
4	“Sustainability (Switzerland)”	4	49	Zone 1
5	“Cogent Education”	5	38	Zone 1
6	“Journal Of Applied Learning and Teaching”	6	38	Zone 1
7	“Frontiers In Education”	7	34	Zone 1
8	“International Journal of Educational Technology in Higher Education”	8	32	Zone 1
9	“International Journal of Learning, Teaching and Educational Research”	9	18	Zone 1
10	“Australasian Journal of Educational Technology”	10	15	Zone 1
11	“Journal Of University Teaching and Learning Practice”	11	15	Zone 1
12	“British Journal of Educational Technology”	12	14	Zone 1
13	“Discover Education”	13	14	Zone 1
14	“Assessment And Evaluation in Higher Education”	14	13	Zone 1

Source(s): Authors’ own computation using Biblioshiny Software

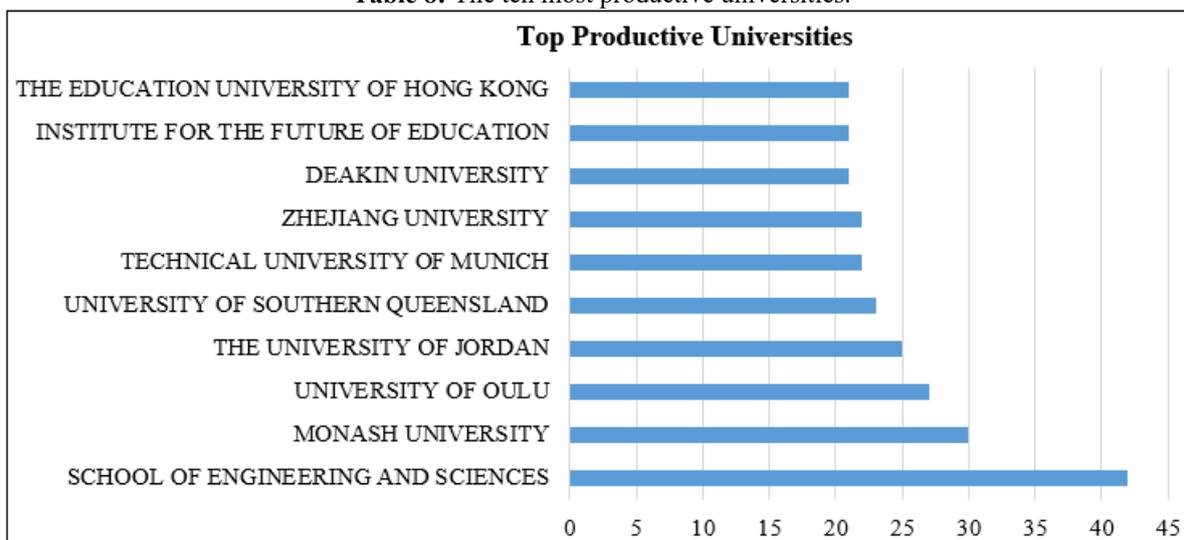
Abbreviation: Frequency (f), Cumulative Frequency (cf)

3.5 The Most Efficient Universities and Institutes

The bibliometric analysis aimed to identify the most prolific universities. Table 4 shows that the School of Engineering and Sciences was the most productive university. Monash University ranked second, the University of Oulu ranked third, the University of Jordan placed fourth, followed by the University of Southern Queensland, and the Technical

University of Munich. The University of Southern Queensland ranked fifth, and the Technical University of Munich placed sixth. This study leads to the conclusion that these universities have produced a substantial amount of scholarly work in the relevant field. Their substantial performance implies active research projects, scholarly contributions, and maybe leading positions within their specialized fields.

Table 8: The ten most productive universities.



Source(s): Authors’ own computation using Biblioshiny Software

Table 4: Top 10 most cited and more recurrently stated articles in the field of AI and Higher Education

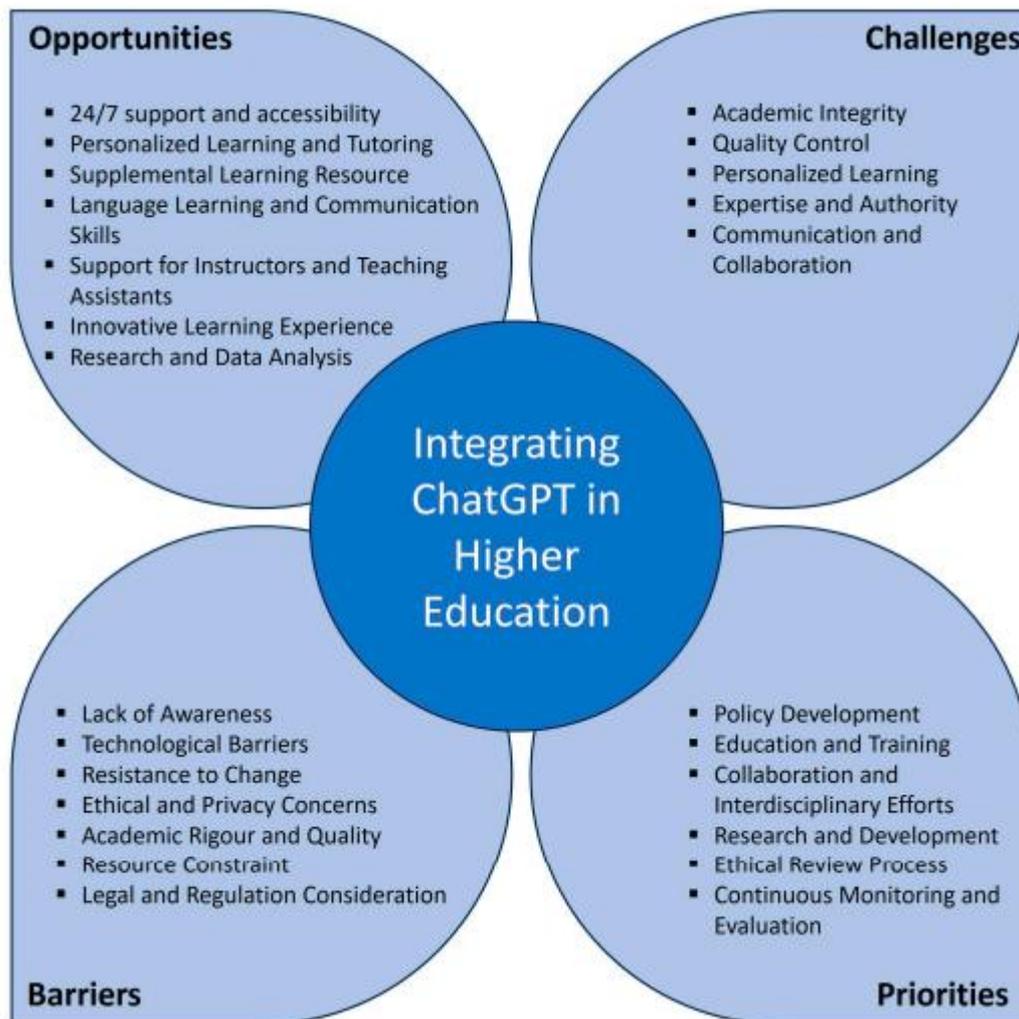
S. No.	Title	Authors	Journal	Year	TC
1	‘Chatting and cheating: Ensuring academic integrity in the era of ChatGPT’	Cotton Dre	Innovations in Education and Teaching International	2024	1001
2	‘ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?’	Rudolph J	Journal of Applied Learning and Teaching	2023	1001
3	‘Students’ voices on generative AI: perceptions, benefits, and challenges in higher education’	Chan Ckya	International Journal of Educational Technology in Higher Education	2023	678
4	‘A SWOT analysis of ChatGPT: Implications for educational practice and research’	Frrkhnia M	Innovations in Education and Teaching International	2024	566
5	‘Artificial intelligence in higher education: the state of the field’	Crompton H	International Journal of Educational Technology in Higher Education	2023	556
6	‘A comprehensive AI policy education framework for university teaching and learning’	Chan Cky	International Journal of Educational Technology in Higher Education	2023	545
7	‘War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education’	Rudolph J	Journal of Applied Learning & Teaching	2023	445
8	‘ChatGPT in higher education: Considerations for academic integrity and student learning’	Sullivan M	Journal of Applied Learning & Teaching	2023	423
9	‘Academic integrity considerations of AI large language models in the post-pandemic era: ChatGPT and beyond’	Perkins M	Journal of University Teaching and Learning Practice	2023	404
10	‘Challenges and Opportunities of Generative AI for Higher Education as Explained by ChatGPT’	Michel Villarreal	education sciences	2023	365

Source(s): Authors’ own computation using Biblioshiny Software

The most important and frequently cited papers in a given scientific subject were found by document citation analysis. With 1001 citations, Cotton Dre and Rudolph J have accumulated the most citations among the 10 most important publications on this research (Table 4).

The recent body of research on AI and higher education, particularly focusing on ChatGPT and other generative AI tools, reveals a dual narrative of opportunities and challenges. Cotton Dre (2024) and Rudolph J (2023) emphasize concerns of academic integrity and assessment validity, highlighting the risk of “cheating” but also the urgent need to redesign evaluation methods. Complementing this, Chan Ckya (2023) captures students’ voices, noting their recognition of AI’s benefits for learning support alongside anxieties over ethical use and fairness. Frrkhnia (2024) offers a SWOT analysis, underscoring ChatGPT’s pedagogical potential while

cautioning about misinformation risks. Crompton (2023) situates AI within the broader higher education ecosystem, identifying the state of the field as one of rapid adoption but uneven institutional readiness. Chan Cky (2023) extends this by proposing an AI policy education framework, stressing structured guidance for faculty and learners. Rudolph (2023) in another contribution, explores the “AI gold rush” of competing chatbots, warning that commercial dynamics will shape academic use. Sullivan (2023) and Perkins (2023) reiterate integrity concerns, calling for academic cultures that emphasize transparency, ethics, and student learning beyond shortcuts. Finally, Villarreal (2023) identifies both challenges and opportunities, with implications for integrating AI responsibly into teaching practices. Collectively, these studies converge on the insight that while generative AI offers transformative potential for personalized learning, efficiency, and innovation, it simultaneously demands new pedagogical models, institutional policies, and ethical safeguards to ensure that higher education evolves without compromising integrity or equity.



4. Conclusion

Higher education, which is greatly impacted by the advancement of information and communication technology, has shown a significant deal of interest in the use of AI. This study uses the terms "AI" OR "Artificial Intelligence" AND "Higher Education" to analyse information from 1,394 Scopus-indexed publications (2019–2025) in order to investigate the relationship between AI and higher education. It identifies major publication sources, trends, and volumes by conducting citation, co-citation, and keyword co-occurrence studies using VOSviewer. This analysis focuses on the most influential journals, organizations, nations, keywords, international collaborations, and publications in this area. 'The Education and Information Technologies Journal' is a critical channel for AI-Higher Education discourse, having the highest growth rate, with 66 publications. The author 'TAN S' has published the most documents (12), 'School of Engineering and Sciences University' has the most contributions in this field with 42 publications. 'The United States' has the most publications (565) and total citations (1879). The VOS viewer program visualizes mapping based on co-citation, bibliographic coupling (BC), and co-occurrence (CO).

The VOSviewer analysis shows strong international collaboration networks, keyword convergence, and influential publication sources. The study's main constraint is its reliance on Scopus data. Linking and analyzing this data can help track the evolution of the topic. This study provides valued intuitions for scholars and academics, promoting the development of approaches to augment the efficient use of AI in higher education and establishing a research agenda for further exploration in this critical area. This study provides valuable insights for social science researchers and medical practitioners alike. This study suggests that while working with possibilities and obstacles regarding the further use of AI in higher education. The results of this bibliometric study provide a comprehensive foundation for evidence-based policymaking. Strategic investment in infrastructure, ethical standards, collaborative networks, and inclusive practices can enhance the accountable and equitable adoption of AI in higher education. Institutions and policymakers should treat this as a call to action to shape AI's revolutionary potential in education.

Acknowledgment:

This paper is part of a Minor Research Project (2025–2026) awarded by Guru Jambheshwar University of Science and

Technology, Hisar. The author gratefully acknowledges the financial and institutional support provided.

References

- [1] AlAjmi, A. (2021). Artificial intelligence and smart universities. In *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success* (pp. 295-310). Cham: Springer International Publishing.
- [2] Bonilla, C. A., Merigó, J. M., & Torres-Abad, C. (2015). Economics in Latin America: a bibliometric analysis. *Scientometrics*, 105(2), 1239-1252.
- [3] Cristianini, N., Scantamburlo, T., & Ladyman, J. (2023). The social turn of artificial intelligence. *Ai & Society*, 38(1), 89-96.
- [4] Dennis, M. J. (2018). Artificial intelligence and higher education. *Enrollment Management Report*, 22(8), 1-3.
- [5] Donthu, N., Kumar, S., & Pattnaik, D. (2020). Forty-five years of Journal of Business Research: A bibliometric analysis. *Journal of Business Research*, 109, 1-14.
- [6] Feikema, A. (2025). *Digital Transformation in Procurement: Plan, Execute and Adopt a Successful Digital Procurement Programme*. Kogan Page Publishers.
- [7] Figuerola-Wischke, A., Merigó, J. M., Gil-Lafuente, A. M., Kydland, F. E., & Amiguet, L. (2024). The Scandinavian Journal of Economics at 125: a bibliometric overview. *The Scandinavian Journal of Economics*, 126(4), 643-697.
- [8] Grimus, M. (2020). Emerging technologies: Impacting learning, pedagogy and curriculum development. *Emerging Technologies and pedagogies in the curriculum*, 127-151.
- [9] Hwang, G. J., & Tu, Y. F. (2021). Roles and research trends of artificial intelligence in mathematics education: A bibliometric mapping analysis and systematic review. *Mathematics*, 9(6), 584.
- [10] Indrawati, S. M., & Kuncoro, A. (2021). Improving competitiveness through vocational and higher education: Indonesia's vision for human capital development in 2019–2024. *Bulletin of Indonesian Economic Studies*, 57(1), 29-59.
- [11] Kelly, B. S., Judge, C., Bollard, S. M., Clifford, S. M., Healy, G. M., Aziz, A., ... & Killeen, R. P. (2022). Radiology artificial intelligence: a systematic review and evaluation of methods (RAISE). *European radiology*, 32(11), 7998-8007.
- [12] Kiili, K., Juho, S., Cloude, E., & Dindar, M. (2023). Demystifying the relations of motivation and emotions in game-based learning: insights from co-occurrence network analysis. *International Journal of Serious Games*, 10(4), 93-112.
- [13] King, M. R., & ChatGPT. (2023). A conversation on artificial intelligence, chatbots, and plagiarism in higher education. *Cellular and molecular bioengineering*, 16(1), 1-2.
- [14] Klutka, J., Ackerly, N., & Magda, A. J. (2018). Artificial intelligence in higher education: Current uses and future applications. *Learning House*, 5-7.
- [15] Konecki, M., Konecki, M., & Biskupic, I. O. (2023, April). Using Artificial Intelligence in Higher Education. In *CSEdu* (2) (pp. 136-141).
- [16] Kuhn, T. N., Engelhardt, W. D., Kahl, V. H., Alkukhun, A., Gross, M., Iseke, S., ... & Madoff, D. C. (2025). Artificial Intelligence–Driven Patient Selection for Preoperative Portal Vein Embolization for Patients with Colorectal Cancer Liver Metastases. *Journal of Vascular and Interventional Radiology*, 36(3), 477-488.
- [17] Liang, W., Tadesse, G. A., Ho, D., Fei-Fei, L., Zaharia, M., Zhang, C., & Zou, J. (2022). Advances, challenges and opportunities in creating data for trustworthy AI. *Nature Machine Intelligence*, 4(8), 669-677.
- [18] Liao, M., & Yao, Y. (2021). Applications of artificial intelligence-based modeling for bioenergy systems: A review. *GCB Bioenergy*, 13(5), 774-802.
- [19] Ma, W., Ma, W., Hu, Y., & Bi, X. (2025). The who, why, and how of ai-based chatbots for learning and teaching in higher education: A systematic review. *Education and Information Technologies*, 30(6), 7781-7805.
- [20] McGrath, C., Farazouli, A., & Cerratto-Pargman, T. (2024). Generative AI chatbots in higher education: A review of an emerging research area. *Higher education*, 1-17.
- [21] Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of Science and Scopus: a comparative analysis. *Scientometrics*, 106(1), 213-228.
- [22] Oliveira, R. C. D., & Silva, R. D. D. S. E. (2023). Artificial intelligence in agriculture: benefits, challenges, and trends. *Applied Sciences*, 13(13), 7405.
- [23] Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and practice in technology enhanced learning*, 12(1), 22.
- [24] Rafik, M. (2023). Artificial intelligence and the changing roles in the field of higher education and scientific research. In *Artificial Intelligence in Higher Education and Scientific Research: Future Development* (pp. 35-46). Singapore: Springer Nature Singapore.
- [25] Rahim, N. I. M., Iahad, N. A., Yusof, A. F., & Al-Sharafi, M. A. (2022). AI-based chatbots adoption model for higher-education institutions: A hybrid PLS-SEM-neural network modelling approach. *Sustainability*, 14(19), 12726.
- [26] Rousseau, T., Amokrane, K., Meddeb, M., Renoir, N., Brunat, M., Fort, M., ... & Berthou, H. (2024, April). Cooperation between a human traffic manager and an AI assistant for an improved railway infrastructure resilience. In *Transport Research Arena (TRA'24)*.
- [27] Shukla, A., Algnihotri, A., & Singh, B. (2023). Analyzing how AI and emotional intelligence affect Indian IT professional's decision-making. *EAI Endorsed Transactions on Pervasive Health and Technology*, 9, 1-13.
- [28] Stöhr, C., Ou, A. W., & Malmström, H. (2024). Perceptions and usage of AI chatbots among students in higher education across genders, academic levels and fields of study. *Computers and Education: Artificial Intelligence*, 7, 100259.
- [29] Stöhr, C., Ou, A. W., & Malmström, H. (2024). Perceptions and usage of AI chatbots among students in

higher education across genders, academic levels and fields of study. *Computers and Education: Artificial Intelligence*, 7, 100259.

- [30] Taneri, G. U. (2020). Artificial Intelligence & Higher Education: Towards Customized Teaching and Learning, and Skills for an AI World of Work. Research & Occasional Paper Series: CSHE. 6.2020. *Center for Studies in Higher Education*.
- [31] Turing, A. M. (1950). *Mind*, 59(236), 433-460.
- [32] Verzani, J. (2011). *Getting started with RStudio*. "O'Reilly Media, Inc."
- [33] Wang, L., Zhang, Y., Wang, D., Tong, X., Liu, T., Zhang, S., ... & Clarke, M. (2021). Artificial intelligence for COVID-19: a systematic review. *Frontiers in medicine*, 8, 704256.
- [34] Winkler-Schwartz, A., Bissonnette, V., Mirchi, N., Ponnudurai, N., Yilmaz, R., Ledwos, N., ... & Del Maestro, R. F. (2019). Artificial intelligence in medical education: best practices using machine learning to assess surgical expertise in virtual reality simulation. *Journal of surgical education*, 76(6), 1681-1690.
- [35] Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational research methods*, 18(3), 429-472.