



ChatGPT and Education: A Scopus Bibliometric Analysis

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Abstract. The birth of ChatGPT has caused controversy, especially in the world of education. Various studies have been conducted looking at the positive and negative impacts. This research is a Scopus-based bibliometric analysis to examine trends in the relationship between ChatGPT and education. The articles analysed were sourced from the Scopus database totalling 403 from the end of 2023 to the beginning of 2024. After managing the database from Scopus, this study classified and visualized it using VOSviewer software. The research results are classified based on VOSviewer output starting from the network, overlay, density visualization, and specific topics such as "education", and "higher education". The research results describe 54 keyword items in 11 clusters. The most popular keywords include "academic integrity", "machine learning", "plagiarism", and "ethics". The most popular keywords include "academic integrity", "machine learning", "plagiarism", "justice", and "ethics". This review provides an appropriate reference point for further research on "ChatGPT and Education".

Keywords: ChatGPT, Education, Academic Integrity.

1 Introduction

The advent of ChatGPT, a generative language model developed by OpenAI, has opened new avenues in the digital landscape, particularly in the field of education. This AI innovation has garnered global attention for its potential to transform educational processes, as it offers unprecedented capabilities in generating coherent and informative text in real-time. These capabilities extend to various educational applications, ranging from personalized learning to automated assessment production and material suggestion [1], [2].

Recent studies have highlighted ChatGPT's versatility in addressing some of the most challenging issues in education. For instance, its application in science education for automated assessment and material suggestion has been noted for its effectiveness (Frontiers, 2023). Additionally, the model's ability to replicate human-written text poses new considerations for online test security in tertiary education, underlining the need for further research into its implications and potential safeguards ([1]).

However, alongside these potentials, some challenges and boundaries need exploration. The impact of generative AI on journalism and media education, as well as its efficacy in specific tasks like bug fixing in programming, are areas that require further scholarly attention [1].

Therefore, a comprehensive study on ChatGPT's role in education is essential. Such research would not only illuminate the model's capabilities and limitations in an educational context but also guide educators and policymakers in leveraging this technology effectively. It would provide critical insights into how ChatGPT can support or transform traditional teaching methods, shaping an innovative and effective future for education.

Furthermore, empirical studies have been conducted to explore the impact of AI chatbots, like ChatGPT, on students' learning outcomes. These studies indicate that AI chatbots, when integrated into educational environments, can significantly affect students' learning, especially in higher education settings [3], [4].

By referencing these studies, the importance of researching the relationship between ChatGPT and education becomes evident, especially given the rapid advancements and applications of AI in this field. The integration of Scopus-based research provides a solid foundation for understanding and analyzing the implications of ChatGPT in educational contexts.

2 Methods

This study aims to analyze the relationship between ChatGPT and its applications in education, focusing on identifying key themes, and trends in the current body of research. The primary data for this study will be sourced from the Scopus database. Scopus is chosen due to its extensive collection of peer-reviewed literature, covering a wide range of disciplines including technology and education.

The search conducted using a combination of keywords related to ChatGPT and education. The search will be limited to articles published in 2023 to the present, to capture the most recent developments in the field. Articles will be included if they focus on the application of ChatGPT in educational settings or discuss its implications for teaching and learning. Excluded will be articles that do not directly relate to education, as well as conference abstracts, book chapters, and non-peer-reviewed publications. Relevant data from the selected articles will be extracted, including publication year, keywords, and main findings. This data will form the basis for the subsequent bibliometric analysis.

VOSviewer emerges as a powerful tool for analyzing the interconnectedness between ChatGPT and education. Its capability to visually map and analyze bibliometric networks allows researchers to effectively identify and display the intricate relationships between various research articles, authors, and keywords in this field. By utilizing VOSviewer, one can gain a deeper understanding of the prevailing trends, major contributions, and emerging areas within the realm of ChatGPT's application in education. This analytical approach not only reveals the current landscape of research but also

After analysis, 54 items were categorized into 11 clusters. Cluster 1 includes artificial intelligence, assessment, education, feedback, learning, nursing, social media, students, systematic review, teaching, and technology. Cluster 2 includes academic integrity, bard, chatbots, creativity, deep learning, generative artificial intelligence, higher education, machine learning, natural language processing, and OpenAI. Cluster 3 includes accessibility, beneficence, clinical practice, ethics, justice, language models, and non-maleficence. Cluster 4 includes board examination, chatbot, GPT-4, knowledge, large language model, plastic surgery, and sentiment analysis. Cluster 5 includes anxiety, COVID-19, depression, mental health, psychiatry. Cluster 6 involves AI, ChatGPT, plagiarism, and Python. Cluster 7 includes generative AI, GPT, and privacy. Cluster 8 includes citations, large language models, and research integrity. Cluster 9 includes artificial intelligence and digital technology. Finally, cluster 10 includes accuracy.

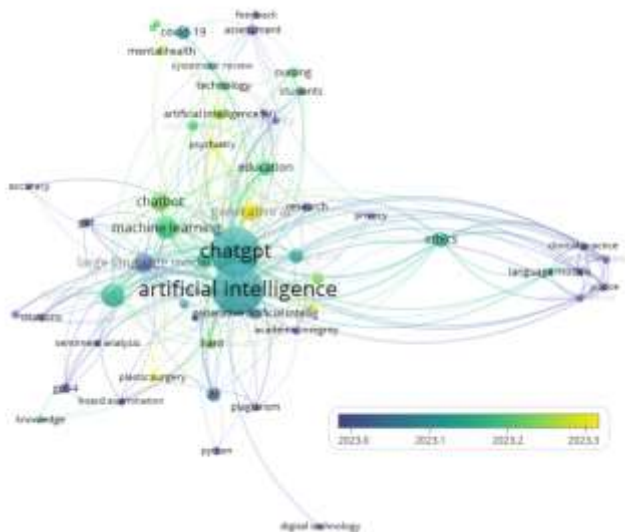


Fig. 2. Overlay visualization of scopus-based articles on chatgpt and education

Based on description of the dataset obtained from Scopus, it appears that articles from the year 2023 dominate the collection. That out of the 403 articles extracted from Scopus, 324 were from the year 2023, while the remaining 79 were from 2024. This indicates a significant focus on recent research and developments, particularly in the year 2023, reflecting the rapidly evolving nature of fields like artificial intelligence, education, and others that are likely to be covered in these articles. This trend could be attributed to the growing interest and advancements in these areas, prompting a surge in research activities and publications.

Overlay visualization in VOSviewer is a powerful technique for bibliometric analysis that provides insights into various aspects of a dataset, typically comprising

scientific publications [4]. Overlay visualizations often display the age of items (like publications or keywords) in a dataset. Different colors can represent different years, allowing you to see how certain topics have evolved over time or how recent the contributions in a particular area are. By highlighting the most recent topics or authors in different colors, this visualization helps identify emerging trends and shifts in research focus. This is particularly useful for understanding the development of new fields or the shift in emphasis within established areas. It can also indicate the journals or publication venues where most research on a topic is published, which can be useful for understanding the landscape of publication in a specific field.

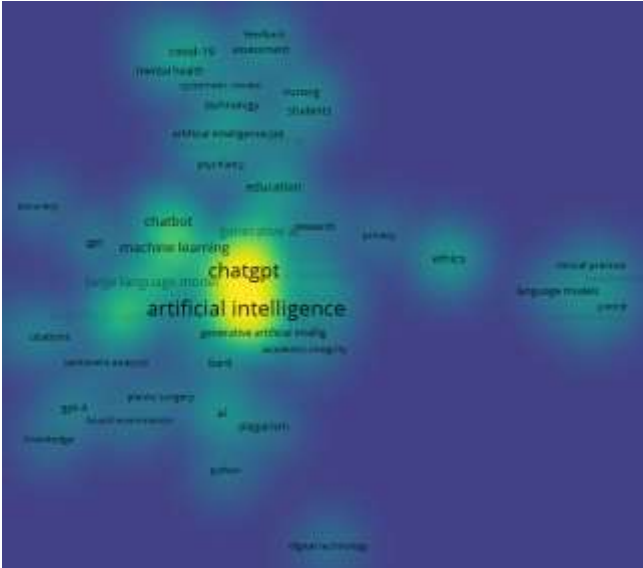


Fig. 3. Density visualization of scopus-based articles of chatgpt and education

Density visualization in VOSviewer is a method used to graphically represent the concentration of data points (such as keywords, authors, or publications) within a bibliometric network [4].

Density visualization helps to identify the most densely populated areas in a map, which usually indicates key topics or focal areas within the research field. These are areas with a high concentration of publications, citations, or other metrics, suggesting significant research activity. It shows where the 'hotspots' are in a particular field or dataset. Hotspots are characterized by a high density of interconnected nodes (like keywords or authors), suggesting these areas are of particular interest or have seen substantial research activity.

Conversely, areas with lower density can highlight gaps in the research or potential opportunities for new investigations. These might be less-explored topics or emerging areas that haven't yet gained widespread attention.

educational environment to be prepared to utilize ChatGPT for learning purposes, while also anticipating and minimizing negative concerns.

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