Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 9 Issue 37 (December 2024) PP. 286-301
DOI: 10.35631/JISTM.937021

JOURNAL OF INFORMATION SYSTEM AND TECHNOLOGY MANAGEMENT (JISTM)
www.jistm.com

A TREND IN PUBLISHING ARTIFICIAL INTELLIGENCE PERSONALIZED EDUCATION: ENHANCING LEARNING EXPERIENCES FOR UNIVERSITY STUDENTS

Dean Nelson Mojolou[1], Faerozh Madli[2*], Helmina Thomas[3], Stephen Laison Sondoh Jr.[4], Erick Karunia[5]

[1] Faculty of Business, Economy, and Accountancy, Universiti Malaysia Sabah
Email: deannelson@ums.edu.my
[2] Faculty of Business, Economy, and Accountancy, Universiti Malaysia Sabah
Email: faerozhmadli@ums.edu.my
[3] Faculty of Business, Economy, and Accountancy, Universiti Malaysia Sabah
Email: helmina.thomas53@gmail.com
[4] Faculty of Business, Economy, and Accountancy, Universiti Malaysia Sabah
Email: jude@ums.edu.my
[5] Faculty of Economics, Universiti Borneo Tarakan
Email: erickkarunia3@gmail.com
[*] Corresponding Author

Article Info:

Article history:
Received date: 27.10.2024
Revised date: 11.11.2024
Accepted date: 15.12.2024
Published date: 24.12.2024

To cite this document:

Mojolou, D. N., Madli, F., Thomas, H., Sondoh Jr, S. L., & Karunia, E. (2024). A Trend In Publishing Artificial Intelligence Personalized Education: Enhancing Learning Experiences For University Students. *Journal of Information System and Technology Management*, *9* (37), 286-301.

DOI: 10.35631/JISTM.937021

Abstract:

This bibliometric analysis explores the emerging landscape of Artificial Intelligence (AI) in personalized education, revealing a significant growth in research publications from 2004 to 2024. The study examines research trends, publication patterns, and collaborative efforts across disciplines, with findings indicating a sharp increase in publications from 200 per year in 2020 to a projected 500 by 2024. Analyzing data from Scopus, the research highlights AI's transformative potential in higher education, with Social Sciences (46%) and Computer Science (23.3%) dominating the publication landscape. Key themes include personalized learning, adaptive learning technologies, and integrating advanced tools like ChatGPT while addressing critical ethical considerations around data privacy and responsible AI implementation. The global research ecosystem, led by the United States, United Kingdom, and China, demonstrates a collaborative approach to developing AI-driven educational solutions that promise to enhance individual learning experiences and outcomes for university students.

Keywords:

Artificial Intelligence; Personalized Education; Learning Experience

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Introduction

Integrating Artificial Intelligence (AI) into education has catalyzed a transformative shift in how students learn and interact with educational content. Notably, traditional one-size-fits-all teaching approaches often fail to address individual students' diverse learning needs and preferences. AI-powered personalized education leverages advanced algorithms to adapt learning experiences based on students' strengths, weaknesses, and interests. This approach improves engagement and enhances academic outcomes, fostering a more inclusive and effective learning environment (Zhu, Zhao, & Tang, 2023). With universities striving to modernize their pedagogical strategies, AI-driven personalization has become a pivotal trend in higher education.

Personalized education, facilitated by AI, offers dynamic capabilities such as adaptive learning platforms, real-time feedback, and predictive analytics (Gutiérrez-Cirlos et al., 2023; Ning, Bo, Wang, Wang, & Guo, 2024). These tools enable educators to identify and address learning gaps while empowering students to progress independently. In addition, research suggests personalized learning enhances motivation and deepens understanding by delivering content tailored to individual cognitive profiles (Boral, Mondal, & Saikia, 2024). Moreover, as AI continues to evolve, its potential to integrate seamlessly with technologies such as virtual reality, natural language processing, and intelligent tutoring systems promises to redefine the educational landscape. Correspondingly, universities increasingly recognize the need to embrace these advancements to remain competitive and relevant in a rapidly changing world.

However, the adoption of AI-powered personalized education is not without challenges. Concerns over data privacy, ethical considerations, and equitable access must be addressed to ensure that these technologies benefit all students (Ho, 2023). Furthermore, educators need to be trained to effectively use AI tools while maintaining the human-centric essence of teaching. Despite these hurdles, the growing body of evidence supporting the efficacy of AI-driven personalized learning underscores its potential to revolutionize university education. As universities continue investing in AI technologies, the trend toward personalized education will likely become a cornerstone of 21st-century learning (Rane, Choudhary, & Rane, 2023).

Literature Review

The application of AI in personalized education has gained increasing attention in recent years, driven by advancements in machine learning, adaptive learning systems, and data analytics. Researchers have extensively explored the role of AI in tailoring educational experiences to students' individual needs. For example, adaptive learning platforms use AI algorithms to analyze student interactions, identify knowledge gaps, and provide customized learning pathways. A study by Holmes et al. (2019) highlighted that AI-driven systems significantly improve student engagement and academic performance by adapting content delivery to individual cognitive profiles. Such personalized approaches are perceived as essential in addressing the limitations of traditional teaching methods, which often fail to meet the diverse learning needs of students in higher education.

AI's capability to offer real-time feedback and assessments is another critical area of exploration. According to Luckin et al. (2018), AI-powered tools can deliver instant, actionable insights into student performance, enabling educators and learners to identify areas for

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improvement. Intelligent tutoring systems, for instance, provide tailored instructional support by simulating one-on-one interactions between students and tutors. These systems are particularly effective in Science, Technology, Engineering, and Mathematics (STEM) disciplines, where problem-solving and iterative learning are crucial. Furthermore, research indicates that AI-powered assessments are faster and more precise than traditional methods, ensuring a more accurate evaluation of student learning outcomes (Roll & Winne, 2019).

The use of AI in personalized education has also been examined in the context of fostering self-regulated learning. Self-regulated learning refers to students' ability to plan, monitor, and evaluate their learning processes. AI-based learning environments can scaffold these skills by providing adaptive feedback and personalized resources. For example, Chen et al. (2020) demonstrated that students using AI-driven platforms exhibited greater autonomy and motivation in their learning journeys than in conventional settings. These systems empower students to take ownership of their education, promoting a deeper engagement with the subject matter and long-term academic success.

While the benefits of AI in personalized education are well-documented, challenges related to data privacy and ethical concerns remain pressing. Scholars like Williamson and Eynon (2020) emphasized the significance of transparent data governance policies to protect student information from misuse. Using large datasets to train AI models raises questions about consent, security, and equitable access. Additionally, there is a risk that AI systems may inadvertently reinforce biases present in the data, leading to unfair outcomes for certain student groups. Addressing these ethical considerations is crucial to ensuring that AI technologies in education serve as inclusive and equitable tools.

Educators also face challenges in effectively integrating AI technologies into their teaching practices. Many studies emphasize a skills gap among educators lacking training in AI-based tools. For instance, Zawacki-Richter et al. (2019) highlighted that professional development programs are essential to help teachers leverage AI tools while maintaining the human-centric aspects of teaching. Without proper training, there is a risk that educators may over-rely on AI systems, potentially diminishing the quality of interpersonal interactions that are vital for holistic learning experiences.

Despite these challenges, the literature consistently points to the transformative potential of AI in personalized education. Hence, by addressing the current limitations, universities can harness AI to create more effective, engaging, and inclusive learning environments. Moreover, future research should focus on developing ethical frameworks, enhancing AI transparency, and ensuring accessibility to all students, regardless of their socio-economic backgrounds. As universities continue to explore the integration of AI in personalized learning, it is evident that these technologies hold the key to revolutionizing the educational landscape for generations to come.

Research Question

- What are the research trends in Artificial Intelligence Personalized Education according to the year of publication?
- Who writes the most cited articles? Moreover, where do they work?
- What are the types of documents by subject of research?
- Who are the top 10 authors based on citation by research?

Journal of Information System and Technology Management
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- What are the popular keywords related to the study?
- What are the collaborations of co-authorship countries?

Methodology

Bibliometrics involves collecting, managing, and analyzing bibliographic data from scientific publications, enabling researchers to examine publication patterns and trends (Alves, Borges, & De Nadae, 2021; Assyakur & Rosa, 2022; Verbeek, Debackere, Luwel, & Zimmermann, 2002). This field includes basic descriptive metrics such as journal sources, publication years, and main author categories (Wu & Wu, 2017). Moreover, more advanced analytical methods, like document co-citation analysis, uncover relationships between documents. Note that conducting a comprehensive literature review requires systematically refining search terms, conducting targeted searches, and analyzing relevant literature to create a robust bibliography and achieve reliable results (Fahimnia, Sarkis, & Davarzani, 2015). Considering this framework, the study emphasized high-impact publications, providing crucial insights into the theoretical foundations driving the field's development. For data accuracy, Scopus was selected as the primary source for data collection, given its credibility and extensive academic scope (Al-Khoury et al., 2022; di Stefano, Peteraf, & Veronay, 2010; Khiste & Paithankar, 2017). Only articles from rigorously peer-reviewed journals were included to ensure the quality of the data, with books and lecture notes intentionally excluded (Gu, Li, Wang, Yang, & Yu, 2019). Accordingly, leveraging Elsevier's Scopus platform, known for its broad and reliable coverage, the study gathered publications from 2020 through December 2023 for in-depth analysis.

Data Search Strategy

Advanced searching in the Scopus database is a powerful feature that allows researchers to perform highly targeted and refined searches to locate specific types of publications. Unlike basic keyword searches, advanced searching uses a combination of Boolean operators (AND, OR, NOT), field codes, and specialized filters to narrow down results based on specific criteria, such as author name, affiliation, document type, or publication year. Researchers can also apply proximity operators to find terms that appear within a certain number of words of each other, which is particularly useful when searching for complex topics or multi-word phrases. The advanced search function in Scopus also supports nested queries, enabling users to combine multiple conditions within a single search. Furthermore, this level of customization helps researchers filter out irrelevant results and focus on studies that align closely with their research questions. Additionally, Scopus's advanced search allows for precise searches by citation, funding information, or specific identifiers such as DOIs or PubMed IDs. Using these tools, researchers can streamline their literature search, making compiling a focused, high-quality set of results easier for comprehensive review or analysis. The search query provided for Scopus is designed to locate publications focused on the intersection of AI, personalized education, and learning experiences.

Here is how it works: using TITLE-ABS-KEY, the search looks for documents where the specified keywords appear in the title, abstract, or keywords field. The search is set up with Boolean operators to capture publications that mention both "artificial intelligence" and "personalized education" along with "learning" and "experience," ensuring relevance to studies that cover these specific aspects. The query also restricts results to publications between 2004 and 2024 (PUBYEAR > 2003 AND PUBYEAR < 2025), which helps focus on recent research within the past two decades. To refine the results further, the query limits the subject area to "Social Sciences" (LIMIT-TO (SUBJAREA, "SOCI")), likely since social sciences research often explores the educational, social, and behavioral implications of AI in learning

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environments. Additionally, the search is filtered to include only English-language publications (LIMIT-TO (LANGUAGE, "English")), which is often done to ensure accessibility for an English-speaking research audience. This combination of keywords, date range, subject area, and language criteria allows researchers to retrieve a targeted set of high-relevance documents on how AI can personalize and enhance learning experiences, especially within educational and social science contexts. This study's criteria for selecting literature were carefully designed to ensure relevance, quality, and accessibility. Only English-language publications were included to maintain consistency and comprehensibility, while non-English studies were excluded. The publication timeline was set from 2004 to 2025, meaning that any research published before 2004 was not considered, as the focus is on more recent findings relevant to current trends in the field. Regarding literature type, only journal articles and conference proceedings were included, as these sources are generally peer-reviewed and represent high-quality research outputs. Meanwhile, books and review articles were excluded to keep the focus on original research contributions and empirical studies rather than secondary summaries or non-peer-reviewed content. This selection approach helps to compile a robust, high-quality body of literature for analysis.

Table 1: The Search String.

Scopus	TITLE TITLE-ABS-KEY (artificial AND intelligence OR personalized AND education AND learning AND experience) AND PUBYEAR > 2003 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA, "SOCI")) AND (LIMIT-TO (LANGUAGE, "English"))

Table 2: The Selection Criterion Is Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2004 – 2025	< 2004
Literature type	Journal (Article) and Proceeding	Book, Review

Data Analysis

VOSviewer is a user-friendly bibliometric software developed by Nees Jan van Eck and Ludo Waltman at Leiden University in the Netherlands, designed to help researchers visualize and analyze scientific literature. (van Eck & Waltman, 2010, 2017). The tool is widely used for its ability to create intuitive network visualizations, group related items into clusters, and produce density maps, making it easier to understand complex research landscapes. In addition, VOSviewer supports the examination of co-authorship, co-citation, and keyword co-occurrence networks, providing a comprehensive view of connections and trends in a given field. Its interactive, user-friendly interface and regular updates make it easy for researchers to explore large datasets efficiently. Additionally, VOSviewer's capacity to calculate bibliometric metrics, customize visualizations, and work with various data sources enhances its value for scholars aiming to gain insights into complex research areas. One of VOSviewer's most notable features is its ability to convert detailed bibliometric data into visually accessible maps and charts, particularly emphasizing network visualizations. The software excels at identifying and clustering related items, analyzing patterns of keyword co-occurrence, and generating density maps that make research trends easier to interpret. Moreover, its straightforward interface supports beginners and experienced users in effectively exploring research landscapes. With ongoing development, VOSviewer remains a leading tool in bibliometric analysis by offering metrics calculation, flexible visualization options, and adaptability to various types of

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bibliometric data, such as co-authorship and citation networks. This versatility makes it indispensable for researchers seeking meaningful insights into their field.

For this study, datasets containing information on publication year, title, author, journal, citation counts, and keywords (in PlainText format) were sourced from the Scopus database, covering the period from 2020 to December 2023. These datasets were analyzed using VOSviewer version 1.6.19, which enabled the generation of visual maps through its clustering and mapping techniques. Unlike the Multidimensional Scaling (MDS) approach, VOSviewer focuses on positioning items in low-dimensional space so that the distance between any two items reflects their degree of relatedness and similarity (van Eck & Waltman, 2010). Although VOSviewer shares this spatial similarity with MDS, its normalization methods diverge. Instead of relying solely on similarity measures like cosine and Jaccard indices, VOSviewer uses a method more suited for normalizing co-occurrence frequencies, such as association strength (ASij), which it calculates as follows (Van Eck & Waltman, 2007).

$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

Result And Finding

What Are The Research Trends In Artificial Intelligence Personalized Education According To The Year Of Publication?

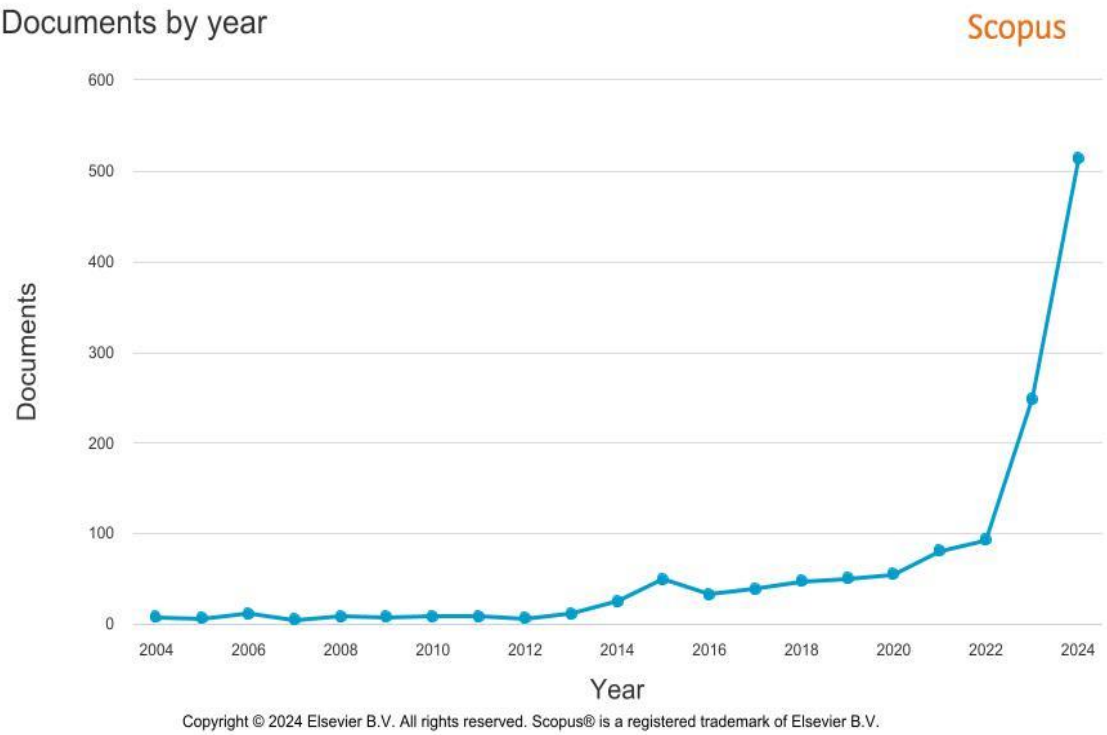

Figure 1: Plotting Document Publication By Years.

The graph depicts a steady increase in the number of documents published on Scopus related to "Artificial Intelligence Personalized Education: Enhancing Learning Experiences for University Students" from 2004 to 2024. The trend revealed a gradual uptick in publications

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until around 2014, after which the number of documents per year rose more sharply. By 2020, the annual publication count crosses 200 documents; by 2024, it is projected to reach over 500 documents. This rapid growth in publication volume over the past decade suggests increasing research interest and academic focus on AI-powered personalized education for university students. The steep upward trajectory since 2014 indicates this is an emerging and accelerating field of study, likely driven by advancements in AI technologies and their potential applications in enhancing higher education experiences and outcomes. The publication growth trajectory presented in the figure suggests that AI-powered personalized education for university students is gaining substantial momentum and attention from the research community. This aligns with the increasing adoption of AI and personalization technologies across higher education to enhance teaching, learning, and student experiences. As universities and educators continue exploring the potential of AI to tailor educational content, activities, and support to individual learners, research output in this area will likely continue its upward climb in the coming years. Notably, the sharp incline after 2014 indicates this is an emerging, high-priority exploration area quickly gaining traction among academic scholars and institutions.

Who Writes The Most Cited Articles?

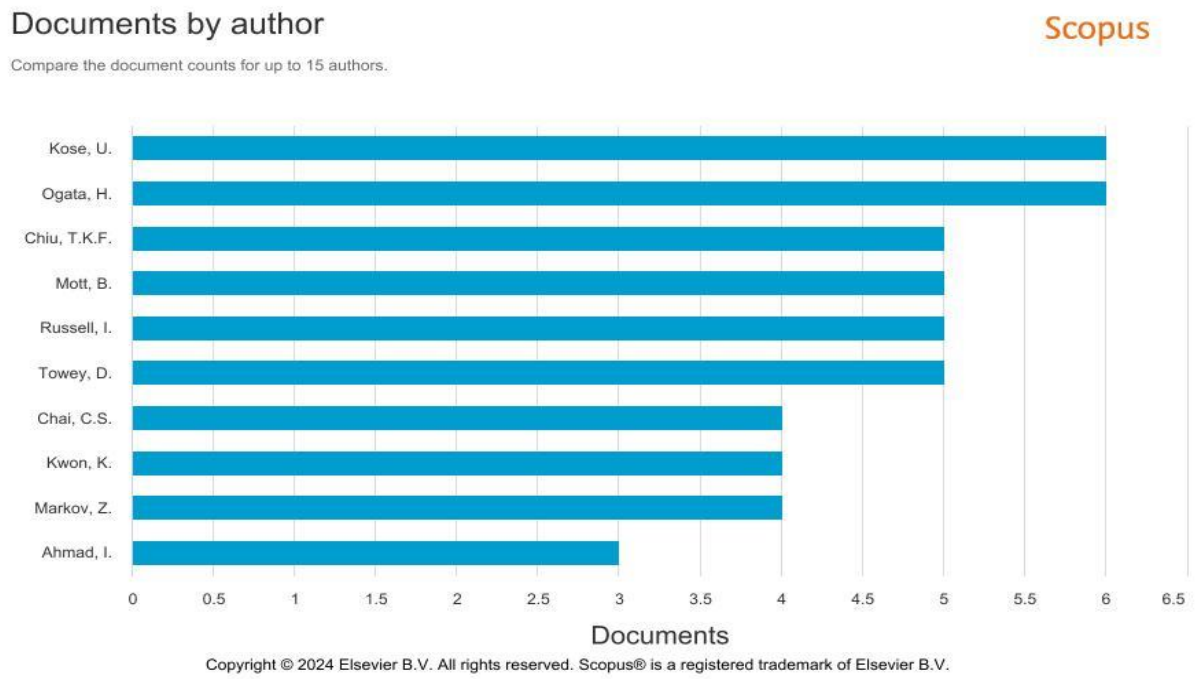

Figure 2: Documents By Author

Journal of Information System and Technology Management
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Table 3: Number of Documents and Percentage

Author Name	Number of Documents	Percentage (%)
Kose, U.	6	0.46
Ogata, H.	6	0.46
Chiu, T.K.F.	5	0.38
Mott, B.	5	0.38
Russell, I.	5	0.38
Towey, D.	5	0.38
Chai, C.S.	4	0.31
Kwon, K.	4	0.31
Markov, Z.	4	0.31
Ahmad, I.	3	0.23

The graph displays the document counts for the top 15 authors publishing "Artificial Intelligence Personalized Education: Enhancing Learning Experiences for University Students" based on Scopus data. The author with the highest publication count is Kose, U., with around six documents. This is followed by Ozala, H. and Chu, T.K.F., each with approximately five publications. Further down the list, several authors have between three to four documents, including Mott, B., Russell, I., Towey, D., and Chai, C.S. The remaining authors in the top 15 - Kwon, K., Makany, Z., and Ahmad, I. - each have around two to three publications on this topic. This distribution of publication counts suggests that while a few prolific authors drive research in this area, the field likely has a broad base of contributors at varying output levels. The top authors may be considered influential voices; however, many authors with three to four publications indicate a diverse research community exploring AI-powered personalized education in university settings.

What Are The Types Of Documents By Subject Of Research?

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JISTM
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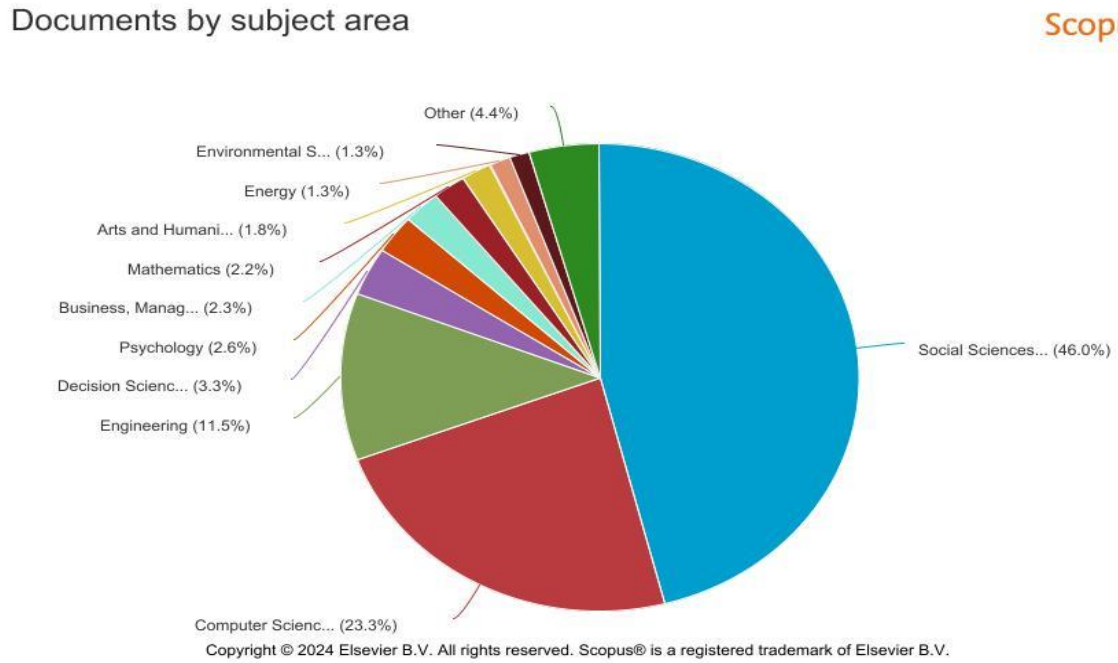

Figure 4: Documents By Subject Area

The pie chart illustrates the document distribution by subject area, as recorded in Scopus, from 2004 to 2024. Most publications fall within Social Sciences, which accounts for 46.0% of the documents, indicating significant research interest in this area over the past two decades. This large share likely reflects the interdisciplinary nature of social sciences, as they encompass topics relevant to societal trends, behavioral studies, and education—fields closely related to the study of personalized education and AI in learning. The prominence of social sciences in these publications suggests that researchers are exploring how AI can be applied within educational contexts to address various social, behavioral, and institutional challenges in higher education. The second largest category is Computer Science, comprising 23.3% of the documents. This is not surprising, considering that the development and application of AI are grounded in computer science. Research within this field is essential to advancing algorithms, machine learning models, and personalized learning systems that can adapt to individual students' needs. Notably, studies in this area likely focus on creating intelligent systems capable of analyzing large data sets from students' learning patterns, enabling the development of tools to personalize learning experiences effectively. This high percentage reflects the significant research investments in AI technology and underscores the technical backbone required to implement AI-driven education solutions.

Engineering (11.5%) and other fields, such as Decision Sciences (3.3%) and Business Management (2.3%), contribute smaller, yet notable, portions to the overall body of literature. Engineering likely provides insights into the design and technical infrastructure for deploying AI-based educational systems. At the same time, Decision Sciences may contribute methods for evaluating AI's impact on learning outcomes and optimizing educational interventions. Meanwhile, areas like Psychology (2.6%) and Arts and Humanities (1.8%) may explore AI's psychological and ethical dimensions in education, addressing how personalization impacts student motivation, privacy, and learning behaviors. The diversity of fields represented in this chart highlights the interdisciplinary nature of AI in education, demonstrating that a broad range of academic disciplines beyond computer science alone supports the advancement of personalized learning systems.

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Who Are The Top 10 Authors Based On Citation By Research?

Table 4: Top 10 Authors Based On Citation

Authors	Title	Year	Journal	Cited by
(Ouyang, Zheng, & Jiao, 2022)	Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020	2022	Education and Information Technologies	219
(Kabudi, Pappas, & Olsen, 2021)	AI-enabled adaptive learning systems: A systematic mapping of the literature	2021	Computers and Education: Artificial Intelligence	220
(Holmes et al., 2022)	Ethics of AI in Education: Towards a Community-Wide Framework	2022	International Journal of Artificial Intelligence in Education	209
(Ng, Leung, Chu, & Qiao, 2021)	Conceptualizing AI literacy: An exploratory review	2021	Computers and Education: Artificial Intelligence	337
(Liu, Silva, Wu, & Wang, 2017)	A machine learning-based method for the large-scale evaluation of the qualities of the urban environment	2017	Computers, Environment, and Urban Systems	190
(Nguyen, Ngo, Hong, Dang, & Nguyen, 2023)	Ethical principles for artificial intelligence in education	2023	Education and Information Technologies	186
(Mok, 2014)	Teaching tip: The flipped classroom	2014	Journal of Information Systems Education	253
(Tlili et al., 2022)	Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis	2022	Smart Learning Environments	290
(Qadir, 2023)	Engineering Education in the Era of ChatGPT: Promise and Pitfalls of Generative AI for Education	2023	IEEE Global Engineering Education Conference, EDUCON	249
(Kasneci et al., 2023)	ChatGPT for good? On opportunities and challenges of large language models for education	2023	Learning and Individual Differences	1383

The data indicates the ten authors with the highest citation counts for research related to "Artificial Intelligence Personalized Education: Enhancing Learning Experiences for University Students." Particularly, Ouyang F., Zheng L., and Jiao P. are the most highly cited,

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 9 Issue 37 (December 2024) PP. 286-301
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with 219 citations. This suggests that their work on AI in online higher education has significantly influenced the field. Next are Kabudi T., Pappas I., and Olsen D.H., whose systematic mapping of the AI-enabled adaptive learning systems literature has been cited 220 times. Meanwhile, Holmes W. et al. follow with 209 citations for their work on an ethics framework for AI in education. The remaining top-cited authors cover topics like AI literacy conceptualization, machine learning for urban environment evaluation, and ethical principles for AI in education. This highly cited research indicates that the field encompasses both technical advancements and critical discussions around the responsible deployment of AI in university teaching and learning.

What Are The Popular Keywords Related To The Study?

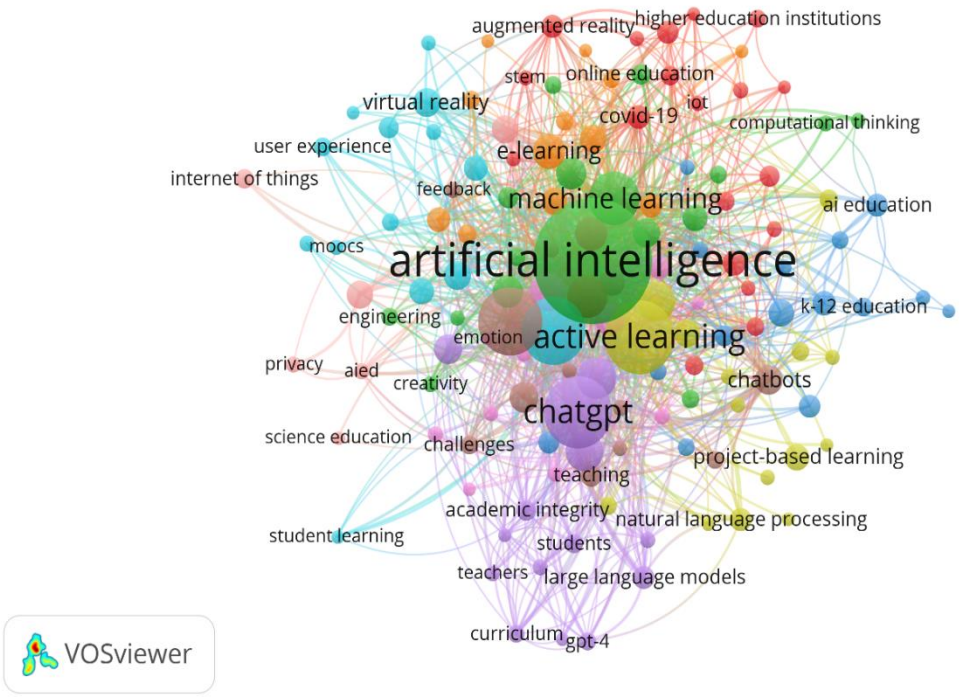

Figure 5: Network Visualization Map Of Keywords' Co-Occurrence

The bibliometric analysis of AI in personalized education reveals key terms indicating the significant themes and trends within this research area. "Artificial intelligence" (392 occurrences, 802 total link strength) is the most prominent keyword, underscoring its foundational role in personalized education. Related terms like "AI" (44 occurrences) and "AI education" (14 occurrences) further demonstrate AI's influence in educational settings. The term "personalized learning" (27 occurrences, 88 link strength) specifically reflects the targeted focus of customizing education based on individual needs and learning patterns. This

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underscores a substantial interest in tailoring AI technologies to enhance learning experiences. This popularity highlights how AI is perceived as a transformative tool for creating individualized educational pathways. The dataset also suggests that other AI-driven methods, such as "adaptive learning" (20 occurrences, 66 link strength) and "learning analytics" (20 occurrences, 40 link strength), are integral components of AI personalized education. In addition, adaptive learning represents AI's ability to adjust content delivery based on student performance in real time, while learning analytics involves collecting and analyzing data to optimize learning outcomes. These terms, with moderate occurrences and link strength values, indicate their growing adoption but suggest room for further exploration. Another notable term is "natural language processing" (14 occurrences, 46 link strength). This is relevant for developing AI-based conversational agents and chatbots that facilitate real-time personalized support, enhancing engagement and accessibility.

Keywords like "ChatGPT" (132 occurrences, 324 link strength) and "large language models" (14 occurrences, 62 link strength) illustrate the application of recent AI advancements in natural language processing to education. These tools enable personalized feedback, tutoring, and question-answering, creating highly interactive learning environments. However, terms like "ethics" (20 occurrences, 48 link strength) and "privacy" (7 occurrences, 16 link strength) also surface, highlighting ongoing concerns around data use and ethical implications in AI-driven personalized learning. This suggests a balanced focus in the field, not only on leveraging AI for tailored education but also on ensuring responsible use of these technologies. Together, these insights portray a landscape where personalized education is increasingly influenced by AI, with growing attention to both its capabilities and associated challenges.

What Are Co-Authorship Countries' Collaboration?

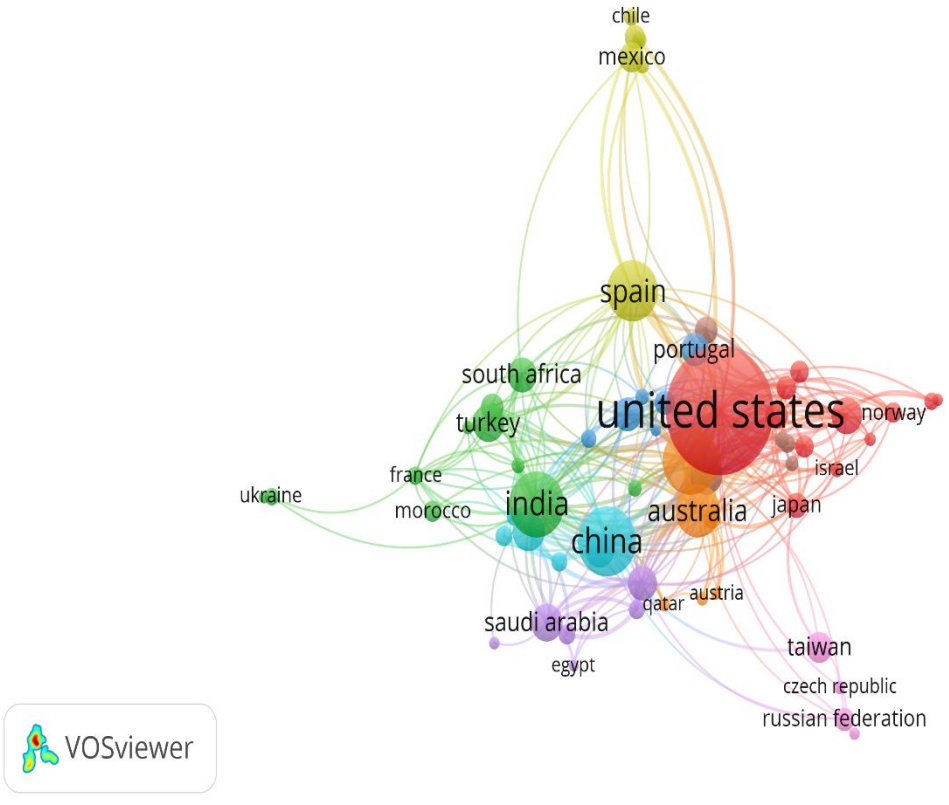

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Figure 6: The Countries Whose Authors Collaborate On Artificial Intelligence Personalized Education.

The data on co-authorship by country highlights the collaborative landscape in AI personalized education, revealing countries with significant influence and varying levels of scholarly impact. The United States stands out with the highest number of publications (274), citations (3,802), and total link strength (82), indicating its leading role and high impact in this field. This leadership is likely due to the country's strong research infrastructure, funding availability, and collaboration networks. Other prominent contributors include the United Kingdom, with 92 publications and 1,906 citations, and China, with 99 publications and 1,030 citations. While China has many documents, the United Kingdom demonstrates a stronger citation impact, indicating that United Kingdom-based research in this field may be more widely cited or influential.

Regional collaboration patterns also emerge in countries like Australia (64 documents, 869 citations, and 63 link strength), Canada (38 documents, 564 citations, and 39 link strength), and India (89 documents, 875 citations, and 52 link strength), each demonstrating significant research output and network strength. Accordingly, these countries contribute a substantial volume of publications and maintain extensive collaborations, as indicated by their link strengths, suggesting active engagement with other countries in AI research for personalized education. However, citation rates vary; for instance, Australia's research appears more impactful in citations than Canada's and India's, reflecting differing levels of influence despite similar output.

In terms of emerging contributors, countries such as Spain (79 documents, 1255 citations, and 44 link strength), Malaysia (38 documents, 194 citations, and 35 link strength), and Saudi Arabia (36 documents, 482 citations, and 25 link strength) demonstrate growing research output and moderate collaboration strengths. Although these countries have lower citation counts than the leading nations, their link strengths suggest they are building robust international research partnerships. This may help to increase their influence in the field over time. Moreover, the diversity in regional involvement, particularly from Asia and Europe, indicates a widening global interest in AI-driven personalized education, which could lead to more innovative approaches as these countries deepen their collaborative efforts.

Discussion and Conclusion

The bibliometric analysis indicates a significant growth in research interest in AI-driven personalized education over the past two decades, particularly from 2014 onward. This upward trend reflects the increasing focus on how AI technologies can enhance learning experiences for university students. Since 2020, the number of annual publications in this area has exceeded 200, with projections suggesting it will reach over 500 by 2024. This growth mirrors the wider adoption of AI in educational contexts, where it is leveraged to personalize instruction and support students' diverse needs. Notably, the acceleration in research activity is likely influenced by the rapid technological advancements in AI and the push within higher education institutions to innovate and improve teaching outcomes through AI-based solutions. The distribution of research across disciplines also reflects the interdisciplinary nature of AI in education. Social Sciences represent the largest share of publications, comprising 46.0% of the total, underscoring the emphasis on understanding AI's social and behavioral implications in educational contexts. Meanwhile, Computer Science follows with 23.3%, a substantial portion

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DOI: 10.35631/JISTM.937021
dedicated to the technical development of AI applications for education. Smaller yet notable contributions come from Engineering, Decision Sciences, and Psychology, each providing critical insights into the practical, ethical, and psychological dimensions of AI-based personalized learning. This spread across disciplines highlights the collaborative effort across fields to address the technical and societal challenges associated with AI-enhanced education in universities.

The bibliometric analysis of AI in personalized education highlights critical keywords and collaboration patterns, revealing the field's thematic focus and global research dynamics. "Artificial intelligence" emerges as the primary keyword, underscoring its central role in personalized education, while related terms such as "personalized learning" and "adaptive learning" highlight a strong focus on tailoring educational experiences to individual student needs. Other notable terms, like "ChatGPT" and "large language models," demonstrate the application of natural language processing advancements in creating interactive, AI-driven educational tools. However, keywords such as "ethics" and "privacy" signal an awareness of the ethical challenges accompanying AI in education, suggesting a balanced approach prioritizes innovation and responsibility. Overall, the keyword analysis suggests a dynamic research landscape where the potential of AI to personalize education is highly valued, while ethical and data privacy considerations remain significant. Global co-authorship patterns reveal the United States as the leading contributor, with high publication volume, citation counts, and strong collaborative ties, reflecting its substantial influence in this field. At the same time, the United Kingdom and China also emerged as major players, with the United Kingdom demonstrating a notable citation impact, indicating highly influential research. Countries such as Australia, Canada, and India present active engagement and substantial output, although citation rates vary, reflecting various levels of impact. Moreover, emerging contributors like Spain, Malaysia, and Saudi Arabia are building robust international collaborations, which may enhance their influence over time. The diversity in regional involvement, with active contributions from Asia, Europe, and the Middle East, emphasizes a growing global interest in AI-driven personalized education, suggesting that future innovations may benefit from an increasingly international research network.

Acknowledgements
Acknowledge and extend special gratitude to the Global Academic Excellence (M) Sdn Bhd, who granted the Publication Grant Scheme for this project.

References
Al-Khoury, A., Hussein, S. A., Abdulwhab, M., Aljuboori, Z. M., Haddad, H., Ali, M. A., … Flayyih, H. H. (2022). Intellectual Capital History and Trends: A Bibliometric Analysis Using Scopus Database. *Sustainability (Switzerland)*, *14*(18). https://doi.org/10.3390/su141811615

Alves, J. L., Borges, I. B., & De Nadae, J. (2021). Sustainability in complex projects of civil construction: Bibliometric and bibliographic review. *Gestao e Producao*, *28*(4). https://doi.org/10.1590/1806-9649-2020v28e5389

Assyakur, D. S., & Rosa, E. M. (2022). Spiritual Leadership in Healthcare: A Bibliometric Analysis. *Jurnal Aisyah : Jurnal Ilmu Kesehatan*, *7*(2). https://doi.org/10.30604/jika.v7i2.914

Boral, K., Mondal, K. K., & Saikia, A. (2024). Exploring the Landscape: A Bibliometric Analysis of 30-Most Cited Articles on ChatGPT in Education. *International Journal of*

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 9 Issue 37 (December 2024) PP. 286-301
DOI: 10.35631/JISTM.937021
Education in Mathematics, Science and Technology. Retrieved from https://api.semanticscholar.org/CorpusID:273991514

di Stefano, G., Peteraf, M., & Veronay, G. (2010). Dynamic capabilities deconstructed: A bibliographic investigation into the origins, development, and future directions of the research domain. *Industrial and Corporate Change*, *19*(4), 1187–1204. https://doi.org/10.1093/icc/dtq027

Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. *International Journal of Production Economics*, Vol. 162, pp. 101–114. https://doi.org/10.1016/j.ijpe.2015.01.003

Gu, D., Li, T., Wang, X., Yang, X., & Yu, Z. (2019). Visualizing the intellectual structure and evolution of electronic health and telemedicine research. *International Journal of Medical Informatics*, *130*. https://doi.org/10.1016/j.ijmedinf.2019.08.007

Gutiérrez-Cirlos, C., Carrillo-Pérez, D. L., Bermúdez-González, J. L., Hidrogo-Montemayor, I., Carrillo-Esper, R., & Sánchez-Mendiola, M. (2023). ChatGPT: opportunities and risks in the fields of medical care, teaching, and research. *Gaceta Medica de Mexico*. https://doi.org/10.24875/GMM.230001671

Ho, C. W. L. (2023). Generative AI and the Foregrounding of Epistemic Injustice in Bioethics. *American Journal of Bioethics*. https://doi.org/10.1080/15265161.2023.2250319

Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Shum, S. B., … Koedinger, K. R. (2022). Ethics of AI in Education: Towards a Community-Wide Framework. *International Journal of Artificial Intelligence in Education*. https://doi.org/10.1007/s40593-021-00239-1

Kabudi, T., Pappas, I., & Olsen, D. H. (2021). AI-enabled adaptive learning systems: A systematic mapping of the literature. *Computers and Education: Artificial Intelligence*. https://doi.org/10.1016/j.caeai.2021.100017

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., … Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*. https://doi.org/10.1016/j.lindif.2023.102274

Khiste, G. P., & Paithankar, R. R. (2017). Analysis of Bibliometric term in Scopus. *International Research Journal*, *01*(32), 78–83.

Liu, L., Silva, E. A., Wu, C., & Wang, H. (2017). A machine learning-based method for the large-scale evaluation of the qualities of the urban environment. *Computers, Environment and Urban Systems*. https://doi.org/10.1016/j.compenvurbsys.2017.06.003

Mok, H. N. (2014). Teaching tip: The flipped classroom. *Journal of Information Systems Education*.

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*. https://doi.org/10.1016/j.caeai.2021.100041

Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. P. T. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies*. https://doi.org/10.1007/s10639-022-11316-w

Ning, M., Bo, C., Wang, Q., Wang, X., & Guo, Q. (2024). Bibliometric Analysis of the Influence of Artificial Intelligence on the Development of Education. *International Journal of Emerging Technology and Advanced Engineering*. Retrieved from https://api.semanticscholar.org/CorpusID:270221147

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 9 Issue 37 (December 2024) PP. 286-301
DOI: 10.35631/JISTM.937021
Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020. *Education and Information Technologies*. https://doi.org/10.1007/s10639-022-10925-9

Qadir, J. (2023). Engineering Education in the Era of ChatGPT: Promise and Pitfalls of Generative AI for Education. *IEEE Global Engineering Education Conference, EDUCON*. https://doi.org/10.1109/EDUCON54358.2023.10125121

Rane, N. L., Choudhary, S., & Rane, J. (2023). Education 4.0 and 5.0: Integrating Artificial Intelligence (AI) for Personalized and Adaptive Learning. *SSRN Electronic Journal*. Retrieved from https://api.semanticscholar.org/CorpusID:265613295

Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., … Burgos, D. (2022). Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis. *Smart Learning Environments*. https://doi.org/10.1186/s40561-022-00205-x

V, D. A., A, R. T. K. S., H, G. J. G. A. C., T, P. K. G. D., Thelijjagoda, S., & Gunatilake, P. (2023). AI-Powered Smart and Personalized Education Platform. *2023 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES)*, 1–7. Retrieved from https://api.semanticscholar.org/CorpusID:268544670

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

van Eck, N. J., & Waltman, L. (2017). Citation-based clustering of publications using CitNetExplorer and VOSviewer. *Scientometrics*, *111*(2), 1053–1070. https://doi.org/10.1007/s11192-017-2300-7

Van Eck, N. J., & Waltman, L. (2007). Bibliometric mapping of the computational intelligence field. *International Journal of Uncertainty, Fuzziness and Knowldege-Based Systems*, *15*(5), 625–645. https://doi.org/10.1142/S0218488507004911

Verbeek, A., Debackere, K., Luwel, M., & Zimmermann, E. (2002). Measuring progress and evolution in science and technology - I: The multiple uses of bibliometric indicators. *International Journal of Management Reviews*, *4*(2), 179–211. https://doi.org/10.1111/1468-2370.00083

Wu, Y. C. J., & Wu, T. (2017). A decade of entrepreneurship education in the Asia Pacific for future directions in theory and practice. *Management Decision*, Vol. 55, pp. 1333–1350. https://doi.org/10.1108/MD-05-2017-0518

Zhu, G., Zhao, B., & Tang, J. (2023). Research on the Application of AI in Personalized Education. *Proceedings of the 2023 International Conference on Information Education and Artificial Intelligence*. Retrieved from https://api.semanticscholar.org/CorpusID:270155620