SINIRSIZ EĞİTİM VE ARAŞTIRMA DERNEĞİ

Sınırsız Eğitim ve Araştırma Dergisi

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Sınırsız Eğitim ve Araştırma Dergisi, Cilt 10, Sayı 1

Dear Readers,

Our journal has entered its tenth year of publication with the March 2025 issue. The aim of our journal, the Limitless Education and Research Association (SEAD), has continuously been published since 2016 is to contribute to the field of education and research with new scientific studies. To this end, theoretical and experimental original research, review articles, thesis summaries, and other scientific works are published for free and shared with readers at both nationwide and worldwide.

The Unlimited Education and Research Journal (SEAD) is published three times a year in both Turkish and English. As an international peer-reviewed journal, it is prepared with the scientific endeavors, contributions, and support of academics, scholars, researchers, educators, and teachers from different countries. Each issue including current and new studies is meticulously presented to the readers in the field, following thorough reviews.

Maintaining its academic and scientific quality for ten (10) years, the Limitless Education and Research Journal (SEAD) is indexed in the EBSCO, Education Full Text (H.W. Wilson) Database Coverage List, which is recognized by the Council of Higher Education (ÜAK). It is also indexed in various national and international databases such as ASOS, DRJI, ESJI, OAJI, ROAD, SIS, SOBİAD, and Worldcat, and receives a significant number of citations. According to the SOBİAD impact factor, our journal ranks highly among scientific journals in our country. Efforts to have our journal indexed in more extensive national and international databases are ongoing.

In the March 2025 issue of our journal, seven (7) scientific research and review articles are featured. We would like to thank all the editors, authors, reviewers, and translators who contributed to the preparation and publication of this issue. With the hope that our journal will bring contributions to scientists, researchers, educators, teachers, and students in the field, we extend our best regards.

LIMITLESS EDUCATION AND RESEARCH ASSOCIATION

The Journal of Limitless Education and Research, Volume 10, Issue 1

Sınırsız Eğitim ve Araştırma Dergisi, Cilt 10, Sayı 1

Değerli Okuyucular,

Dergimiz, Mart 2025 sayısı ile yayın hayatında onuncu yılına girmiş bulunmaktadır. Sınırsız Eğitim ve Araştırma Derneği (SEAD) tarafından 2016 yılından bu yana 10 yıldır kesintisiz olarak yayınlanan Dergimizin amacı, yeni bilimsel çalışmalarla eğitim ve araştırma alanına katkı sağlamaktır. Bu amaçla kuramsal ve deneysel özgün araştırmalar, derleme makaleler, tez özetleri ve diğer bilimsel çalışmalar ücretsiz yayınlanmakta, ulusal ve uluslararası düzeydeki okuyucularla paylaşılmaktadır.

Sınırsız Eğitim ve Araştırma Dergisi (SEAD), yılda üç sayı olarak Türkçe ve İngilizce yayınlanmaktadır. Uluslararası hakemli dergi olarak farklı ülkelerdeki akademisyen, bilim insanı, araştırmacı, eğitimci ve öğretmen yazarların bilimsel çaba, katkı ve destekleriyle hazırlanmaktadır. Her sayıda titiz incelemeler sonucu güncel ve yeni çalışmalar alandaki okuyuculara sunulmaktadır.

Akademik ve bilimsel kalitesinden ödün vermeden on (10) yıldır yayın hayatını sürdüren Sınırsız Eğitim ve Araştırma Dergisi (SEAD), ÜAK tarafından alan indeksi olarak kabul edilen EBSCO, Education Full Text (H.W. Wilson) Database Covarage List'te taranmaktadır. Ayrıca ASOS, DRJI, ESJI, OAJI, ROAD, SIS, SOBİAD, Worldcat gibi ulusal ve uluslararası çeşitli indekslerde taranmakta ve çok sayıda atıf almaktadır. SOBİAD etki faktörüne göre Dergimiz, ülkemizdeki bilimsel dergiler içinde önemli bir sırada bulunmaktadır. Dergimizin daha geniş ulusal ve uluslararası indekslerde taranması için girişim ve çalışmalarımız devam etmektedir.

Dergimizin Mart 2025 sayısında yedi (7) bilimsel araştırma ve derleme makaleye yer verilmiştir. Bu sayının hazırlanması ve yayınlanmasında emeği geçen bütün editör, yazar, hakem ve çevirmenlere teşekkür ediyoruz. Dergimizin alandaki bilim insanı, araştırmacı, eğitimci, öğretmen ve öğrencilere katkılar getirmesi dileğiyle, saygılar sunuyoruz.

SINIRSIZ EĞİTİM VE ARAŞTIRMA DERGİSİ

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Scientific Mapping of Chatgpt Usage in Education: A Bibliometric Perspective

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Abstract: The rapid advancement of digital technologies and computer science indicates that society is evolving towards a technological future. Among these developments, core technologies with far-reaching effects such as ChatGPT have emerged. This study aims to examine the use and role of ChatGPT in the field of education from a bibliometric perspective and to reveal its position in the academic literature in detail. For this reason, the searches using the words "ChatGPT" and "School", "Teacher" or "Student" in the Scopus and WOS database on 29/05/2024 form the basis of this study. The research findings reveal that global collaboration plays an important role. Furthermore, the applications of AI and ChatGPT in higher education and medical education have been identified as an indicator of the transformative effect of AI in the field of education. In conclusion, AI applications offer insights that are both positive and negative for all areas of education, offering exciting potential for future educational methods and strategies. A more in-depth examination of the role of ChatGPT in education is critical in shaping the future in this field.

Keywords: Artificial intelligence, ChatGPT, Education, School, Teacher, Bibliometric analysis.

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1. Introduction

Education is a fundamental element for the development and progress of societies. With the advancement of technology, important changes and innovations have emerged in the field of education. One of these innovations is using artificial intelligence-based language models in education. Leading language models such as ChatGPT developed by OpenAI provide potential in many areas, including the creation of learning materials and interaction with students (Jeong et al., 2023). This system, which learns language structure and the ability to understand human language using large data sets, interacts with people naturally and performs various tasks. However, the impact of ChatGPT is not only limited to functionality; it also deeply affects the educational process (Lund et al., 2023). In other words, ChatGPT plays a critical role in supporting students and teachers in the field of education through various functions and applications. Research indicates that ChatGPT has a number of important functions, including the provision of personalized learning experiences (Qadir, 2023), acting as a virtual teacher (Su & Yang, 2023), supporting the learning process (Fauzi et al., 2023), increasing productivity and producing academic content (Rahman & Watanobe, 2023). It can thus be argued that ChatGPT plays a significant role in the educational process, offering students the opportunity to engage in private lesson experiences and receive responses to their academic queries. In this context, research on the role of ChatGPT in schools, its conceptual framework, methodological analysis and limitations is of great importance. The correct utilization of this technology presents a significant opportunity to enhance educational outcomes and ensure students are adequately prepared for the future. Nevertheless, ethical and safety concerns related to the use of this technology must also be considered. Consequently, a comprehensive understanding of the effectiveness, prevalence and potential problems of ChatGPT in education is required.

1.1. The Use of ChatGPT in Education

In addition to traditional educational practices, the contribution of technology in the field of education is increasing. In particular, ChatGPT, an artificial intelligence-based language model, is notable for its capacity to generate text that appears human-like through the analysis of language structures in large datasets (Qasem, 2023). This technology offers a number of advantages in the field of education, including the provision of personalized learning experiences, the automation of content creation and learning materials (Qadir, 2023). In particular, tools such as ChatGPT assist teachers in content creation and organization processes, enabling them to prepare materials suitable for students (Ur & Kodikal, 2023). This enables

educational practitioners to utilize their time more efficiently and interact more with students by creating content that aligns with learning objectives and optimizing lesson planning processes. Nevertheless, it is imperative to address meticulously the ethical, security and reliability issues related to the use of these technologies. Such misunderstandings or malicious use can have serious consequences. Furthermore, concerns have been expressed that the use of advanced artificial intelligence systems such as large language models in scientific research may cause ethical problems such as authorship and plagiarism (Sallam, 2023; Qasem, 2023). Therefore, a balanced approach should be adopted by considering these aspects of technology. In this framework, more comprehensive research on the effects and use of ChatGPT in education should be conducted.

The innovative features of ChatGPT have attracted the attention of researchers, leading to a rapidly increasing demand for its use in the learning processes of educational practitioners. This demand has been widely addressed by researchers, with numerous articles published in peer-reviewed journals on the use of ChatGPT in educational contexts. For instance, the studies by Huang et al. (2021) and Chen et al. (2020), which investigated the effectiveness of chatbots in language learning, emphasized the pedagogical possibilities and learning achievements of such technologies. In examining teachers' attitudes towards chatbots in education, Chocarro et al. (2023) emphasized the importance of social language and bot proactivity in educational tasks. Jia-Qi et al. (2020) and Korsakova et al. (2021) investigated the impact of chatbot-based learning on students' motivation and learning outcomes, with a particular focus on chemistry courses. The potential of chatbots to support mental health, violence prevention education and awareness in online courses has also been examined by Grové (2021), Kang et al. (2022) and Jasin et al. (2023). The application of chatbots in English language teaching, resource integration for intelligent search, and practical applications in undergraduate medical education help us understand the potential and various applications of ChatGPT in education, as evidenced by the studies by Chuah and Kabilan (2021), Nguyen et al. (2021), and Tsang (2023), respectively. However, it has been observed that the existing literature on the use of ChatGPT in education is repetitive and research trends are not sufficiently considered (Zheltukhina et al., 2024). Bibliometric analysis, which has been increasingly preferred in recent years to understand innovations and trends in the literature, stands out as an important tool in this context (Donthu et al., 2021; Khan et al., 2021). Bibliometric analysis provides a comprehensive overview of the general state of the field by evaluating the number of publications, citation rates, contributions of research groups and institutions in a particular subject. It also provides an opportunity to

identify existing knowledge gaps by identifying potential areas for future research. In this context, the objective of this study is to determine the research trends in the studies on ChatGPT in the field of education. This study aims to guide scientists who will conduct research in this field and to make important contributions by following the developments of the field. Furthermore, this study reveals that the popularity of academic research is not a temporary trend, but rather a reflection of the potential for analysing large-scale scientific data and creating high research impact.

1.2. Purpose of The Study

The objective of this study was to gain a comprehensive understanding of the use of ChatGPT in the field of education. This approach allows for the identification of the prevailing trends in research on ChatGPT in the field of education. The articles in question have been included in the "Education & Educational Research-E&ER" and SCOPUS Social Science categories of WOS. The most readily accessible and conspicuous elements of a scientific article are the authors, title, abstract and keywords, which are collectively referred to as 'topics'. The sheer volume of articles and the limited time researchers have to read them make it challenging to peruse all relevant articles. Therefore, researchers must be able to select articles with a high degree of efficiency. These components of articles serve as exemplars of scientific article reports. The abstract, which forms part of a scientific article, and effective keywords are article-specific terms. It is also important to be aware of the most prolific educational researchers.

This article explores the following research questions:

1. How is the bibliometric distribution of articles published within the educational field related to ChatGPT?

2. What is the distribution of the most popular keywords in the articles published in the field of education related to ChatGPT?

3. Which countries are the most productive countries in the articles published in the field of education related to ChatGPT?

4. Which are the most cited journals in the references of articles published in the field of education related to ChatGPT?

5. Which are the most cited institutions in the references of articles published in the field of education related to ChatGPT?

2. Method

The documents obtained for analysis in this study were sourced from the Scopus and WOS databases. These databases provide researchers conducting bibliometric analyses with a series of data, including the number of citations, institutions, abstracts, bibliographies, author lists, countries and impact factors of journals in the relevant indexes. This enables more accurate analysis of these data. In this study, Microsoft Excel was employed for statistical analysis, while VOSviewer was utilized as a network mapping program for bibliometric analysis. This approach can also be employed to gain a general understanding of the subject, identify knowledge gaps and guide future research (Pradana et al., 2023). The bibliometric analysis conducted in this study aligns with the recommendations set forth by Donthu et al. (2021). The software program developed by Nees Jan van Eck and Ludo Waltman (Arslan, 2022) is a tool utilized to create, visualize, and explore maps based on the network data obtained. The program employs elements derived from networks of scientific journals, researchers, organizations, countries, keywords and/or terms to create networks of relationships through co-authorship, co-occurrence, citation, bibliographic links or co-citation links (Van Eck & Waltman, 2010).

2.1. Data Collection

The most common search strategy employed to identify resources within an index such as Web of Science and Scopus is a keyword search. The objective of our keyword search was to identify as many pertinent articles as possible on ChatGPT in the field of education. We employed the following keyword sequence in Web of Science and Scopus without any temporal limitation. In the context of this research, a search was conducted on 29/05/2024 in the Web of Science and Scopus databases using the terms "ChatGPT" and "School" or "ChatGPT" and "Teacher" or "ChatGPT" and "Student" in the title, author, keyword and abstract fields.

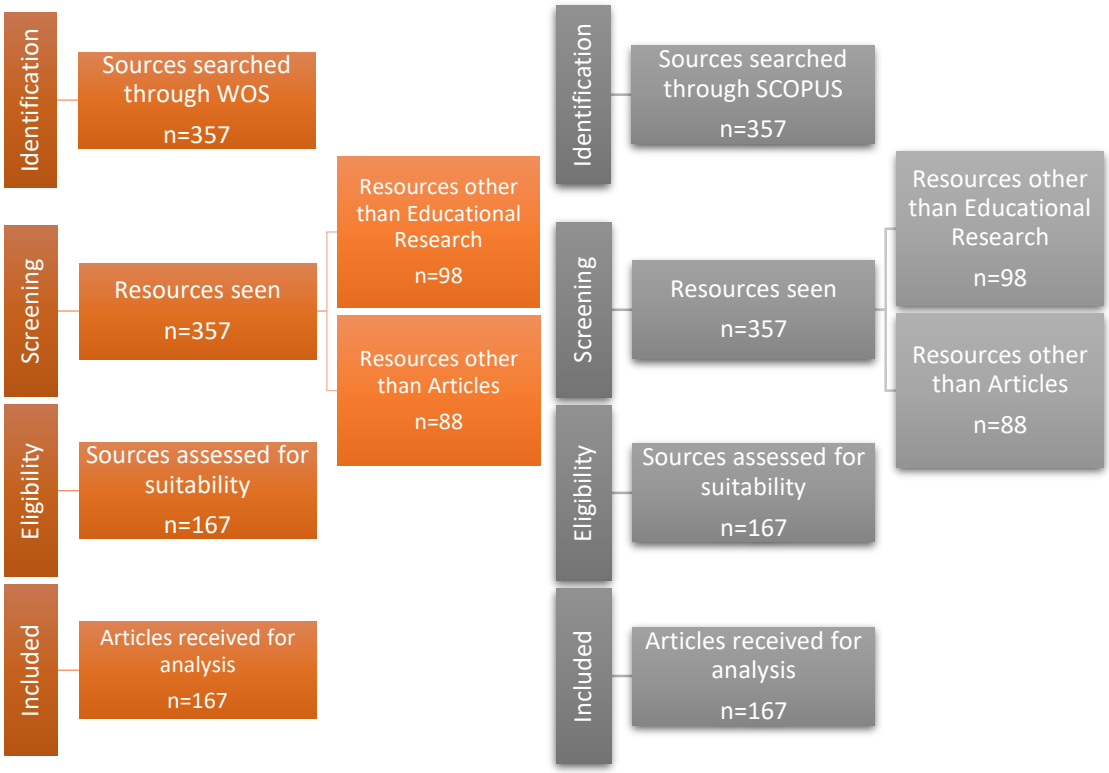

Figure 1. WOS and Scopus Stages for Identification and Selection of Documents

In order to focus the search on studies conducted in educational institutions, the search terms have been selected to exclude any results pertaining to training in business or other sectors. As can be seen in Figure 1, 357 results were obtained in the search in the WOS database. Subsequently, 269 publications were selected for use when publication types other than articles were excluded, and 167 articles were selected for use when publications other than educational research were excluded. The initial search on Scopus returned 1,411 results. Subsequently, 769 publications were selected for use when sources other than articles were excluded, and 538 publications were selected for use when publications outside the field of social sciences were excluded. At this juncture, the rationale for the decision in the Scopus database is that all but 13 of the 538 articles in our findings are included in SCOPUS, given that they are included in WOS. The author, citation, journal, country, institution and keywords of the accessed studies were exported for use in VOSviewer. A variety of analytical techniques were employed to examine the bibliographic data obtained from databases, including citation analysis, co-author analysis, co-citation analysis, co-citation analysis, and co-word analysis (Gülmez et al., 2021). In the subsequent scientific mapping step, maps were created in order to

gain an understanding of the research topics and various structures present within the dataset (Cobo et al., 2011).

2.2. Data Analysis

The articles were analyzed using the VOSviewer software. International scientific publications are among the most important indicators of scientific productivity. In addition, the indexes of these publications are among the most reliable quality indicators of studies. The primary reason for using the WoS and Scopus databases in this study is that they contain first-class accessible resources, especially in the field of social sciences and educational sciences (Zhu ve Liu, 2020). The similarity in the publications contained within the WoS and Scopus databases, coupled with the fact that the latter covers the former, prompted us to pursue our findings from the Scopus database. Another rationale for selecting the Scopus database is that data files from WoS, SCOPUS and PubMed can be analyzed through the VOSviewer software. In this study, the distribution of the number of articles by years, countries and universities, the most preferred journals for publishing articles, the most prolific authors of articles and the most popular keywords were revealed through bibliometric analysis. While there is information about article titles in Scopus, title analysis cannot be performed for the Scopus database using the VOSviewer program. This is considered a limitation of the study. The VOSViewer bibliometric analysis process is summarized in Figure 2.

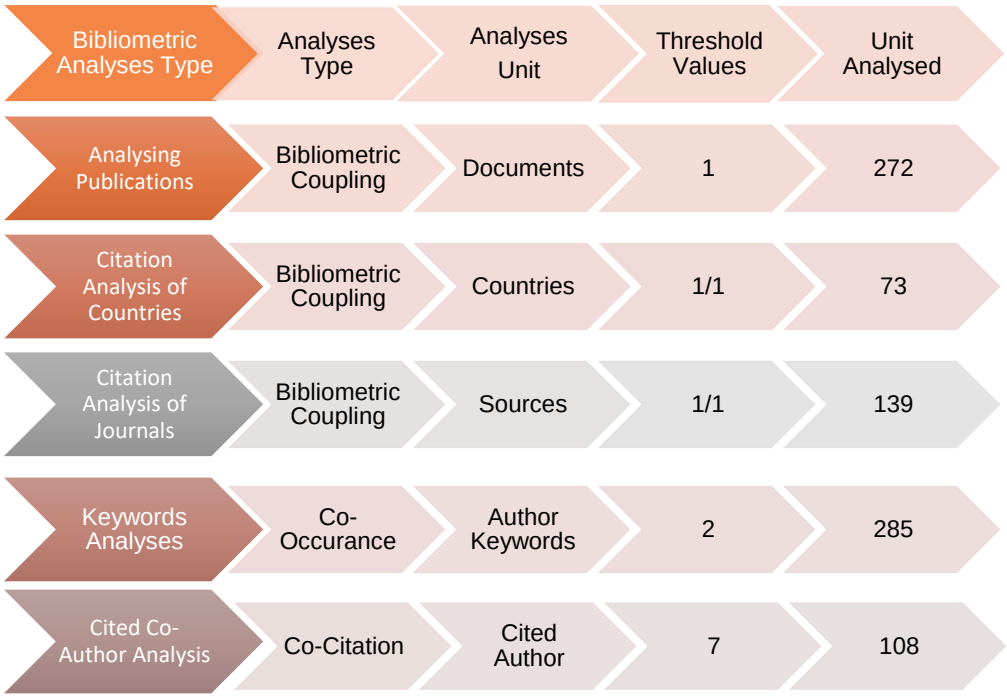

Figure 2. Bibliometric analysis process

3. Results

This study presents a bibliometric analysis of the studies on the use of ChatGPT in the field of education in the Scopus database.

3.1. Bibliometric Analysis of Publications

Bibliographic matching refers to the case of a common work cited by two independent sources. Due to this common interest in the same publication, we can assume that there is a link between the cited publications and the more they have in common, the more similar their topics are. According to the analysis performed with 272 units selected with the criterion of having at least 1 citation and having a link between them, 12 clusters, 7165 links and a total link strength of 10693 were obtained (Figure 3).

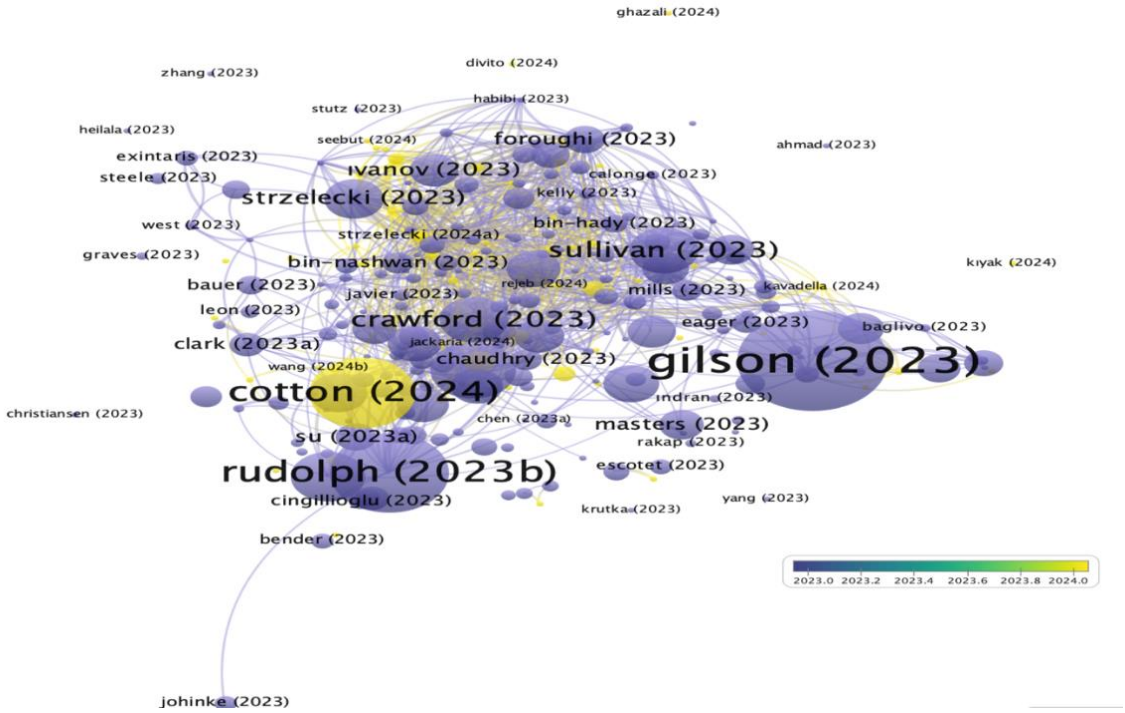

Figure 3. Bibliographic match links of publications by year

The publications with the strongest bibliographic matching links were Strzelecki (2024) with 444 links, Rudolph (2023a) with 384 links and Ansari et al. (2023) with 316 links. The analysis of the most cited articles is presented in Table 1.

Table 1.
Top 5 most cited articles

N.	Article Title	Authors	Cited	Date
1	How Does ChatGPT Perform on the United States Medical Licensing Examination (USMLE)? The Implications of Large Language Models for Medical Education and Knowledge Assessment	Gilson et al.	489 Cited	February 2023
2	ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?	Rudolph et al.	304 Cited	January 2023
3	Chatting and cheating: Ensuring academic integrity in the era of ChatGPT	Cotton et al.	247 Cited	March 2024
4	War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education	Rudolph et al.	159 Cited	April 2023
5	Academic Integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond	Perkins	124 Cited	March 2023

"How Does ChatGPT Perform on the United States Medical Licensing Examination (USMLE)? The Implications of Large Language Models for Medical Education and Knowledge Assessment" by Gilson et al. (2023), "How Does ChatGPT" by Cotton et al. (2024), 489 citations, "A ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?" by Rudolph et al. (2023a), 304 citations, "Chatting and cheating: Ensuring academic integrity in the era of ChatGPT" by Cotton et al. (2023), 247 citations, Rudolph et al. (2023b) published "War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond The new AI gold rush and its impact on higher education" with 159 citations and "Academic Integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond" published by Perkins (2023) with 124 citations are in the top five.

3.2. Bibliometric Publication Analysis of Countries

In order to create a network map of the citations received by publications according to their country of origin, 72 observation units with a relationship between them were analyzed within the scope of the criteria of publishing at least 1 work by a country and receiving 1 citation (Figure.4).

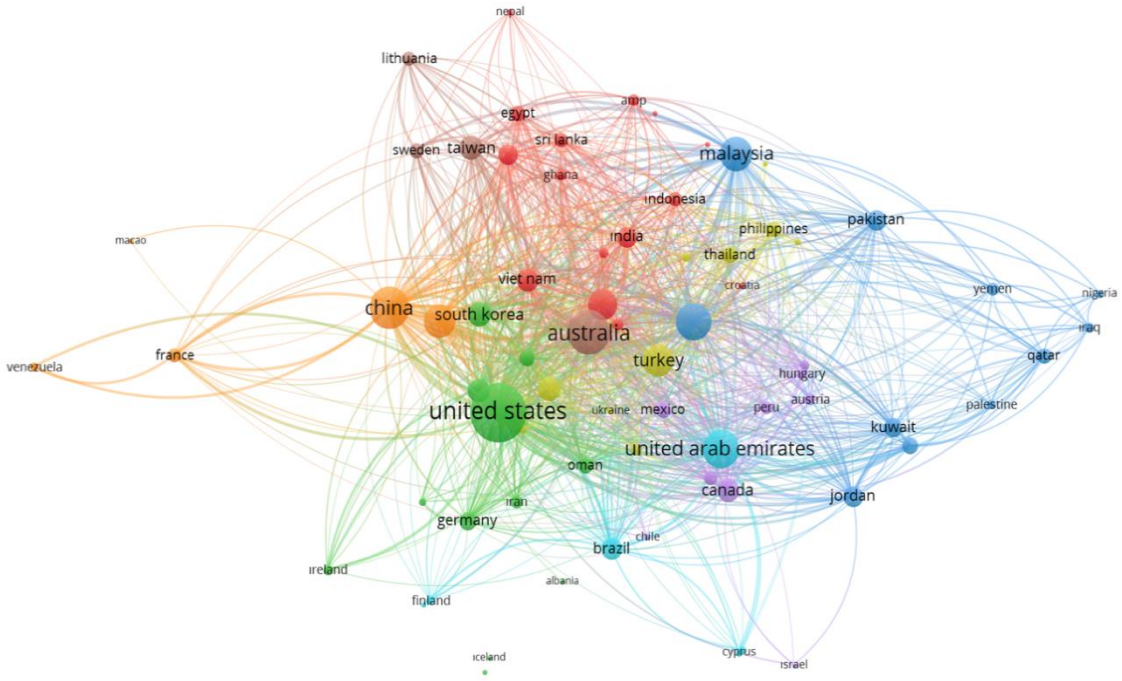

Figure 4. Bibliographic links of countries

In total, 8 clusters, 2124 connections and 65643 total connection strength were identified. The top 5 countries with the highest link strength are USA (13024 links), China (7638 links), Australia (8441 links), United Kingdom (6122 links) and Hong Kong (4902 links). The citation rankings of the most productive countries are presented in Table 2 and the publication rankings of the most cited countries are presented in Table 2.

Table 2.
Top 5 most cited countries

N.	Country Names	Number of Cited	Number of Publications
1.	United States	1197	134
2.	Singapore	502	11
3.	Ireland	498	4
4.	Australia	454	41
5.	United Kingdom	447	36

According to Table 2, the most cited countries are USA (1197 citations), Singapore (502 citations), Ireland (498 citations), Australia (454 citations) and the United Kingdom (447 citations). According to Table 3, the number of publications is the United States of America (134 publications), the People's Republic of China (42 publications), Australia (41 publications), the United Kingdom (36 publications) and Hong Kong (25 publications).

Table 3.
Top 5 most publication countries

N.	Country Names	Number of Publications	Number of Cited
1.	United States	134	1197
2.	Republic of China	42	159
3.	Australia	41	455
4.	United Kingdom	36	447
5.	Hong Kong	25	280

3.3. Bibliometric Publication Analysis of Journals

In order to create a network map of inter-journal citations, 129 observation units with a relationship between them were analyzed within the scope of the criteria of publishing at least 1 work and receiving 1 citation by a journal. In total, 11 clusters, 3557 links and 19713 total links were identified.

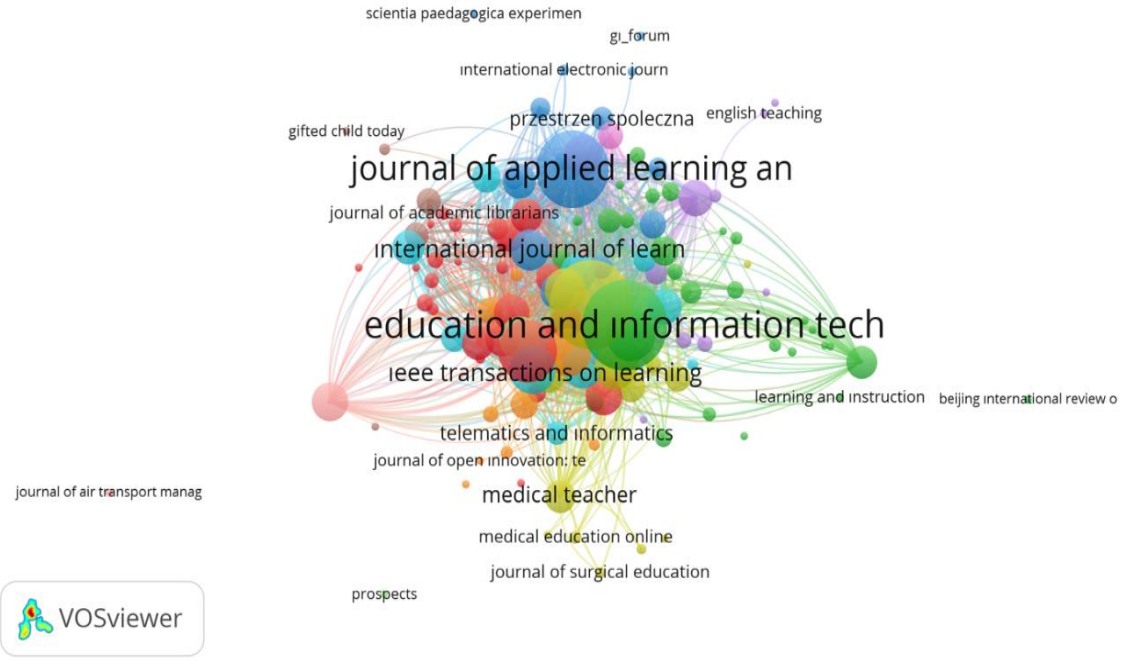

Figure 5. Bibliographic links of journals

The publication numbers of the most productive journals are presented in Table 4. According to Table 4, Computers and Education: Artificial Intelligence (24 publications) Education and Information Technologies (22 publications) JMIR Medical Education journal (21 publications), Journal of Applied Learning and Teaching (17 publications) and Journal of Chemical Education (15 publications).

Table 4.
Top 5 most publication journal

N.	Journal Name	Number of Publications	Number of Cited
1.	*Computers and Education: Artificial Intelligence*	24	82
2.	Education and Information Technologies	22	200
3.	JMIR Medical Education	21	669
4.	Journal of Applied Learning and Teaching	17	811
5.	Journal of Chemical Education	15	114

In terms of the number of citations, as shown in Table 5, Journal of Applied Learning and Teaching (811 citations), JMIR Medical Education (669 publications), Journal of University Teaching and Learning Practice (267 citations), Innovations in Education and Teaching International (248 citations) and Education and Information Technologies (200 citations).

Table 5.
Top 5 most cited journal

N.	Journal Name	Number of Publications	Number of Cited
1.	Journal of Applied Learning and Teaching	17	811
2.	JMIR Medical Education	21	669
3.	Journal of University Teaching and Learning Practice	5	267
4.	Innovations in Education and Teaching International	2	248
5.	Education and Information Technologies	22	200

3.4. Keyword Analysis

When we look at the most frequently used keywords in publications with ChatGPT in schools, ChatGPT with 357 repetitions in Figure 6, Artificial Intelligence with 164 repetitions and higher education with 62 repetitions. As a result of the analysis made with 289 observation units that were seen at least 2 times and had a relationship between them, a total of 24 clusters, 2087 links and 3629 total link strength were determined.

The analysis conducted after removing "ChatGPT" and "Artificial Intelligence" is presented in Figure 7. According to Figure 7, higher education with 62 repetitions, generative AI with 58 repetitions and education with 51 repetitions are leading. As a result of the analysis made with 285 observation units that occur at least 2 times and have a relationship between them, a total of 19 clusters, 1637 connections and 2078 total connection strength were determined.

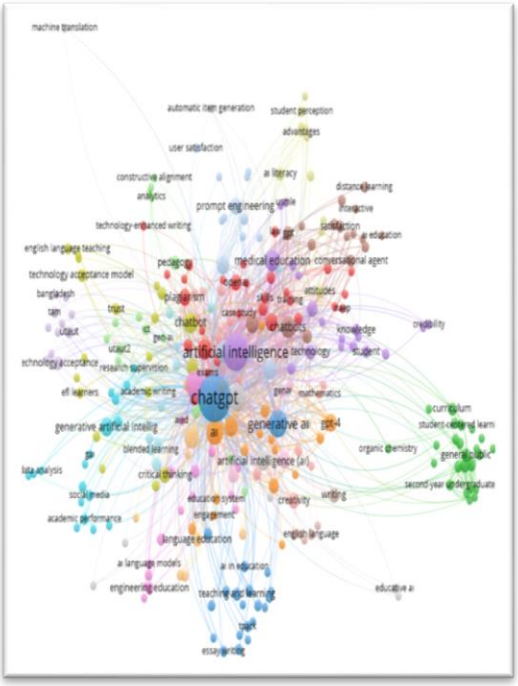

Figure 6. Most frequently used key word links

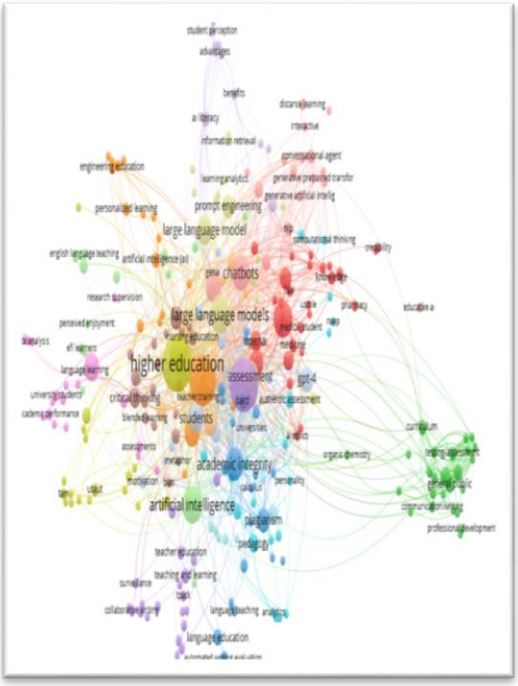

Figure 7. Most frequently used key word links (except ChatGPT and AI.)

3.5. Co-citation of Co-authors

Co-citation is the frequency with which two documents are cited together by other documents. If two documents are co-cited in at least one other document, these documents are called co-citations. The more often two documents are co-cited, the higher the strength of the co-citation and the more likely they are to be semantically related. For the bibliographic network shown in Figure 8, the minimum number of citations was chosen as 30 and according to the analysis performed on 177 units, 5 clusters, 15245 links and 185182 total link strength were determined. The most co-cited authors are Tan S. (253) Fitscher F. (145) and Rudolph J. (139), with 253 citations.

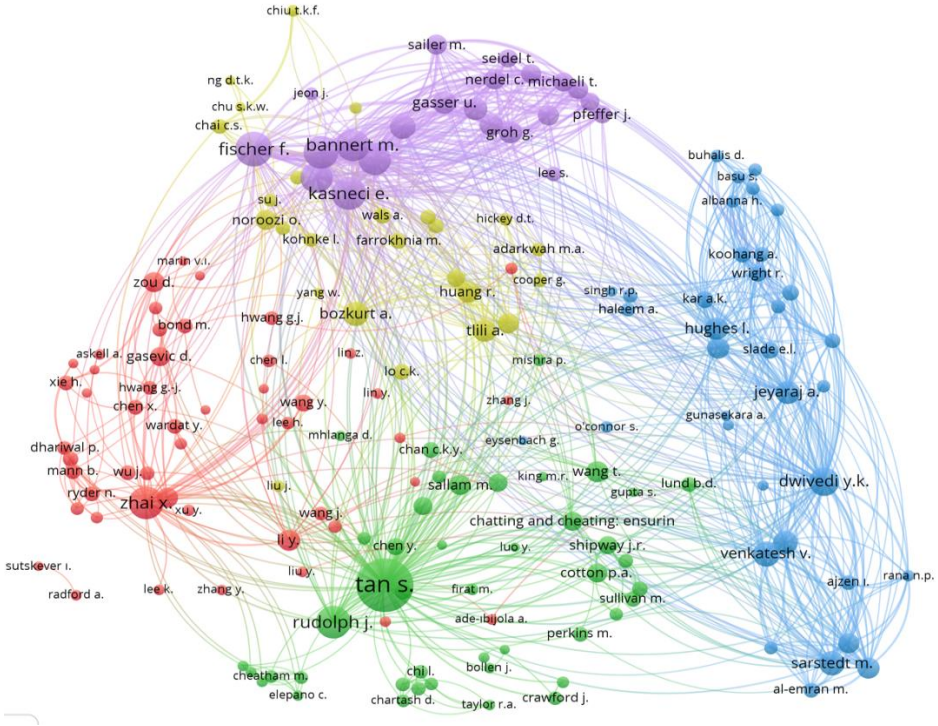

Figure 8. Links between co-cited authors

4. Discussion and Conclusion

This study analyzed the studies on "school", "teacher" and "student" subjects related to ChatGPT application in SCOPUS database by bibliometric analysis method. According to the results of the analysis, 538 studies on the use of ChatGPT in the field of education were found. This shows that ChatGPT has been met with great interest in a period of about one and a half years since its launch announcement in November 2022. In addition, at the time of this research, an average of two studies per day within the specified scope emphasizes the extent of this interest. This provides a promising perspective for the potential future use of ChatGPT in the field of education. Therefore, it is important that this study conducts a bibliometric analysis of research in important databases such as SCOPUS and guides educational practitioners by providing an insight into the use of ChatGPT.

The bibliometric analysis shows that the journals with the highest number of publications on ChatGPT are "Computers Education: Artificial Intelligence", "Education and Information Technologies", "JMIR Medical Education", "Journal of Applied Learning and Teaching" and "Journal of Chemical Education". These journals were also found to be the most popular journals in Zheltukhina et al.'s (2024) study of educational research published on Scopus. In particular, the inclusion of journals in artificial intelligence, education and medicine

in this list reflects the wide range of applications of ChatGPT in various disciplines. However, the differences between the number of publications and the number of citations are noteworthy. For example, the fact that the number of citations of the journal "Computers Education: Artificial Intelligence" is lower compared to other journals despite 24 publications may indicate that although the publications in this journal are quantitatively high, they are less effective in terms of quality compared to other journals. In conclusion, the distribution of ChatGPT-related publications to journal publications and the number of citations indicate that this technology attracts a wide multidisciplinary interest and has a significant impact in different fields. These data can be used as an important resource to further understand and guide the research and applications of ChatGPT in education, medicine and other disciplines.

According to the results of the research, studies by Gilson et al. (2023) and Cotton and Shipway (2024) examine the impact of ChatGPT on United States Medical Licensing Examination (USMLE) performance and address the effects of large language models on medical education and knowledge assessment. These studies have attracted wide academic interest, while studies by Rudolph et al. (2023a) and Cotton et al. (2023) discuss whether ChatGPT marks the end of traditional assessments in higher education and how to ensure academic integrity. However, studies by Rudolph et al. (2023b) and Perkins (2023) examine how ChatGPT competes with other similar AI systems and its effects on higher education. These studies emphasize that ChatGPT has the potential to trigger a significant change in the academic world. The SWOT analysis conducted by Taktak et al. (2024) highlights that teachers in K-12 schools actively utilize ChatGPT for various purposes, ranging from lesson content development to planning processes, and that its potential to replace traditional assessment tools, such as exams and assignments, has sparked extensive debates among educational institutions and students. These discussions underscore the need to reassess ChatGPT's implications for academic integrity, educational quality, and exam standardization. Furthermore, studies with the highest citation impact on ChatGPT reveal a tendency to use this technology not only as a communication tool but also in unexpected areas enabled by its capabilities. This reflects ChatGPT's role as a catalyst for generating new hypotheses in the academic world, further stimulating researchers' curiosity.

In the bibliometric analysis, the fact that the USA is one of the countries with the highest number of citations to ChatGPT shows that the United States is the leader in this field and ChatGPT is intensively researched here (Prahani et al., 2022). This reinforces the leading position of the USA in artificial intelligence and natural language processing. In addition, countries such as China, Singapore, Ireland, Australia, Australia and the United Kingdom also have significant

citation counts, indicating that ChatGPT is receiving widespread attention globally. The efforts of these countries in researching and implementing the potential of ChatGPT emphasize the universal importance of this technology. In addition, these data show that ChatGPT has become a worldwide phenomenon and attracts intense interest in various countries. This shows how AI technologies are evolving and taking shape in a global context.

In the findings related to the most popular key concepts used within the scope of the research, two different methods were analyzed. The first is the analysis made within the scope of search criteria. In this analysis, it is seen that the concept of "ChatGPT" is clearly ahead. However, looking at the studies conducted between 2020-2021, it is seen that concepts such as "artificial intelligence" and "machine learning" are at the forefront (Pu et al., 2021). This situation can be interpreted as a reflection of the increasing popularity of ChatGPT and the rapid development in the field of artificial intelligence. Secondly, in the analysis made by excluding the concepts of "artificial intelligence" and "ChatGPT", it was determined that the concepts of "higher education" and "medical education" were used more frequently. The frequent use of the expression higher education indicates that ChatGPT focuses on how it can be used especially in university-level education. This suggests that ChatGPT has various applications in higher education, such as improving students' learning experience or supporting teaching processes.

Finally, in the co-authors' joint analysis, by setting a specific citation threshold (minimum 30), the analysis on a dataset of 177 units identified common citations between documents and their strength. The results show that there are 5 clusters, 15245 links and 185182 total link strength. In other words, Tan S. (253), Fitscher F. (145) and Rudolph J. (139) were identified as the most co-cited authors. These findings indicate that the works of certain authors, such as Tan S., Fitscher F. and Rudolph J., stand out in the bibliographic network and are frequently cited by other documents. The influence and importance of these authors in their field of research is noteworthy for other researchers in the field of these studies. However, while this type of bibliographic analysis is a useful tool for understanding the influence of particular researchers and studies within the field, it is not possible to assess the quality of a study based on the number of citations alone. This is because the fact that a document is cited only indicates that it has been found valuable by other documents, but the number of citations is not enough. Therefore, in order to assess the scientific contribution of a document, it is important to evaluate it in a broad context. In conclusion, this analysis is seen as an important step to better understand the role of ChatGPT in education and the potential of this technology in education. These findings can

guide researchers and educators on how ChatGPT can be used in the field of education and shape future research in this field.

4.1. Limitations

This study analyses the most recent studies in the SCOPUS database and includes research on the concepts of "school", "teacher" and "student".

4.2. Suggestions for Future Research

This research allows scholars to identify the main research areas by identifying topics and leading authors in the SCOPUS database related to the use of ChatGPT with an educational focus. In this context, it can be stated that there are several research avenues for future studies. Our bibliometric analysis shows that ChatGPT influences in various aspects and therefore future research could examine different topics and approaches in more depth. For example, topics that need to be focused in the educational context such as leadership models, ethical challenges, school administrators can be suggested. Furthermore, future studies could focus on empirical studies and conduct more specific analyses to create a holistic perspective.

As a result of the rapid growth of ChatGPT in every field, it is emphasized that educational research scholars should focus on research conducted in collaboration with educational practitioners. Because every innovation brings with it opportunities and challenges. Studies in this field will support being prepared for future challenges and being cautious by providing

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest in this study.

RESEARCH AND PUBLICATION ETHICS STATEMENT

The authors declare that research and publication ethics are followed in this study.

AUTHOR LIABILITY STATEMENT

The authors declare that the “Conceptual Framework, Post Draft, Review and Editing” part of this work was done by Assist. Prof. Dr. Mustafa TAKTAK, “Method Design, Post Draft, Research, Visualization” part of this work was done by İsmail Eray DURSUN.

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