Mapping the Landscape of Artificial Intelligence in Higher Education: A Bibliometric Analysis

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Abstract

The changing landscape of artificial intelligence (AI) in higher education is examined in this bibliometric analysis. Recent years have seen notable changes in the way AI technologies are integrated into educational settings. We use longitudinal studies, examining the field's history over time and finding patterns and variations in research focus, to better understand this quickly changing subject. Examining regional differences in AI acceptance and use in higher education, this study sheds insight on how various geographic areas are utilizing AI's promise to improve education. In order to assess the efficacy of AI applications in enhancing student performance, we also carry out comparative evaluations across various institutions and educational systems, taking into account elements like learning outcomes, student assistance, and curriculum design. We investigate cutting-edge AI uses in higher education, such as content production, student mental health assistance, and AI-driven academic advice. These apps provide fresh approaches to improve instruction and student learning. We provide standardized measures that is used to gauge AI's efficacy across systems and institutions in order to guarantee a thorough assessment of the technology's impact on higher education. This study advances our knowledge of how artificial intelligence is influencing higher education and will direct future advancements in this area.

Keywords: Artificial Intelligence, Higher Education, Bibliometric Analysis, Bibliographic coupling.

1. AN OVERVIEW:

Higher Artificial Intelligence (AI) is developing as a transformational force in higher education. In the digital era, technology has had a significant impact on education. Artificial intelligence (AI) is the term used to describe the introduction of sophisticated AI systems into educational settings with the goal of improving student learning, streamlining administrative procedures, and stimulating creativity [1-2]. This article explores how artificial intelligence (AI) is transforming higher education and discusses its advantages, drawbacks, and potential to completely change how information is obtained and shared[3].

1.1 Tailored Education and Flexible Curriculum:

By customizing learning pathways for each student, artificial intelligence (AI) has the potential to completely transform the traditional classroom setting. It can evaluate the strengths, limitations, and learning preferences of pupils using data analysis and machine learning techniques. This makes it possible to develop curriculum that are flexible and meet the individual needs of every student. As a result, learning may proceed at the student's own pace, which guarantees a better comprehension and retention of the content[4-6].

1.2 Enhanced Education and Training:

AI-powered resources can provide instructors priceless assistance. Chatbots, intelligent assistants, and virtual instructors may answer questions, lead conversations, and provide immediate feedback. This guarantees that students have access to quick, individualized help while simultaneously relieving the load on teachers. AI may also evaluate student performance data, which enables teachers to pinpoint areas that need more focus or a change in their approach to teaching[7-8].

1.3 Improved Cooperation and Research:

AI is extremely useful in academia for analyzing large volumes of data, speeding up research, and promoting multidisciplinary cooperation. AI-driven analytics may locate pertinent studies, glean important insights, and even propose new lines of inquiry. Virtual research assistants can also automate laborious processes like data collecting and analysis, freeing up academics to concentrate on more advanced intellectual pursuits[9].

1.4 Inclusivity and Accessibility:

AI has the power to provide kids with a range of learning requirements equal opportunities. It can help people with impairments by having speech-to-text and text-to-speech capabilities. Furthermore, AI-powered translation systems can increase non-native speakers' access to educational information, fostering inclusion in the international educational community [10].

1.5 Allocation of Resources and Administrative Efficiency:

AI has the potential to improve administrative procedures in higher education beyond the classroom. AI-powered solutions may streamline processes, lessen administrative load, and improve overall operational efficiency in a variety of contexts, including admissions, scheduling, and resource allocation. Consequently, this makes it possible for educational institutions to distribute resources more wisely, which eventually helps both teachers and pupils [11-14].

The past several decades has witnessed revolutionary changes in the way information is taught and learned due to the confluence of artificial intelligence (AI) and education. The potential of artificial intelligence (AI) to transform higher education is becoming more and more apparent as its capabilities grow [15-17]. Higher artificial intelligence (AI) has the potential to transform traditional teaching approaches, personalize learning, and streamline administrative procedures when it is integrated into the academic setting. The rising amount of research resulting from this growing synergy between AI and higher education requires a methodical examination in order to identify key players, new areas of interest, and common trends [18-21].

The intellectual environment around the use of higher artificial intelligence in higher education is thoroughly explored in this bibliometric analysis. Through the application of bibliometric approaches, our goal is to measure and assess the body of knowledge in this area, illuminating key publications, significant figures, and the progression of research topics over time[22-23]. With the goal of revealing important patterns, relationships, and new trends within the large body of scholarly literature, the analysis offers priceless insights for scholars, teachers, and policymakers alike. This introduction lays out the background and importance of our bibliometric journey, as well as the purpose of our investigation into the integration of higher artificial intelligence in higher education. It opens the door for a thorough investigation of the intellectual environment with the goal of revealing the intellectual foundation of this dynamic and quickly changing nexus between academia and artificial intelligence. By conducting this bibliometric study, we want to advance knowledge of how higher education is changing in the age of artificial intelligence[24-26]. This knowledge will eventually shape future research projects and direct strategic efforts in the field of higher education.

2. METHODOLOGY:

The study, "Mapping the Landscape of Artificial Intelligence in Higher Education: A Bibliometric Analysis," follows a series of important phases in its approach. Using TITLE-ABS-KEY KEY ("artificial intelligence" AND "higher education") AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar"))as the search criterion, a customized search string is created to locate English language academic publications about artificial intelligence in higher education. The selection of database is Scopus which helps to narrow the emphasis on pertinent research articles even further. Applying the search string to find scholarly publications that fit the predefined criteria is known as data retrieval. A quantitative analysis is then conducted using bibliometric approaches, which cover characteristics such as publication patterns, author contributions, sources, affiliations, topic areas, and citations. The results are presented in a visually appealing manner using tables and graphs to make the findings easier to understand and help identify important trends in the academic literature. The data has also been filtered using inclusion and exclusion criteria to guarantee that it was pertinent and followed the goals of the study.

3. RESULT ANALYSIS AND DISCUSSION:

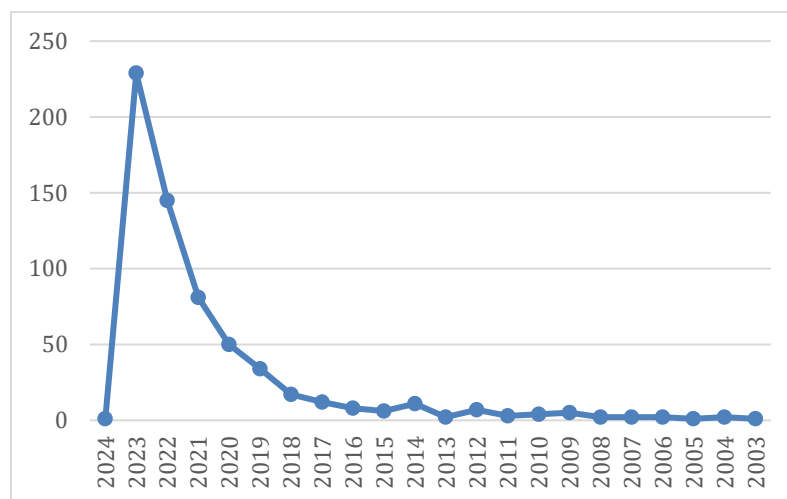### 3.1 Annual Scientific Production

Fig 1: Documents by Year

Fig 1 shows the total number of papers published in each year between 2003 and 2024. The number of articles increases steadily over time, reaching a peak of 229 articles in 2023. There is a discernible rising trend in the number of articles published between 2018 and 2024, indicating a rise in writing, reporting, and research activities over this time. In 2023, there were 229 articles published. This can point to increased activity or interest in the topic being researched or covered throughout these years.

3.2 Best Ten Sources

The top ten sources are shown in Table 1. "Sustainability Switzerland" is a notable source among the others, having the most published papers (21), suggesting a significant focus on information relevant to sustainability. With 16 publications, "Education and Information Technologies" comes in close second, most likely focusing on information and educational technologies. With 12 papers apiece, "Computers And Education Artificial Intelligence" and "International Journal Of Educational Technology In Higher Education" tied for third place, highlighting the expanding importance of AI in the field of education. For those who are interested in their particular disciplines, these sites offer insightful information and resources.

Table 1: List of Top Ten Sources in the area of Study

S.NO	Source	Documents
1	Sustainability Switzerland	21
2	Education And Information Technologies	16
3	Computers And Education Artificial Intelligence	12
4	International Journal Of Educational Technology In Higher Education	12
5	IEEE Access	11
6	Education Sciences	10
7	Frontiers In Psychology	10
8	International Journal Of Emerging Technologies In Learning	10
9	Journal Of University Teaching And Learning Practice	7
10	Wireless Communications And Mobile Computing	7

3.3 Most Prolific Authors

The top 10 writers are shown in the Fig2, according to the quantity of articles they have written. With four papers apiece, Guerrero-Roldán, Ilić, and Kuleto tie for first place, demonstrating their extensive contributions to their respective disciplines. Seven authors, each with three works, are closely behind, including Bañeres, Bucea-Manea-țoniș, Chiu, Derrick, Fomunyam, and Jiao. These writers have proven to be committed and productive in their academic and research endeavours, and their contributions are probably noteworthy in their fields of specialization. This table highlights the writers' influence in their respective fields and provides insight into their publication activities.
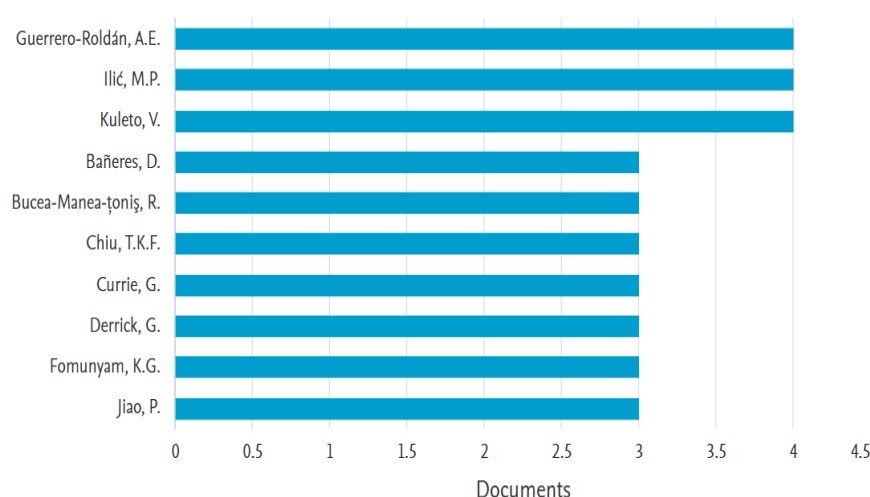
Fig 2: Most Influential Authors

The table 2 provides an overview of the top ten affiliations based on the number of documents they are associated with. Tecnológico de Monterrey leads with 15 documents, highlighting its significant contribution to academic publications. King Abdulaziz University and King's College London follow closely with 8 and 7 documents, respectively, showcasing their strong presence in scholarly research. The presence of various international institutions, such as SRM Institute of Science and Technology, Bucharest University of Economic Studies, and others, with 4 to 6 documents, emphasizes the global reach and collaborative nature of research and academic partnerships. This table underscores the diverse and impactful affiliations that contribute to the body of knowledge through their publications.

3.4 Most Prolific Institutions based on documents published

Table 2: Top Documents by affiliations

S.No	Affiliation	Documents
1	Tecnológico de Monterrey	15
2	King Abdulaziz University	8
3	King's College London	7
4	SRM Institute of Science and Technology	6
5	Bucharest University of Economic Studies	6
6	University Business Academy in Novi Sad	5
7	University of South Africa	5
8	University of Tasmania	5
9	Deakin University	5
10	Universitatea Spiru Haret	5

The institutions with the highest publication rate of papers within the study's context are displayed in the table. With 15 documents, Tecnológico de Monterrey tops the list and shows a significant contribution to scholarly publications in the discipline. King Abdulaziz University and King's College London follow closely after with 8 and 7 documents, respectively, demonstrating their robust presence in academic research. A number of other institutions have five documents apiece, demonstrating their active participation in research: SRM Institute of Science and Technology; Bucharest University of Economic Studies; and University Business Academy in Novi Sad. These organizations demonstrate their commitment to expanding knowledge in the field of study by representing a varied and international panorama of academic contributions.

3.5 Top 15 Countries based on publications

The leading nations and territories are highlighted in the figure 3 according to the quantity of papers they have created, demonstrating their noteworthy contributions to scholarly and research publishing. China tops the list with 106 documents, closely followed by the US with 100, demonstrating their prominence as significant producers of academic output on a worldwide scale. Australia, Spain, India, and the United Kingdom are all heavily represented, with 55, 46, 41, and 38 papers, respectively. These figures highlight how research activity is distributed globally and highlight the variety of countries that are actively involved in academic research. The table presents a diverse and abundant array of scholarly contributions, mirroring the worldwide scope of study and information sharing.
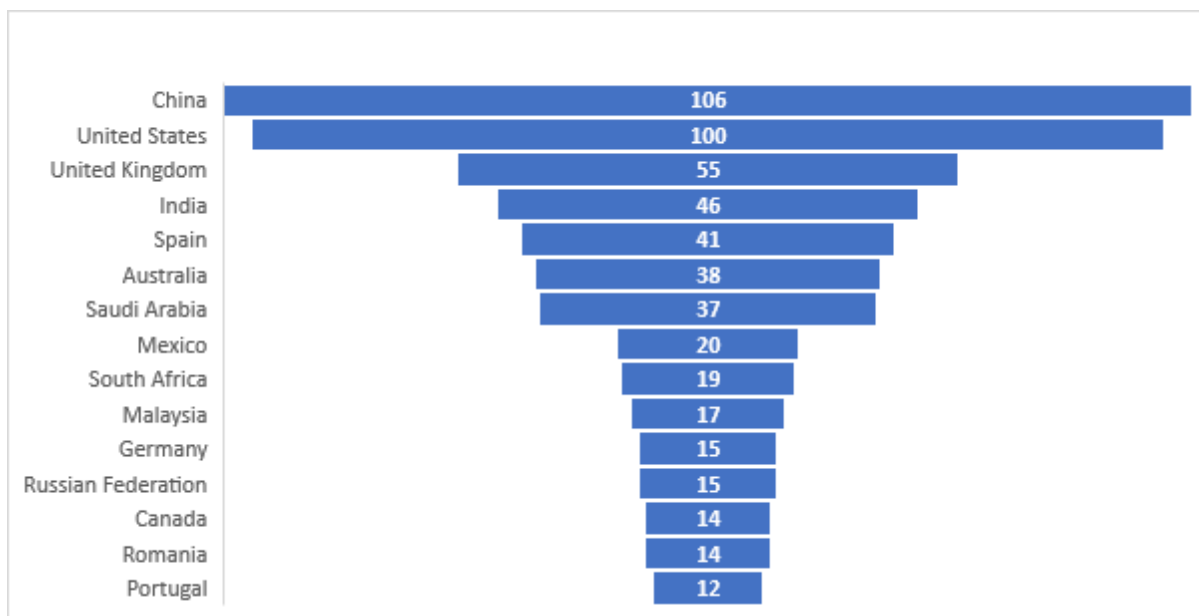

Fig 3: Most documents publishing Countries

3.6 Documents by Top 15 Subject Area

An overview of the distribution of papers across different topic areas is shown in Table 3, which emphasizes the variety of academic study disciplines. With 337 documents, the Social Sciences predominate, closely followed by Computer Science with 281, demonstrating their substantial influence and extensive research effort. With 156, 74, 72, and 40 documents, respectively, engineering, business, management and accounting, mathematics, and psychology also have a significant presence. This diversity is a reflection of the different interests and priorities among academics as well as the multidisciplinary character of research. In addition, the inclusion of topics like energy, environmental science, medicine, and the arts and humanities highlight the diversity of knowledge and skill enhancing the academic landscape. This table highlights the many facets of the study domain as well as the range of specializations and areas of interest that fuel scholarly investigation.

Table 3: Subject Area Wise Bifurcation of Papers Published

Subject area	Documents
Social Sciences	337
Computer Science	281
Engineering	156
Business, Management and Accounting	74
Mathematics	72
Psychology	40
Environmental Science	38
Energy	35
Arts and Humanities	29
Medicine	28
Decision Sciences	25
Materials Science	24
Health Professions	19
Economics, Econometrics and Finance	15

3.7 Bibliographic Coupling of Sources

Bibliographic coupling data for many sources is shown in Figure 4, with an emphasis on the first five rows. With the greatest overall link strength of 77, "Computers and Education: Artificial Intelligence" stands out as having significant ties to and impact in its subject. With a total connection strength of 83, "International Journal of Educational Technology in Higher Education" follows closely, highlighting its importance in the academic network. "Applied Sciences (Switzerland)" and "Education Sciences" both retain noteworthy link strengths of 20 and 23, respectively, emphasizing their significance and collaborative relationships in their respective domains. "Computers and Education" exhibits a strong effect with a link strength of 22. These extensive interactions and common research interests within these fields of study are shown by the strong bibliographic couplings among top sources, which add to the corpus of knowledge in academic literatures.
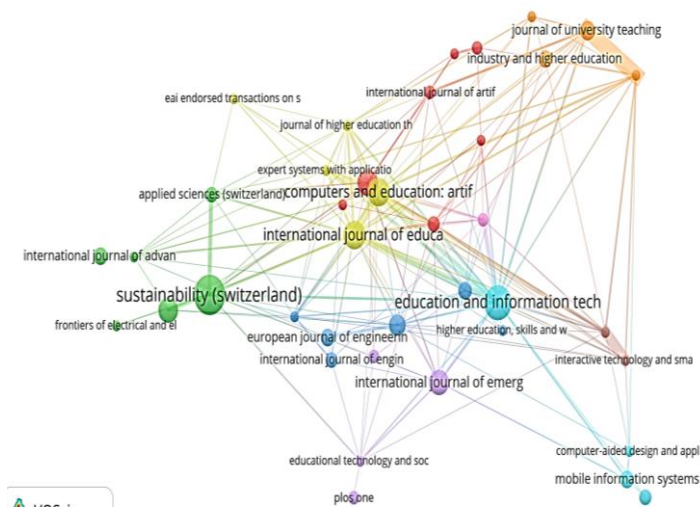
Fig 4: Bibliographic Coupling of Sources.

4. CONCLUSION:

Our study, "Mapping the Landscape of Higher Artificial Intelligence in Higher Education: A Bibliometric Analysis," concludes by examining how artificial intelligence is changing higher education. By improving teaching, streamlining administrative procedures, fostering inclusion, and customizing learning, artificial intelligence (AI) has the potential to completely transform the educational environment. Through the identification of important sources, significant writers, and topic areas, the bibliometric study provides insight into the changing scholarly environment in this discipline. It highlights the international and multidisciplinary character of research, demonstrating its influence and cross-border cooperation. Our analysis offers useful insights for academics, educators, and policymakers, leading to a deeper understanding of this dynamic confluence and directing future efforts in higher education as the convergence of AI and education continues to change the future of learning.

5. FUTURE RESEARCH AREA:

The research scope for "Mapping the Landscape of Artificial Intelligence in Higher Education: A Bibliometric Analysis" will expand in the future to include comparative analyses of AI adoption across institutions, examination of emerging applications in education, longitudinal studies tracking AI's evolving role over time, investigations into regional disparities, and the development of standardized metrics for evaluating AI's efficacy in improving teaching and learning outcomes. These study directions can help us better understand how AI affects higher education and guide future integration efforts.

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