



# Reflections on ChatGPT in the field of Social Sciences: A Bibliometric Study

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**Abstract:** The main objective of this article is to search into the exploration of the ChatGPT trend in the field of Social Sciences, focusing on its trend and its widespread global application in the digital era. It is noted that ChatGPT is an artificial intelligence system that utilizes the GPT (Generative Pre-trained Transformer) language model developed by OpenAI. Emphasis is placed on ChatGPT 's application in various disciplines, such as medicine, education, cell biology, and biotechnology. This suggests that it has a broad range of applications in the field of Social Sciences. The methodology used is based on the analysis of articles related to ChatGPT in English and in the Scopus database a bibliometric study. 220 articles were selected about Social Sciences. Additionally, co-occurrence maps of keywords were conducted for the analysis, using the VOSviewer software, for the evaluation of the structure, conceptual evolution, and trends of ChatGPT following related publications. The research includes four study phases: (i) search criteria of the research field; (ii) search and selection of documents; (iii) software and data extraction; and (iv) analysis of results and trends. In conclusion, ChatGPT represents a paradigm shift in social sciences by bridging technology with human inquiry, fostering innovation, and redefining traditional research practices. However, ethical considerations such as bias mitigation and responsible integration remain critical for its sustainable use.

**Keywords:** *Artificial intelligence; ChatGPT; Bibliometrics review; Scopus; Chabots; Co-authorship; Keywords analyses; Science mapping; VOSviewer*

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## Introduction

ChatGPT (Generative Pre-trained Transformer) a chatbot developed by OpenAI and launched in November 2022, is based on a variant of its Instruct GPT model. This model was trained on a vast dataset to efficiently answer queries (OpenAI, ChatGPT). It utilizes natural language processing to generate responses to text-based inputs. GPT models are built on the Transformer architecture, a neural network (OECD. 2021).

Since the introduction of technology and AI, the field of education has undergone a significant transformation, revolutionizing how students and teachers interact, learn, and share knowledge. One of the most widely used AI models in this context is Open Ai's ChatGPT, which has gained popularity due to its ability to generate responses like of humans and to summarize complex information (Lund., & Wang, 2023). ChatGPT has the potential to automate activities such as exam questions, assignments, and academic essays, among others (O'Connor, 2022). According to Stokel-Walker (2022), ChatGPT is changing the game and could eliminate the need for certain traditional forms of tasks and assessments, such as essay writing. This study provides a detailed bibliometric analysis of chatbot-related literature, with a particular emphasis on ChatGPT. It examines the field's structure, conceptual evolution, and emerging trends using data sourced from the Scopus database. The research is conducted in two phases: (i) a bibliometric analysis of general chatbot literature and (ii) an in-depth review of studies specifically focused on ChatGPT.

The first phase analyses 220 articles published on chatbots between 2023 and 2024, all retrieved from the Scopus database. The study seeks to bridge a critical gap by systematically reviewing existing literature on ChatGPT within the context of social sciences. It identifies influential authors, leading journals, and frequently used keywords, providing a comprehensive overview of the field. To advance research on AI's impact on social sciences, particularly regarding ChatGPT, the study proposes future research directions. These approaches, summarized in Table 1, are accompanied by references to authors who have previously addressed similar topics, enhancing the study's relevance and contribution to the field.

**Table 1**

*Description of the Approaches focusing on ChatGPT*

<b>Approach</b>	<b>Description</b>	<b>Author/Year</b>
<b>Interdisciplinary Integration</b>		
Combining Social and Computational Perspectives	Integrate computational social science methods with traditional approaches to create innovative research designs.	Pavlik, 2023
Interdisciplinary Applications	Explore ChatGPT's application across disciplines like sociology, psychology, and political science to discover new insights and methodologies.	Rudolph et al. 2023
<b>Advanced Research Methodologies</b>		
AI-Assisted Participant Simulation	Use ChatGPT to simulate human participants in social experiments, enabling larger-scale studies and diverse scenarios.	Thorp, 2023
Real-time Social Trend Analysis	Leverage ChatGPT's capacity to process large online data volumes and provide real-time insights into social trends.	Thorp, 2023
<b>Ethical and Methodological Considerations</b>		
Bias Mitigation Strategies	Develop strategies to address potential biases in AI-generated data, including guidelines for responsible research use.	Rudolph et al., 2023
Replication and Validation Frameworks	Establish robust frameworks to replicate and validate results obtained through AI-assisted methods, ensuring findings' reliability and credibility.	Rudolph et al., 2023
<b>Novel Applications</b>		
Personalized Learning in Social Sciences	Explore ChatGPT's potential for creating adaptive learning experiences, personalizing content and exercises for students.	Pavlik, 2023
Policy Analysis and Simulation	Use ChatGPT for scenario-based simulations in policy analysis, enhancing research depth and breadth.	Thorp, 2023
<b>Theoretical Advancements</b>		
AI-Human Interaction Theories	Develop or expand theories explaining dynamics of AI-human interactions in social contexts.	Rudolph et al., 2023
Reflexivity in AI-Assisted Research	Investigate how AI use affects research process reflexivity and outcomes, providing perspectives on field evolution.	Rudolph et al., 2023

One of the goals is to conduct comprehensive research on ChatGPT in social sciences and build a network-based study to inform current and future researchers about trends and developments in the field of study, while minimizing any research partiality through a thorough review of bibliographic databases. To address the research questions, the author relied on prior studies that employed a similar approach (García, 2020; Segura-

Robles et al., 2020; Mahir et al., 2023; Faiza et al., 2023). Also, the author applied a bibliometric review methodology to respond to the specified research questions, as described in Table 2.

**Table 2**

*Research Questions (RQ) related to ChatGPT*

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- (RQ1): What was the publication growth rate between 2023 and 2024?
- (RQ2): Who are the primary authors contributing to the field of ChatGPT?
- (RQ3): What are the top five most impactful articles in the Scopus database related to Social Sciences?
- (RQ4): How was the distribution of research output across Social Sciences fields?
- (RQ5): Which countries have collaborated in the production of research articles?
- (RQ6): What are the most influential and productive journals?
- (RQ7): How does the overlay visualization of co-occurrence map of keywords?
- (RQ8): How does the overlay visualization of density keyword analysis?
- 

As for bibliometric studies, they follow a formal and rigorous procedure that ensures the quality of the utilized information (Moed & Glänzel, 2005). Bibliometrics entails the application of statistical methods to analyze various forms of published material, such as books, articles, or other publications. According to Mao et al. (2017), bibliometric analysis is a widely employed technique for examining the quantitative characteristics, structure, relationships, and current and future trends within scientific disciplines. Previous studies on ChatGPT in social sciences were considered:

- Chatbots and ChatGPT: A Bibliometric Analysis and Systematic Review of Publications in Web of Science and Scopus Databases. [Hamed Khosravi](#), [Mohammad Reza Shafie](#), [Morteza Hajiabadi](#), [Ahmed Shoyeb Raihan](#), [Imtiaz Ahmed](#)

This bibliometric analysis examines chatbot literature, with a focus on ChatGPT. The study analyses data from Scopus and Web of Science databases, covering 1998-2023. The research comprises two phases: a general analysis of chatbot literature and a specific review of ChatGPT publications.

The first phase reveals an annual growth rate of 19.16% (WoS) and 27.19% (Scopus) in chatbot literature. It analyzes 5,839 Scopus and 2,531 WoS documents, examining sources, countries, authors' impact, and keywords. The second phase focuses on 45 ChatGPT publications, analyzing methods, novelty, and conclusions. Key areas of interest include AI technologies, conversational agent design and evaluation, and digital technologies in mental health. This study aims to guide researchers in chatbot research and highlight significant areas for future ChatGPT investigations.

- The article Chatting about ChatGPT: how may AI and GPT impact academia and libraries? [Lund, B.](#), & [Wang, T.](#) (2023). This paper aims to provide an overview of key definitions related to ChatGPT, a public tool developed by OpenAI, and its underlying technology, Generative Pretrained Transformer (GPT).

**Design/methodology/approach.** This paper includes an interview with ChatGPT on its potential impact on academia and libraries. The interview discusses the benefits of ChatGPT such as improving search and discovery, reference and information services; cataloging and metadata generation; and content creation, as well as the ethical considerations that need to be taken into account, such as privacy and bias.

**Findings.** ChatGPT has considerable power to advance academia and librarianship in both anxiety-provoking and exciting new ways. However, it is important to consider how to use this technology responsibly and ethically, and to uncover how we, as professionals, can work alongside this technology to improve our work, rather than to abuse it or allow it to abuse us in the race to create new scholarly knowledge and educate future professionals.

**Originality/value.** This paper discusses the history and technology of GPT, including its generative pretrained transformer model, its ability to perform a wide range of language-based tasks and how ChatGPT uses this technology to function as a sophisticated chatbot

- A Review of ChatGPT AI's Impact on Several Business Sectors. A. Shaji George, A.S. Hovan George2 A.S.Gabrio Martin

ChatGPT, developed by OpenAI, represents a groundbreaking innovation in artificial intelligence. This natural language processing model combines GPT-2 with supervised and reinforcement learning techniques, fine-tuned on the GPT-3 language patterns. It enables natural text-based conversations with AI, offering applications in customer service, virtual assistance, topic detection, emotion recognition, and sentiment analysis. ChatGPT's potential extends across various sectors, including e-commerce, education, entertainment, finance, health, news, and productivity. It can generate personalized content, enhance customer service efficiency, and create more realistic human-AI interactions through multiple conversation threads. This paper explores ChatGPT's current use cases, potential future applications, and its role in improving human lives. It also addresses challenges in AI development and discusses strategies to overcome them, highlighting ChatGPT's significance in advancing artificial intelligence technology.

## **Literature Review**

The first approach to neural computing or cybernetics was invented by McCulloch., & Pitts (1943), they made the first mathematical logical approximation of the human brain, from 1950 to the present day, 73 years have been passed. If Turing (1936) could see the great revolution in the world after the Turing machine in 1950, he claimed that machines would one day mimic human thought. Alan Turing (1936) first explored the mathematical possibility of AI by building intelligent machines to evaluate their intelligence. In 1956, the first concept of AI experimentation was introduced at the Dartmouth Summer Research Project on Artificial Intelligence (DSRPAI) conference, funded by McCarthy. It was there that the first AI program was presented, which was programmed to replicate problem-solving skills like a human being. The concept of AI was born at this conference. The period from 1957 to 1974 resulted in a boom of AI. Computers had better hardware and were more accessible.

During this period, there was a significant growth in the progress of machine learning algorithms dedicated to problem-solving and interpreting human language. The year 1964 stands out when Joseph Weizenbaum introduced the ELIZA program, a chatbot that engaged in dialogues with humans using natural language processing (NLP) and programmed phrases. Shakey, the first mobile robot capable of reasoning about its own decisions, was created in 1966. The lack of computational power was the initial drawback for AI. Computers lacked the necessary capacity to process large amounts of data at high speeds. For this reason, funding for projects decreased for a period of approximately 10 years. Between 1981 and 1987, advancements in algorithms and technological developments revitalized the field of artificial intelligence (AI). During this period, John Hopfield and David Rumelhart popularized "deep learning"(DL) techniques, enabling computers to learn from experience, while Edward Feigenbaum introduced methods that simulated human decision-making processes. Despite these innovations, AI faced challenges as its ambitious goals remained unmet. This led to a decline in government funding, causing AI research to lose prominence between 1987 and 1993. Nonetheless, this period laid the groundwork for AI's resurgence, making it one of the most rapidly advancing and extensively studied fields today (Shinde & Shah, 2018). Significant indicators in AI followed:

- In 2011, IBM's Watson defeated the reigning champions of *Jeopardy*.
- In 2015, Google DeepMind's AlphaGo outperformed a professional Go player, marking a breakthrough in AI capabilities.

ChatGPT represents the evolution from traditional AI to sensitive AI. ChatGPT is a type of language that allows individuals to interact with a computer in a more natural and conversational way. Another characteristic is that it is known as a generative AI due to its ability to generate original results. ChatGPT processes natural language to draw from internet information, providing answers to questions or user instructions. These responses are based on AI. In 1997, three events revitalized interest in AI, as mentioned by Abeliuk and Gutiérrez (2021):

- Gary Kasparov, the world chess champion, was defeated by IBM's Deep Blue, a computer program trained to play chess.
- Windows implemented voice verification computer software developed by Dragon Systems.
- Kismet, a robot created by Cynthia Breazeal, exhibited emotions.

Advancements in the field of AI, particularly in deep learning (Shinde & Shah, 2018), have enabled AI systems to excel in tasks that are highly challenging for humans. In 2018, Google DeepMind introduced AlphaFold, an AI program designed to predict the three-dimensional structure of proteins based on their molecular sequences. That same year, OpenAI launched GPT, an AI model capable of producing texts exceeding 1,000 words with proper grammar, comparable to human-written content.

A perspective from the Social Sciences describes AI as the ability possessed by non-human machines or artificial entities to carry out tasks, communicate, interact, and make logical decisions, similar to humans. In summary, this implies the ability to make decisions, perform actions, and make predictions. Although the current

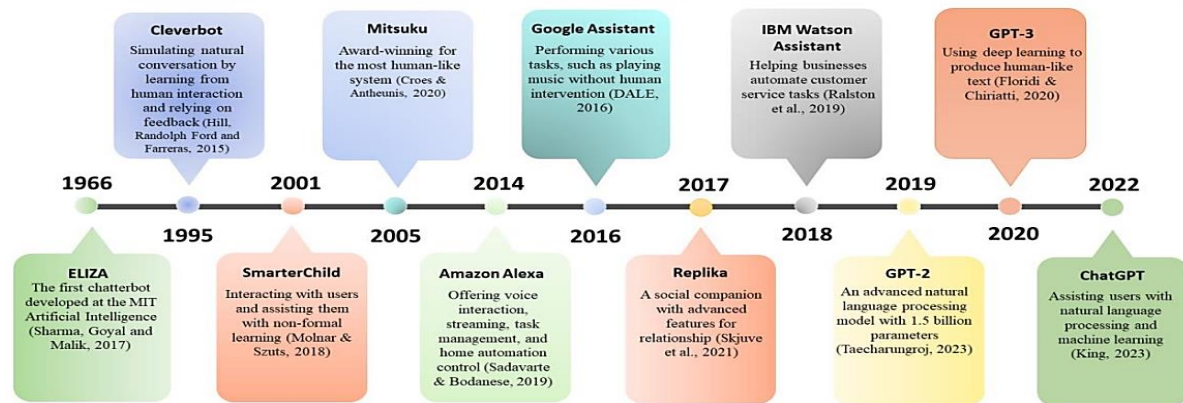
popularity of these technologies might lead us to think of them as a recent development, their development began decades ago. Although the time that has passed, and the advances made in the field, there is still no precise and universally accepted definition of AI. As the main AI-based systems, we have Siri, Alexa, Google Assistant, etc., and more recently ChatGPT (Generative Pre-trained Transformer), which is the term used to describe a family of natural language models perfected by open AI, the main topic of analysis in this article (Abeliuk & Gutiérrez, 2021).

### **Chatbots**

Chatbots operate using OpenAI's GPT a language model or Large Language Model, which generates text by drawing from billions of words in training data and learning how words and phrases relate to each other (Stokel-Walker & Van Noorden, 2023). ChatGPT is a responsive AI model capable of learning from user preferences and behavioural patterns to personalize its responses, even providing advice on personal questions. Chatbots are AI applications that simulate human dialogues and provide computerized responses to user queries using NLP (Dwivedi et al., 2021). Their main features include:

- In recent years, they have gained popularity due to improvements in customer service, including reducing response times through the automation of repetitive tasks. Chatbots provide 24/7 customer assistance, contributing to customer satisfaction.
- In addition to customer service, Chatbots have been shown to play a significant role in education, mental health support, and financial management (Ashfaq et al., 2020).
- They are highly effective at managing multiple conversations simultaneously (Adamopoulou & Moussiades, 2020a).
- Some of the most well-known Chatbots include Siri, Alexa, and Google Assistant (Adamopoulou & Moussiades, 2020b).
- Siri, Alexa, and Google Assistant are some of the most notable examples (Adamopoulou & Moussiades, 2020b).

Figure 1 shows Chatbots according to their launch date. The lack of computational power was the initial drawback of AI. Computers lacked the necessary capacity to process large amounts of data at high speeds. For this reason, there was a decrease in project funding for approximately 10 years.

**Figure 1***ChatBoots evolutions*

Complete History of Chatbots. By Parth Barot November 5, 2018

## ChatGPT

Chatbot uses a GPT machine language model from OpenAI or Lenguaje Grande, *created by text generation with millions of words of training data, learning how words and sentences relate to each other* (Stokel-Walker & Van Noorden, 2023, p.214). ChatGPT is a prototype of responsive AI, capable of learning from user preferences and behavioural patterns, customizing its responses, and even offering advice on personal questions. ChatGPT has the potential to be used in other areas such as education (Huh, 2023), journalism (Pavlik, 2023), scientific writing (Else, 2023; Thorp, 2023; van Dis et al., 2023), and biotechnology (Holzinger et al. 2023; Sanabria-Navarro et al. 2023), among other domains.

This article aims to map the body of work related to ChatGPT within the field of social sciences, using a descriptive design and bibliometric methodology based on the Scopus database. By applying various methodological techniques, the study provides a comprehensive analysis of the selected sample, offering insights into the future potential of ChatGPT-3. It is one of the most powerful language models, developed by OpenAI, and it has revolutionized the way we interact with technology. The model has been trained on a massive amount of data, allowing it to perceive and generate text that is remarkably human-like in precision. ChatGPT-3 is the latest text-based on AI tool, widely renowned for its ability to handle various aspects of different topics, including education and environmental research. It is an emerging tool for research purposes while also highlighting potential challenges. GPT-4 was launched on March 14, 2023, and it was composed of a massive corpus of textual data, such as books, articles, and websites, with billions of model parameters (GPT stands for details in responses) and fine-tuning of policy optimization (a form of reinforcement learning to optimize reward policy).

ChatGPT is based on two techniques: contextual learning and prompt engineering (few prompts). Rapid engineering involves designing model inputs, such as questions and statements, to achieve better results (i.e., responses). ChatGPT's fame lies in its quick, informative, and seemingly "intelligent" responses to any query. One of the most exciting possibilities of ChatGPT is its potential to enhance natural language processing (NLP) and natural language understanding (NLU) across a wide range of applications. ChatGPT can be used to enhance chatbots, virtual assistants, and other conversational functions. These types of systems are becoming increasingly important as more and more people use voice and text to interact with technology. The role of ChatGPT will be examined in detail throughout the following sections (Pavlik, 2023).

## Methodology

The primary aim is to investigate the trends of ChatGPT within the field of Social Sciences through an in-depth exploration of its role in this domain. The study seeks to develop a network-based analysis to provide insights into the trends and evolution of the field, offering valuable information to current and future researchers. This is achieved by conducting a thorough review of bibliographic databases, ensuring minimal research bias.

As the methodology for this study, bibliometrics was used to study research on ChatGPT in the field of social sciences. Moed and Glänzel (2005, p.343) define bibliometrics as: "*the study of quantitative aspects of the production, dissemination, and use of published information*". The following rules were used to prevent the inclusion of different research that could alter the study's effects (Todeschini and Baccini, 2016). If any articles do not follow the logic or do not conform to the methodology of the work, they are removed from the final corpus of articles.

## Sample and Procedure

This work focuses on the 828 articles, specifically 220 in the field of social sciences in scientific journals in Scopus database, selected for the importance of criteria for availability and accessibility of information and for being a validated reference in the development of bibliometric analysis. The primary techniques applied are term analysis and textual bibliographic data (title, abstract, title, and keywords) of the articles. VOSviewer was the chosen software for mapping the networks (van Eck., & Waltman, 2014, 2019).

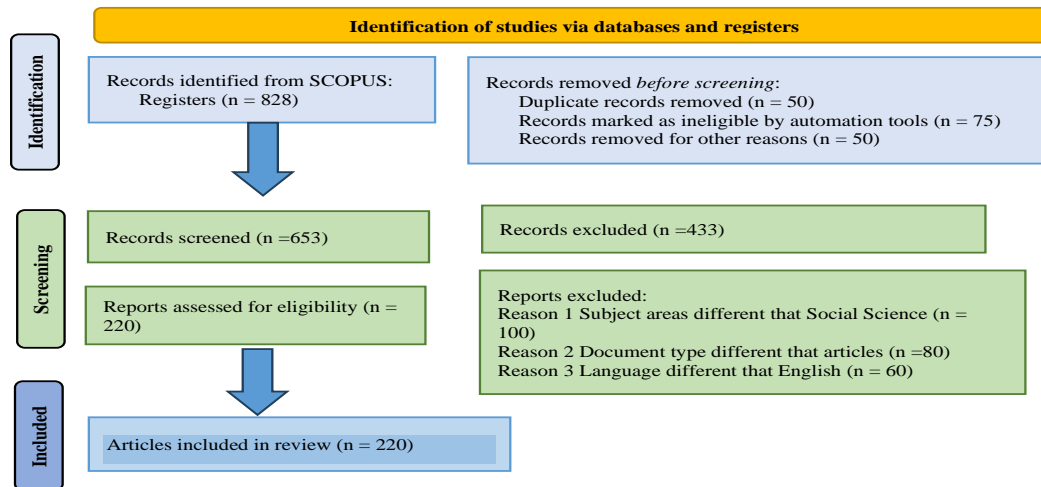
Bibliometric methodology is not recent (Kessler, 1963), but it currently produces significant interest in the academic world, as there is the advantage of having powerful online information available for almost all published articles, updated and accessible from most reputable and prestigious publishers. In this analysis, we trust on VOSviewer (van Eck., & Waltman, 2014, 2019), which performs the relevant presentations for network analysis. Keywords, in the occurrences attribute, provide articles where the selected words and authors are located, placing the documents within certain perspectives. According to Donthu et al. (2021), bibliometric methodologies are generally the most common way to represent networks and are used to classify, visualize, evaluate, and examine a universe of concepts to reveal the organization and dynamics of a specific scientific field. In this article, the Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) criteria (Moher et al., 2009;



Moher et al., 2015) were used, consisting of four stages (table 2 and figure 2). Table 3 have the main ideas extracted from the text.

**Figure 2**

*The stages criteria (PRISMA).*



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

### Co-occurrence Analysis

To clarify the conceptual structure of the ChatGPT domain, we employed a co-occurrence analysis of keywords, a method well-established in bibliometric research (Cobo et al., 2011). This approach differs from analogical measures that link articles indirectly through citations or co-authorships. Instead, co-word analysis examines the textual content of publications directly, offering a more nuanced understanding of the field's conceptual landscape (Župić & Čater, 2015).

Co-occurrence analysis offers multiple benefits in research evaluation, including the ability to directly scrutinize research terminology, uncover interrelated themes, and monitor the evolution of concepts over time. This method, when combined with other bibliometric approaches such as co-authorship and co-citation analyses, provides a comprehensive perspective on the research landscape (Donthu et al., 2021; Mukherjee et al., 2022). Together, these analytical techniques shed light on: the intricate networks of knowledge creation, the dynamics of collaboration within the field and the progression of intellectual discourse. Researchers can harness these methodologies to obtain a holistic understanding of the swiftly advancing domain of AI language models. This multifaceted approach facilitates an in-depth examination of ChatGPT's conceptual underpinnings and emerging research directions, yielding valuable insights for both academic researchers and industry professionals in this area of study.

**Table 3***Four phases' stages criteria (PRISMA).*

<b>Phase I: Research</b>
The literature review aims to analyse the development of DL research through bibliometric analysis, combining Descriptive Analysis and Science Mapping (van Eck & Waltman, 2014). This approach assesses the field's evolution, intellectual structure, and dynamics, as shown in previous studies (Hallinger & Suriyankietkaew, 2018; Albort-Morant et al., 2018; Mohamed et al., 2020). Key indicators, including publication years, leading journals, countries, co-authors, and institutions, will be examined. Science mapping will visualize research fields and their connections, uncovering relationships and trends (van Eck & Waltman, 2014).
<b>Phase II: Document Search and Selection</b>
Selecting a high-quality and reliable database is essential for bibliographic research. Based on the methodological criteria outlined by Herrera-Franco et al. (2020), the Scopus database was chosen for this study. Scopus stands out for its rigorous quality standards, extensive data coverage (featuring 1.7 billion cited references dating back to 1970), user-friendly data retrieval, and comprehensive inclusion of scientific journals, as emphasized by Harzing & Alakangas (2016). The study focused on articles published between 2023 and 2024, specifically those containing "ChatGPT" in their titles. Only articles in English were considered due to English being the predominant language in scientific publications. While exact percentages vary by field and database, English remains the most widely used language in academic literature, with non-English publications also making significant contributions to the scholarly corpus Using Boolean logical operators, the following search was conducted. Search Topic: ST=(TITLE-ABS-KEY("ChatGPT") OR TITLE-ABS-KEY(("ChatGPT") OR TITLE-ABS-KEY(("ChatGPT")))) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")).
<b>Phase III: Software and Data Extraction</b>
During this stage, the selected articles were assessed based on their contributions to the ChatGPT topic. Specifically, <b>220 bibliographic</b> documents were downloaded into a CSV file, following Cobo et al. (2011). The CSV file contained bibliographic data such as authors, titles, publication years, journals, keywords, and citation numbers, as described by Hallinger & Suriyankietkaew in 2018. To ensure data cleanliness, the CSV format was imported into the Mendeley database for a thorough review to eliminate duplicates. For constructing bibliometric maps, the VOSviewer software was employed due to its ease of data processing, construction, and visualization of bibliometric networks, as per van Eck & Waltman (2019). VOSviewer has been widely used for studying various scientific disciplines, as demonstrated by De la Cruz del Rio et al. in 2020
<b>Phase IV: Results and Trends Analysis</b>
The analysis of results was conducted in two stages, the first stage involved a descriptive statistical analysis of the data, while the second stage focused on building networks. In the elaboration of term maps and the visualization of link strengths, VOSviewer was employed, which is well-suited for constructing and visualizing related networks. Co-occurrence networks, as extensively discussed by Rousseau et al. 2018, were analyzed using VOSviewer. The software organized groups and created clusters of varying sizes and colors, facilitating subsequent analysis of these groupings

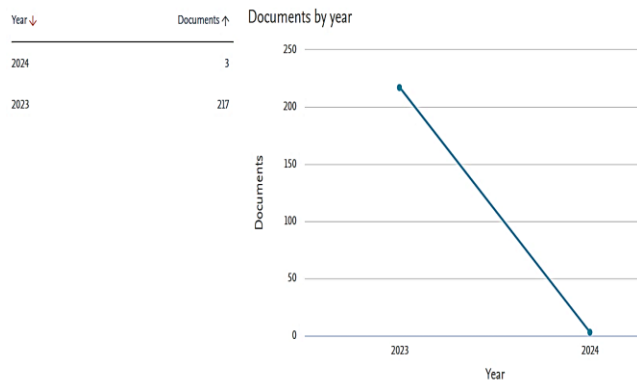
## Results

### **The growth rate of publication in the period of 2002-2004 (RQ1).**

Yearly research output from 2023-2024, the year-wise distribution of documents indexed in the SCOPUS database, is shown in Figure 3. In 2024, only three papers on ChatGPT research were published; but in 2003, the number of publications increased to 217 articles. Figure 2 clearly shows that the growth rate of publication in the period of 2023 has been growing rapidly. This forward movement indicates that the research on ChatGPT was consistently the focus of academics during 2023.

**Figure 3**

*The Growth Rate of Publication in the Period of 2022-2024*

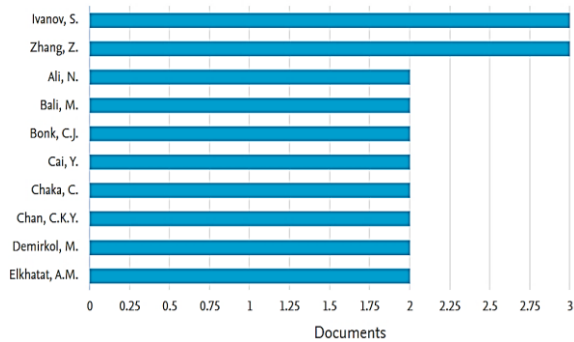


**Main Publications and Authors (RQ2)**

The growth of analysed publications related to the ChatGPT field was limited or nearly non-existent for the year 2022, and it is from the year 2023 onwards that it develops with 217 articles. The primary authors in the field of ChatGPT in Scopus are shown in Figure 4.

**Figure 4**

*The 10 main authors in the field of Social Science*



(N= 220 articles) (SCOPUS).

**The top five most cited articles in the field of social sciences (RQ3)**

The top five most cited articles in the field of social sciences during in 2023 are listed at following (table 4):

Table 4

Five most cited articles

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<p><b>1 So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy.</b> Dwivedi, Y.K. Kshetri, N.Hughes, L.,Wirtz, J., Wright, R. <i>International Journal of Information Management</i>, 71, <b>citation 167</b>.  <b>Abstract.</b> Artificially intelligent tools like ChatGPT have vast potential and pose ethical and legal challenges. This article gathers insights from 43 experts spanning diverse fields, offering a multidisciplinary perspective. ChatGPT can enhance productivity in sectors like banking, hospitality, and IT, as well as business functions such as management and marketing. However, limitations, privacy threats, biases, and misuse are acknowledged. Opinions on regulation vary. The article identifies three key research themes: knowledge, transparency, and ethics; digital transformation; and education and research. Research directions include assessing necessary skills for managing generative AI, mitigating biases from training data, ideal contexts for AI integration, optimizing human-AI collaboration, accuracy assessment methods, and ethical and legal considerations. In conclusion, ChatGPT's transformative potential sparks both promise and concerns, warranting further research to harness its capabilities while addressing ethical, legal, and societal implications.</p>
<p><b>2. How Does ChatGPT Perform on the United States Medical Licensing Examination? The Implications of Large Language Models for Medical Education and Knowledge Assessment.</b> Gilson, A., Safranek, C.W., Huang, T., Taylor, R.A., Chartash, D. <i>JMIR Medical Education</i>, 9, <b>161 citations</b>.  <b>Abstract.</b> This study assessed Chat Generative Pre-trained Transformer (ChatGPT), a natural language processing model with 175 billion parameters, in answering questions related to the United States Medical Licensing Examination (USMLE) Step 1 and Step 2 exams. Two question sets were used: one from AMBOSS, a popular medical student question bank, and another from the National Board of Medical Examiners (NBME) free 120 questions. ChatGPT's performance was compared to GPT-3 and InstructGPT. In the AMBOSS-Step1 dataset, ChatGPT achieved 44% accuracy, while in the AMBOSS-Step2 dataset, it achieved 42% accuracy. In the NBME-Free-Step1 and NBME-Free-Step2 datasets, it scored 64.4% and 57.8%, respectively. ChatGPT outperformed InstructGPT by an average of 8.15% across all datasets, whereas GPT-3 performed poorly. ChatGPT's accuracy decreased as question complexity increased within the AMBOSS-Step1 dataset. In the NBME datasets, ChatGPT provided a logical justification for its answers 100% of the time and included information directly related to the question in 96.8% of cases. The presence of irrelevant information was 44.5% lower for incorrect answers compared to correct answers in the NBME dataset.</p>
<p><b>3. ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?</b> Rudolph, J., Tan, S.,Tan, S. <i>Journal of Applied Learning and Teaching</i>, 6(1), pp. 342–363. 2023. <b>Citations 100</b>  <b>Abstract.</b> ChatGPT, a cutting-edge chatbot, stands out as a remarkable AI model. It excels in rapidly generating high-quality prose, sparking both anticipation and concern, particularly in the realm of higher education and various other domains. ChatGPT, a variant of OpenAI's powerful GPT language model, proficiently crafts text indistinguishable from human composition. It engages users in natural and intuitive conversations. This article delves into the evolution of OpenAI, transitioning from a non-profit organization to a commercial entity. Our methodology combines comprehensive literature review and experimentation with AI software. Our literature review signifies one of the first peer-reviewed academic examinations of ChatGPT, exploring its relevance in higher education, particularly in assessment, learning, and teaching. After delineating ChatGPT's capabilities and assessing its strengths and limitations, we scrutinize its implications for higher education and the future of learning, teaching, and assessment in the AI chatbot era. We contextualize ChatGPT within the current landscape of (AI) in Education (AIEd) research, exploring its applications for students, educators, and systems, while weighing opportunities and challenges. The article concludes by offering recommendations to students, educators, and higher education institutions, with a particular focus on assessment.</p>
<p><b>4. What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education.,</b> Tlili, A., Shehata, B., Adarkwah, M.A., Huang, R., Agyemang, B.<i>Smart Learning Environments</i>, 10(1), 15, 2023, <b>82 citations</b>.  <b>Abstract.</b> (AI) technologies, like ChatGPT, are increasingly integrated into various aspects of our lives. Developed by OpenAI, ChatGPT has garnered global attention as a cutting-edge AI application. This study focuses on its role in education, using a qualitative instrumental case study approach with three stages. In the first stage, the study finds a generally positive public discourse on social media, reflecting enthusiasm for ChatGPT's educational potential. Yet, there are also cautious voices regarding its use in education. The second stage analyzes ChatGPT's impact on education, considering educational transformation, response quality, usefulness, personality, emotion, and ethics. In the final stage, user experiences across ten educational scenarios</p>

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reveal concerns, such as cheating, honesty, truthfulness, privacy, misleading, and manipulation. The study's findings underscore the need for responsible adoption of chatbots like ChatGPT in educational settings, prompting further research in this direction.

5. *War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education.* Rudolph, J., Tan, S., Tan, S., *Journal of Applied Learning and Teaching*, 6(1), pp. 364–389. 2023. **Citations 42**

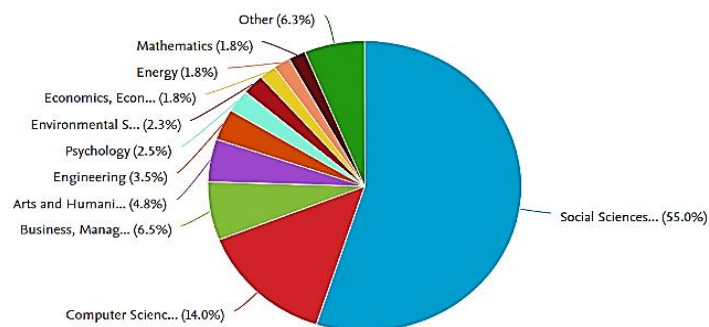
**Abstract.** The chatbot landscape has rapidly evolved since late November 2022, with intense competition in the AI domain. ChatGPT, Bing Chat, Bard, Ernie, and others are gaining popularity in higher education. In this article, we highlight promising English and Chinese chatbots, delving into their backgrounds and histories. After reviewing academic literature, we conduct a comprehensive assessment, revealing that no chatbot stands out as an A-student. GPT-4 and its predecessor perform better, while Bing Chat and Bard lag behind. The hype around AI's intelligence appears unfounded. The article concludes with recommendations for higher education stakeholders: (1) Faculty should reassess their methods, (2) focus on teaching and learning, (3) students must use chatbots wisely, and (4) institutions should adapt to these evolving technologies.

### Distribution of Researched Theme Areas on ChatGPT (RQ4)

The areas with the highest number of articles on the topic of ChatGPT are described in Figure 5, with Social Sciences standing out at 55.0%, followed by Computer Sciences 14.0%.

**Figure 5**

*The articles by subject area in ChatGPT in the field of Social Science*



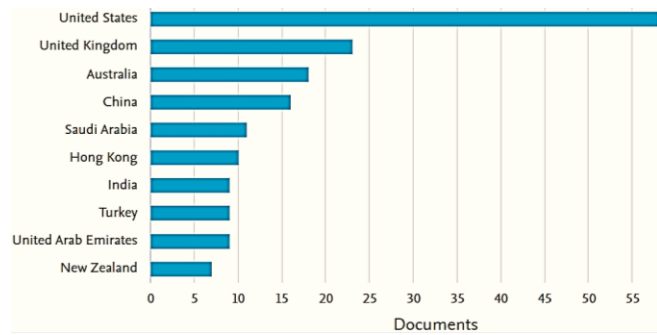
(N= 828 articles) (SCOPUS).

### Countries with mayor production by subject area in ChatGPT (RQ5)

In relation to the productive countries with the highest scientific output, the top 10 are collected in database figure 6. The USA stands out above all others, being the country with the largest number of documents (58), The United Kingdom presents the second-largest collection of articles (23), and Australia is in the third position (18). Below is China (16), South Arabia (11), Hong Kong (10), India, Turkey, United Arabic Emirates (9) and New Zealand (7).

**Figure 6**

*Countries with mayor production by subject area in ChatGPT in the field of Social Science*

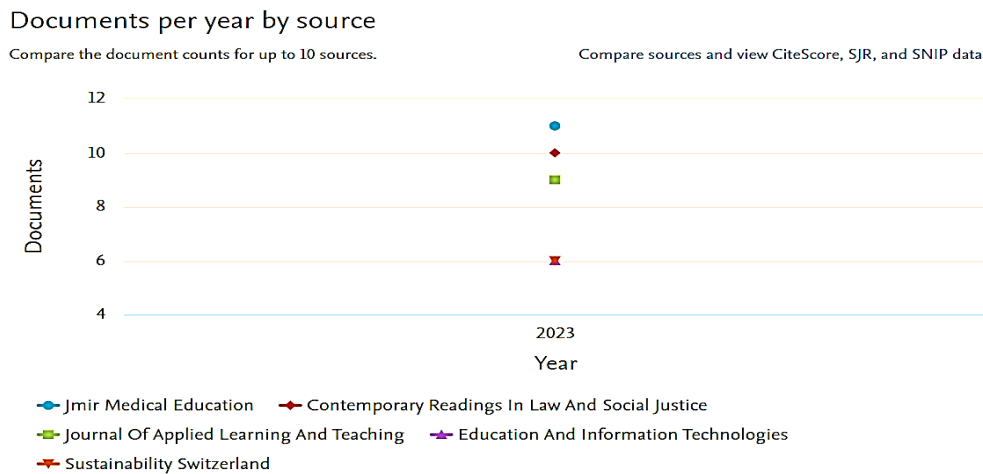


**Main Scientific Journals Related to ChatGPT (RQ6)**

Figure 7 describes the journals related to the study of ChatGPT in the field of Social Sciences. There are five journals listed: Jmir Medical Education (11 articles), Contemporary Readings in Law and Social Justice (10 articles), Journal of Applied Learning and Teaching (9 articles), Education and Information Technologies (6 articles) and Sustainability Switzerland (6 articles).

**Figure 7**

*Principals journal about ChatGPTs research (SCOPUS).*



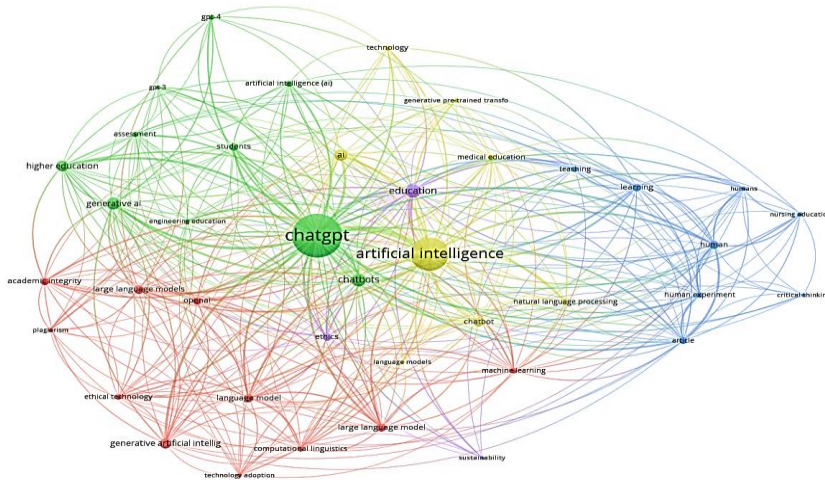
**Network Analysis (RQ7)**

The combination of mapping and grouping showed in Figure 8 offers an overview of the structure within research areas associated with social sciences in the context of ChatGPT. Each distinct group is denoted by a unique colour, indicating varying degrees of significance, similarity, and interrelation among these groups. The

co-occurrence map of keywords is observed in Figure 8, displaying the main terms, their occurrences, and connections with other terms. The network generated five clusters, with keywords in each cluster differentiated by colours: red, blue, green, violet and yellow. This illustrates that "the density of elements decreases as the distance from the focal point increases, while it increases with the number of nearby elements," as described by van Eck., & Waltman, (2019). According to the analysis of co-occurring terms (co-occurring keywords) presented in Figure 8, the phrases "ChatGPT" emerge as the most frequently occurring expressions. Figure 8 illustrates the connection among authors who are part of a network. The expectation is that, as there are only a limited number of authors currently associated with each other, more researchers will collaborate in the future. This increased collaboration is anticipated to yield a greater number of high-quality research outcomes. In Figure 8, the authors primarily concentrate on the issue of ChatGPT's role in social sciences.

**Figure 8**

*The co- occurrence map of keywords (VOSviewer).*



**Table 5**

*The cluster generated in co- occurrence map of keywords (VOSviewer).*

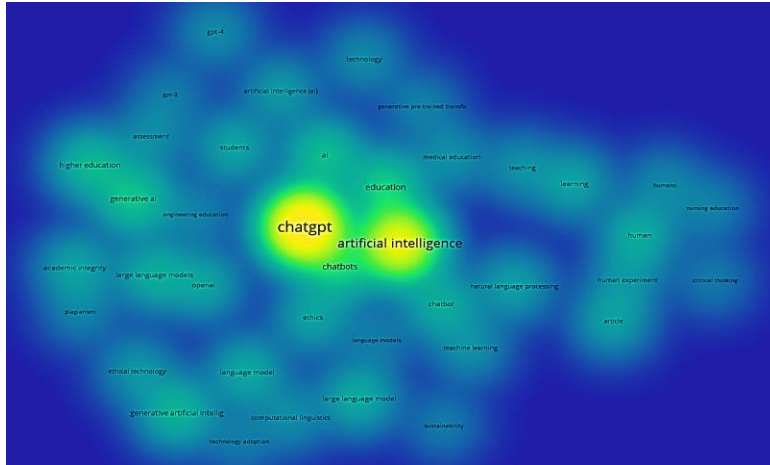
Cluster	Colour	Items	Some Key words
1	Red	11	Relates to academy integrate, ChatGPT, Education, Ethics, Language model, Machine Learning, Plagiarism, Openai, Technology Adoption.,
2	Green	10	Chatgpts, artificial intelligence, assessment, chat. Engineering education, generative, AI, ChatGpt 3, Chatgpt 4, Higher education student,
3	Blue	8	Article, Critical thinking, Humans, Humans experiment, Learning, Nursing education, Education.
4	Yellow	8	AI, GPT 4, Students, Chatbot, Language Model, Medical Education,
5	Violet	3	Education, Ethics, Sustainability

### The density map of keywords (VOSviewer). (RQ8)

Figure 9 illustrates the concentration of associated terms and the quantity of nodes in close proximity. A yellow node, indicating a high degree of occurrence, represents the prevalence of specific phrases. Within this yellow node, which is predominantly associated with the keyword "ChatGPT," lies the epicentre of extensive research.

#### Figure 9

*The density map of keywords (VOSviewer).*



## Discussions and Conclusions

With only one year of creation, the impact of AI-based chatbot technology, such as ChatGPT, on several sectors has been revolutionary. They are able to quickly process students and researchers' inquiries and provide personalized responses based on the data they collect. Additionally, ChatGPT has made its mark in different areas as healthcare, and education, social sciences. Similarly, it is being used by educational institutions to assist students with course material or answer general queries about university life more efficiently than before, which allows them to focus more time on other areas of importance like research projects or teaching activities instead of mundane administrative tasks that could be automated using a chatbot system like ChatGPT's AI platform. Similarly, it is being used by educational institutions to assist students with course material or answer general queries about university life more efficiently than before, which allows them to focus more time on other areas of importance like research projects or teaching activities instead of mundane administrative tasks that could be automated using a chatbot system like ChatGPT's AI platform.

ChatGPT has had a transformative impact on social science research, particularly in its language generation capabilities. It has shown proficiency in data analysis, idea generation, and questionnaire



development, playing a significant role in unravelling human behaviour, social dynamics, and cultural phenomena. Additionally, ChatGPT has been integrated into social media analysis, helping to illuminate trends and sentiment shifts.

The tool has also contributed to streamlining qualitative analysis, although there are both benefits and risks associated with automated coding. Ethical considerations, such as bias and algorithmic transparency, are important factors to consider. ChatGPT's influence extends to policy-making, particularly in areas like healthcare and education, though caution is advised when relying on AI-generated recommendations. Experts emphasize the need for a balanced approach that combines AI capabilities with human expertise.

In the field of social sciences, whose epistemological premise is based on thinking and creating, the integration of ChatGPT presents a paradox. While it can aid researchers and academicians in writing and research tasks, it may also deprive them of understanding the essentials of the discipline. The confluence of ChatGPT and social science requires deeper understanding, as it is not only aiding but also altering the epistemology of the discipline.

Despite concerns, some researchers have found that ChatGPT can replicate certain research results at a fraction of the cost, potentially accelerating social science research in some areas. However, it's crucial to maintain a balance between leveraging AI capabilities and preserving the critical thinking and creativity that are fundamental to social science research.

The application of ChatGPT in social sciences has also attracted significant attention among researchers. The efficiency of ChatGPT compared to other chatbots in the US Medical Licensing Exam using AMBOSS and NBME questions was examined by Gilson et al. (2023), and it was found that ChatGPT outperformed InstructGPT and GPT-3 by 60% and provided logical justifications in 100% of cases. In another study, Lim et al. (2023) evaluated the potential uses and disadvantages of generative artificial intelligence (AI) in education. In addition, in terms of managing mental health, the study conducted by Hamdoun et al. (2023) showed that text-based or voice-enabled conversational agents could be efficient by incorporating ethical considerations. A recent study carried out by Lund et al. (2023) demonstrated the potential for ChatGPT to improve productivity in academia and scholarly publishing.

Bibliometric analysis is a valuable tool for identifying prolific authors, main pathways, leading countries, and their collaboration patterns, as well as the intellectual structure of a particular domain in existing literature (Donthu et al., 2021; Ellegaard & Wallin, 2015; Zupic & Čater, 2015). This type of analysis involves processing substantial amounts of unstructured data, such as the number of publications, keywords, and other relevant metrics. Bibliometric analysis can also be useful for forecasting future trends in a particular academic topic (Farhat et al., 2023). It is noted that the topic studied, ChatGPT, has been in the Scopus database for just one year, and the promise of bibliometrics still lies in the ability to synthesize knowledge, although tracking, trends, and performing statistical analyses are important components (Maggio et al., 2021). Consequently, well-executed bibliometric studies can significantly contribute to the advancement of a field and guide future research efforts.

As conclusion, it can be affirmed that the main objective was fully achieved. The results were presented, and a bibliometric study on ChatGPT, along with its respective networks, was conducted. Given that this topic is relatively new, it has been observed that the majority of articles in SCOPUS have been developed from 2023. ChatGPT has gained prominence in 2023 and has generated extensive discussion about its academic utility, usage, and quality in research. Additionally, it has been noted that it is most frequently used in the social sciences, followed by medicine and computer science. This reflects the increasing importance of AI in information retrieval through applications like Chatbots, which use Natural Language Processing (NLP) to simulate human conversations. The accuracy of ChatGPT's data curation capabilities was evaluated through a bibliometric analysis using search strings in SCOPUS databases.

Co- occurrence and density are the two crucial factors in this study that were identified using bibliometric analytical strategies. Research on the ChatGPT topic in the social sciences only appears from 2023 and it was taken from the Scopus database. We removed all irrelevant or repetitive studies, whose keywords are not in the abstract, keywords, or title, the correct document type or not (e.g., a book chapter).

ChatGPT is a powerful (AI) tool with the potential to transform the education sector. Its ability to perform tasks that require knowledge and creative intelligence, such as grading assignments and providing student guidance, has the potential to revolutionize the way education is delivered. However, there are also challenges associated with integrating AI into education, including the need to ensure the accuracy and reliability of AI-generated responses and concerns about the replacement of teachers.

ChatGPT Search represents a revolutionary approach to online information retrieval, transforming traditional search engine interactions. By leveraging conversational AI and natural language processing, this innovative tool enables users to search through complex queries more intuitively and efficiently. Unlike conventional search engines, ChatGPT Search understands context, anticipates user needs, and provides personalized, real-time information. Its key advantages include natural language interactions, ad-free experiences, and the ability to generate comprehensive responses directly. This technology signals a potential paradigm shift in how we access and consume information, promising a more intelligent, user-friendly search experience that adapts to individual communication styles and requirements.

Regarding the main contributions of this research, it offers both theoretical and practical insights for the generation of new theories. It's important to highlight that ChatGPT has the potential to be revolutionary, even if it needs improvements, such as the ability to write scientific articles. In the future, it could even generate complete articles suitable for publication in prestigious journals, demonstrating remarkable advances in machine capabilities. However, it has also been observed that the future of AI Chatbots is not fully defined. Although OpenAI is working on the release of GPT-4, and Google has made waves with its controversial IA La MDA, there are challenges and concerns. Several countries have banned or restricted the use of ChatGPT, and the European Union demands that copyright be respected. For instance, Italy has been the first country to prohibit its use. These decisions have a significant impact on the development of ChatGPT and its future evolution. The Benefits of PRISMA are Transparency: Clearly documents how studies were selected or excluded. Rigor: Ensures a systematic and unbiased approach to literature review. Reproducibility: Others can replicate the process for validation or future research and Focus Ensures the included studies meet the research objectives.

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