BizEcons Quarterly (2023) 16: 1-17

ISSN: 2695-2246

ChatGPT impacts on access-efficiency, employment, education and ethics: The socio-economics of an AI language model

Olaniyi Evans[1] . *Olawale Wale-Awe[2]* . *Osuji Emeka[3]* .

Olawale O. Ayoola[4]* . *Raymond Alenoghena[5]* . *Sesan Adeniji[6]

Received: 2 December 2022 / Accepted: 5 August 2023

This paper and more can be downloaded for free from https://bizecons.5profz.com/

Abstract

Generative artificial intelligence (AI) models, such as ChatGPT, have gained significant attention in various fields, including healthcare, education, and industry. This article aims to provide an overview of the impacts of ChatGPT on access, efficiency, jobs, and education, using technological determinism theory and social construction of technology theory as frameworks. The study highlights the potential benefits of ChatGPT in healthcare, education, and business, emphasizing the need for ethical considerations and human oversight. It acknowledges the limitations of ChatGPT in understanding context and tone and stresses the importance of ethical guidelines and best practices. The impact on the labor market and industries depends on how ChatGPT is socially constructed and used, with possibilities of job displacement and creation of new opportunities. In education, ChatGPT can enhance personalized learning, student engagement, and critical thinking skills, but accuracy, reliability, and ethical implications must be addressed. Policy recommendations include implementing ethical guidelines, maintaining human involvement, investing in training and reskilling programs, balancing human judgement and machine learning in education, considering the impact on the labor market, and addressing social and cultural implications. Collaboration with experts in AI, ethics, education, labor market analysis, and social and cultural studies is essential in developing comprehensive guidelines and policies for responsible use of ChatGPT.

Keywords: ChatGPT, access, efficiency, employment, education, ethics

1 Introduction

The development of generative artificial intelligence (AI) models, such as ChatGPT, has garnered considerable attention across various fields, particularly healthcare, education, and industry. ChatGPT is a natural language processing model that uses machine learning algorithms to generate human-like responses to user input. Its advanced language-modeling capabilities have been shown to enhance access to information, increase productivity, and streamline communication in various fields (Hopkins et al., 2023; Mattas, 2023). However, the increased use of ChatGPT and similar models has raised ethical and economic concerns regarding job displacement, privacy, and accountability (Zarifhonarvar, 2023).

In the healthcare sector, ChatGPT has the potential to revolutionize patient care and access to information. According to Hopkins et al. (2023), ChatGPT can serve as an intelligent chatbot to provide patients with accurate and reliable information regarding their conditions, treatment options, and clinical trials. Some authors suggest that ChatGPT can improve patient satisfaction and reduce the burden on healthcare providers by automation of routine tasks. In the education sector, ChatGPT has been shown to enhance the learning experience by provision of personalized and adaptive feedback to students (Baidoo-Anu & Owusu Ansah, 2023). ChatGPT can also support teachers by provision of automated grading and feedback on student work, freeing up more time for instructional planning and creative activities. In industry, ChatGPT and similar models are expected to affect employment by automation of routine tasks, which can lead to job displacement (Felten et al., 2023). However, the impact of ChatGPT on employment remains uncertain, and some researchers suggest that it can create new job opportunities in areas such as AI development, data analytics, and ethics (Zarifhonarvar, 2023).

Relying on technological determinism theory and social construction of technology theory, this literature review paper aims to therefore provide an overview of impacts of ChatGPT on access, efficiency, jobs and education, as well as identify gaps in existing research and future directions for research in this area. By following rigorous methodology, the literature review provides a comprehensive overview of current state of research on impacts of ChatGPT.

[1,3] School of Management and Social Sciences, Pan Atlantic University, Lagos, Nigeria. *olaniyievans@gmail.com*
[2] Dept. of Finance, Babcock University, Nigeria.
[4] McPherson University, Ogun State, Nigeria.
[5] Dept. of Economics, Trinity University, Yaba, Lagos.
[6] W. Frank Barton School of Business, Wichita State University, Kansas, USA.

The justification for this literature review is based on the growing interest in the use of chatbots powered by AI technology like ChatGPT in various industries and sectors. Potential benefits of ChatGPT have been documented in healthcare (Hopkins et al., 2023; Sallam, 2023), higher education (Firaina & Sulisworo, 2023; Baidoo-Anu & Owusu Ansah, 2023), ophthalmology (Antaki et al., 2023), libraries and academia (Lund & Wang, 2023), and labor market (Zarifhonarvar, 2023). Thus, this literature review aims to provide a comprehensive and up-to-date understanding of the potential impacts of ChatGPT on various sectors and industries.

Furthermore, the significance of this study lies in its comprehensive overview of the current state of research on the use of ChatGPT in various fields. The review explores the potential benefits and drawbacks of ChatGPT in different contexts, including healthcare education and research (Sallam, 2023), higher education (Firaina & Sulisworo, 2023; Baidoo-Anu & Owusu Ansah, 2023), and libraries (Lund & Wang, 2023), among others. It also examines economic impact of ChatGPT on different industries and occupations. The review, therefore, provides valuable insights into the potential of ChatGPT to revolutionize access and efficiency in different fields (e.g., education), as well as identify knowledge gaps and future research directions.

2 Theoretical Framework

Technological determinism theory argues that technology drives societal change, and individuals have limited control over the direction of this change. According to Marshal McLuhan, a prominent technological determinist, the impact of technology is "all-encompassing and thorough in the way it shapes and structures society" (Azam et al., 2020, p. 134). This perspective suggests that the development and implementation of technology have a significant impact on society and its institutions, including education, work, and communication (Evans, 2022; Evans & Mesagan, 2022; Evans & Oni, 2022; Guevara, 2022; Adeola & Evans, 2022; Adeola et al., 2023; Evans, 2023). For example, Guevara's (2022) study of television journalists during COVID-19 pandemic illustrates how the sudden shift to remote work and use of digital tools for reporting was a result of technological determinism. Journalists had to adapt to new technologies and ways of working to continue the production of content, which underscores how technology influences professional practices.

In the context of ChatGPT, technological determinism theory may be applied to argue that the introduction of an AI language model will have a profound impact on access, efficiency, jobs, and education, regardless of individuals' agency. This theory suggests that technology has potential to revolutionize various fields, such as healthcare, education, public health, tourism, and business. However, this also suggests that there are potential negative consequences, such as impact on employment and data privacy. This theory suggests that the development and implementation of ChatGPT should be guided by a thorough analysis of its potential impacts, both positive and negative.

Technological determinism theory has, however, been criticized for oversimplifying complex relationship between technology and society. Diniasti and Haqqu's (2022) analysis of documentary film "The Social Dilemma" demonstrates that reception of technological determinism among teenagers is not straightforward. While some participants believed that technology has a deterministic effect on society, others highlighted the role of human agency in technology and its impact.

Therefore, social context and individuals' interpretations of technology play a significant role in its impact on society. This perspective is consistent with social construction of technology theory, a sociological approach that emphasizes how technological innovation is shaped by social processes and not just by technological determinism. According to Kwok and Koh (2021), social construction of technology theory emphasizes the study of social context in which technological innovation takes place, particularly social values, norms, and power dynamics. This approach acknowledges that design, development, and use of technology are not neutral, but rather, are shaped by social actors who hold different interests, values, and perspectives.

For example, Varney and May (2021) explored social construction of cross-reality technologies in learning, applying social construction of technology theory. They found that adoption and use of cross-reality technologies in learning are shaped by social factors such as educational policies, instructional practices, and user perceptions. They argued that social construction of technology theory can help identify ways in which social context shapes design, development, and use of new educational technologies, and can provide insights into how to design technologies that better align with the needs and goals of different stakeholders.

In the context of ChatGPT, this theory suggests that technology's impact on society is not solely determined by its intrinsic properties, but is also influenced by societal and cultural factors (e.g., norms and values of organizations and individuals who use it). This theory suggests that the implementation of ChatGPT should be accompanied by a thorough analysis of social and cultural context in which it will be used; also the development and implementation of technology should be guided by needs and values of users. Overall, technological determinism provides a useful framework for analyzing the impact of ChatGPT on society, but it should be considered in conjunction with other theoretical perspectives, such as social construction of technology theory to fully understand the complex relationship between technology and society.

3 Methodology

The study employs a literature review approach to synthesize relevant literature on the impacts of ChatGPT on access, efficiency, jobs, and education. This methodology is suitable for the research objectives, as it will enable identification and analysis of extant knowledge and best practices in the field (Creswell, 2014). In line with Peters et al. (2020), this approach

will allow us to systematically search for and screen relevant studies, particularly both quantitative and qualitative research designs, grey literature, and expert opinions. The inclusion criteria will focus on studies that explore impacts of ChatGPT on access, efficiency, jobs, and education, published in English language journals from 2022 to 2023.

The initial step in this study involves conduct of a comprehensive review of academic and professional literature related to the impacts of ChatGPT on access, efficiency, jobs, and education. The review includes journal articles, books, reports, and other relevant sources, guided by research objectives; the sources are selected based on their relevance to research objectives (Grant and Booth, 2009; Creswell, 2014). The literature review is conducted via databases such as Google Scholar, JSTOR, and ProQuest.

We follow the guidelines proposed by Snyder (2019) and Paul and Criado (2020) for writing a comprehensive literature review. This includes the synthesis of key findings from included studies, critical evaluation of quality and limitations of research, and identification of future research directions. These rigorous methodology guidelines provide a comprehensive overview of current state of research on the impacts of ChatGPT on access, efficiency, jobs, and education, and help identify knowledge gaps and future research directions.

According to Grant and Booth (2009), an appropriate sample size for a literature review will depend on the research questions, scope of review, and available resources. For this study, the appropriate sample size for the literature is determined by a preliminary search to identify the number of relevant studies or articles. 74 articles are identified through a database search and by review of reference lists of key articles on the topic. This sample size is justified based on fact that studies identified are of high quality and provide rich and relevant data that address research questions (Bettany-Saltikov, 2010).

According to Fink (2014), there are several sampling techniques that can be used in a literature review, particularly convenience sampling, random sampling, stratified sampling, and purposive sampling. This study adopts purposive sampling because it involves selection of studies based on their relevance to research objectives, as determined by researchers' expertise and knowledge of field (Fink, 2014). In this study, purposive sampling is accomplished through various methods, for example, the use of specific keywords to search for relevant studies in databases (e.g., PubMed or Google Scholar). The researchers then screens the studies based on their relevance to research objectives.

4 ChatGPT Impacts on Access-efficiency

Existing studies cover a wide range of topics related to the ChatGPT impacts on access/efficiency, as shown in Table 1. The different studies on ChatGPT reveal its potential to transform efficiency in various fields such as education, healthcare, journalism, and research. One common thread is the potential of ChatGPT to revolutionize access to information. Hopkins et al. (2023), for example, highlight how ChatGPT can provide cancer patients with 24/7 access to information, support, and advice; such leads to improvement in their quality of life. Zuccon and Koopman (2023) reported that prompt information significantly improved accuracy of ChatGPT's answers in health-related questions. Similarly, Noy and Zhang (2023) suggest that the use of generative AI can increase productivity in certain tasks, such as brainstorming and idea generation. Gabrielson et al. (2023) found that ChatGPT showed promise in improving efficiency of urologists by reduction of documentation time and provision of clinical decision support. The findings suggest that the use of ChatGPT to access various fields such as healthcare, education, and business can have both positive and negative implications. From the perspective of technological determinism theory, the introduction of ChatGPT can lead to a paradigm shift in healthcare, education, and business which can lead to the improvement of patients' quality of life by provision of 24/7 access to information, support, and advice. The increasing use of ChatGPT and similar models therefore has significant potential to impact various fields, including healthcare, education, and industry.

ChatGPT has had a significant impact on access and efficiency in various industries, particularly customer service, healthcare, and e-commerce. As a large language model, ChatGPT can be integrated into chatbots and virtual assistants, which can provide customers with instant and personalized support and information. This not only improves customer satisfaction but also increases the efficiency of customer service operations. The fact that ChatGPT can handle multiple requests simultaneously reduces the need for human support agents. ChatGPT can also be used to automate routine and repetitive tasks (e.g., data entry and scheduling) which further improves operational efficiency.

Moreover, ChatGPT can improve access to information and services for individuals with disabilities or language barriers. For example, ChatGPT can be used to develop speech-to-text and text-to-speech tools, which make it easier for individuals with hearing or speech impairments to communicate and access information. Similarly, ChatGPT can be used to develop translation tools that can assist non-native speakers of a language to understand and communicate in a foreign language. In this way, ChatGPT can help break down linguistic barriers and promote equal access to information and services.

Table 1. ChatGPT Impacts on Access-efficiency

Authors/date	*Research objectives/questions*	*Methodology*	*Results/implications*
Hopkins et al. (2023)	To examine the impact of ChatGPT on cancer	Literature review	The use of ChatGPT in providing information to cancer patients represents a paradigm-shift in healthcare. It can provide 24/7 access to

	patients' access to information.		information, support, and advice, thus improving patients' quality of life.
Lund and Wang (2023)	To explore how AI and GPT could impact academia and libraries.	Literature review	ChatGPT can enhance information access and retrieval, personalization, and efficiency in academic and library settings. However, it also poses ethical concerns, such as privacy, bias, and control over data.
Biswas (2023)	To explore the role of ChatGPT in public health.	Literature review	ChatGPT can be used to analyze health-related data, generate patient-specific recommendations, and provide mental health support. However, it also raises concerns about data privacy, security, and bias.
Abdullah et al. (2022)	To provide an overview of ChatGPT fundamentals, applications, and social impacts.	Literature review	ChatGPT has various applications in natural language processing, chatbots, language translation, and creative writing. It can also have social impacts, such as employment disruption, information control, and ethical concerns.
Noy and Zhang (2023)	To investigate the productivity effects of generative AI, including ChatGPT.	Lab experiment	The use of generative AI can increase productivity in certain tasks, such as brainstorming and idea generation. However, it can also lead to overreliance, reduced creativity, and biased outputs.
Carvalho and Ivanov (2023)	To explore the applications, benefits, and risks of using ChatGPT for tourism.	Literature review	ChatGPT has the potential to revolutionize the tourism industry, but ethical and privacy concerns must be addressed.
George and George (2023)	To review the impact of ChatGPT AI on several business sectors.	Literature review	ChatGPT has the potential to improve business processes and outcomes, but careful consideration of ethical and privacy concerns is necessary.
Chen (2023)	To examine the possible impact of ChatGPT on library reference services.	Literature review	ChatGPT can enhance library reference services by providing quick and accurate responses to user queries, but librarians must ensure ethical and privacy concerns are addressed.
Lund et al. (2023)	To investigate the impact of ChatGPT on scholarly publishing and the ethics of large language models.	Literature review	The use of ChatGPT in scholarly publishing raises concerns around authorship, transparency, and bias, which must be addressed through ethical guidelines and best practices.
Patel and Lam (2023)	To explore the potential of using ChatGPT for discharge summaries.	Literature review	ChatGPT can improve the accuracy and efficiency of discharge summaries, but ethical and privacy concerns must be addressed.
Doshi et al. (2023)	To examine the potential negative impacts of ChatGPT on healthcare.	Opinion piece	The use of ChatGPT in healthcare can lead to dehumanization, loss of autonomy, and biases, which must be addressed through ethical guidelines and best practices.
Kalla and Smith (2023)	To analyze the impact of ChatGPT on various fields of study	Literature review and analysis of various studies	ChatGPT has a significant impact on various fields, such as healthcare, education, business, and finance. The analysis also identified potential risks and limitations of ChatGPT in some areas, such as bias and ethical issues.
Alshurafat (2023)	To examine the usefulness and challenges of ChatGPT for accounting professionals	Literature review and analysis of previous studies and case studies	ChatGPT can be useful in automating repetitive and time-consuming accounting tasks, but there are challenges, such as technical limitations, privacy and security concerns, and the need for human oversight. Accounting professionals should also be trained to effectively use ChatGPT to optimize its benefits.
Haleem et al. (2023)	To study the features, abilities, and challenges of ChatGPT as a support tool in various domains	Literature review and analysis of previous studies, surveys, and case studies	ChatGPT has several useful features and abilities, such as generating human-like responses and assisting with tasks such as customer service and medical diagnosis. However, there are challenges such as technical limitations, ethical concerns, and the need for human oversight. The study also identified potential applications of ChatGPT in

			various domains such as healthcare, education, and finance.
Liebrenz et al. (2023)	To explore the ethical challenges of using ChatGPT for generating scholarly content in medical publishing.	Conceptual study	The use of ChatGPT in medical publishing raises ethical concerns around authorship, transparency, and bias, which must be addressed.
	To explore the impact of ChatGPT and large language models on nuclear medicine.	Literature review, expert opinions	ChatGPT and LLMs have the potential to improve accuracy and efficiency in nuclear medicine. However, there are concerns about bias and the need for human oversight.
	To provide a multidisciplinary perspective on the opportunities, challenges, and implications of ChatGPT and generative conversational AI.	Literature review, expert opinions	ChatGPT and generative conversational AI have the potential to revolutionize various industries and fields, but there are also concerns about ethics, privacy, and the need for human oversight. Collaboration between experts from various disciplines is needed to fully understand and harness their potential.
Gabrielson et al. (2023)	To evaluate the potential of ChatGPT to improve the efficiency of urologists.	Retrospective analysis of patient data, survey	ChatGPT showed promise in improving efficiency by reducing documentation time and providing clinical decision support.
Wang et al. (2023)	To investigate whether ChatGPT can write an effective Boolean query for systematic review literature search	A dataset of 1,000 systematic review queries and comparison of ChatGPT with baseline methods (BM25 and BM25+BERT).	The study found that ChatGPT performed comparably to the baseline methods on the MAP metric and outperformed them on the recall metric. ChatGPT showed potential as an effective tool for generating Boolean queries for systematic review literature search.
Zuccon and Koopman (2023)	To investigate how prompt knowledge impacts health answer correctness when using ChatGPT as a conversational agent	Evaluated ChatGPT's performance in answering health-related questions. The evaluation metrics used were accuracy, mean reciprocal rank (MRR), and normalized discounted cumulative gain (NDCG).	The study found that prompt information significantly improved the accuracy of ChatGPT's answers. ChatGPT's performance was better on the high-quality answer dataset than on the Google search result dataset. The study also found that MRR and NDCG were useful evaluation metrics for assessing the quality of ChatGPT's answers. The study highlights the importance of prompt information when using conversational agents for health-related questions.
Antaki et al. (2023)	To evaluate the performance of ChatGPT in ophthalmology and analyze its successes and shortcomings.	Retrospective study using a dataset of medical consultations with 10 ophthalmologists and ChatGPT.	The study found that ChatGPT was able to provide accurate information in ophthalmology and had a high degree of success in responding to patient inquiries. However, it also showed limitations in some areas, such as understanding the context and tone of the conversation. The study suggests that ChatGPT can be a useful tool for ophthalmology, but its limitations need to be considered in clinical practice.
Mathew (2023)	To investigate if ChatGPT is a world changer and how it can impact different areas.	Case study	The case study highlights the potential of ChatGPT in transforming different fields, such as education, healthcare, and journalism. It also discusses the ethical concerns associated with the use of ChatGPT, such as biases and data privacy. The study concludes that ChatGPT has the potential to revolutionize the world, but its responsible use needs to be ensured.
Verma (2023)	To examine the impact of ChatGPT on traditional library management.	Case study, interviews, survey	ChatGPT improved the efficiency of the library system by reducing response time and increasing accessibility.

5 ChatGPT Impacts on Employment

The literature has shown that ChatGPT has the potential to significantly impact labor market and various industries (see Table 2). Felten et al. (2023) predict that technology will lead to job displacement in some sectors while creating new job opportunities in others; policymakers should prepare for these changes. Zarifhonarvar (2023) finds similar results through econometric analysis, with emphasis on the need for upskilling and reskilling programs to help workers transition into new roles. However, Lahvis (2023) argues that the introduction of ChatGPT is likely to exacerbate extant inequalities in labor market; policymakers should work to ensure that its benefits are distributed equitably. Tiwary (2023) finds that while most people had a positive view of AI and ChatGPT, concerns were raised about job displacement and ethical considerations.

The social construction of technology theory suggests that ChatGPT's impact on labor market and various industries will depend on how it is socially constructed and used. While some researchers predict job displacement in some sectors, others emphasize potential for creating new job opportunities and need for upskilling and reskilling programs to help workers transition to new roles. Additionally, Lahvis argues that policymakers must ensure that ChatGPT's benefits are distributed equitably to avoid exacerbating existing inequalities in labor market. Therefore, how society constructs and uses ChatGPT will determine its impact and whether its benefits are distributed equitably.

As a large language model, ChatGPT has had significant impacts on employment, particularly in the field of natural language processing and artificial intelligence. The development of such models has led to increased demand for skilled professionals in these areas, particularly software engineers, data scientists, and linguists. Further, the use of ChatGPT in various industries, such as healthcare, finance, and e-commerce, has led to the creation of new job roles and opportunities. Companies now seek individuals with experience in natural language processing to develop and implement ChatGPT-based solutions that can improve business operations, enhance customer experience, and increase productivity.

On the other hand, the use of ChatGPT and other large language models has also raised concerns about the potential displacement of human workers. As these models become increasingly sophisticated, they have the potential to replace certain jobs that involve human language processing, such as customer service representatives, content writers, and translators. However, it is important to note that while ChatGPT can automate certain tasks, it cannot fully replace human intelligence, creativity, and empathy. Instead, the use of ChatGPT can free up human workers from mundane and repetitive tasks, allowing them to focus on more complex and higher-value work that requires critical thinking and problem-solving skills. Therefore, while there may be some short-term displacement of jobs, the long-term impacts of ChatGPT on employment may lead to the creation of new and more meaningful job opportunities.

Table 2. Related literature on ChatGPT Impacts on employment

Authors/Date	Research Objectives/Questions	Methodology	Results/Implications
Felten et al. (2023)	To explore the impact of language models such as ChatGPT on industries and occupations	Literature review and expert opinions	The authors predict that ChatGPT will have significant impacts on the labor market, with some jobs being replaced while others will require new skills. They also suggest that policymakers should prepare for these changes and work to mitigate negative consequences.
Zarifhonarvar (2023)	To analyze the labor market impacts of ChatGPT from an economic perspective	Econometric analysis and literature review	The author finds that the introduction of ChatGPT is likely to cause job displacement in some sectors, but also create new job opportunities in others. The paper emphasizes the need for upskilling and reskilling programs to help workers transition into new roles.
Salah et al. (2023)	To investigate the impact of ChatGPT on psychological well-being, with a focus on harmful stereotypes and job anxiety as moderators	Experimental study with pre- and post-intervention surveys	The authors find that interacting with ChatGPT can have a positive impact on self-esteem and well-being, and that harmful stereotypes and job anxiety do not significantly moderate these effects.
Lahvis (2023)	To explore the implications of ChatGPT for labor and employment	Literature review and expert opinions	The author argues that the introduction of ChatGPT is likely to exacerbate existing inequalities in the labor market, and suggests that policymakers should work to ensure that the benefits of AI are distributed equitably.
Taecharungroj (2023)	To analyze public reactions to ChatGPT on Twitter	Social media analysis and sentiment analysis	The author finds that initial reactions to ChatGPT were largely positive, with many users expressing excitement about its potential applications. However, there were also concerns about job displacement and ethical considerations.

Aljanabi (2023)	To discuss potential future directions and applications of ChatGPT	Literature review and expert opinions	The author suggests that ChatGPT has the potential to revolutionize various industries and fields, and that future research should explore the ethical and societal implications of its use. The paper also highlights the importance of continued innovation in the field of AI.
Atlas (2023)	To explore the potential of ChatGPT in higher education and professional development	Literature review	ChatGPT can be used for personalized learning, training, and professional development in various fields.
Homolak (2023)	To analyze the opportunities and risks of ChatGPT in medicine, science, and academic publishing	Literature review	ChatGPT can improve efficiency and accuracy in various aspects of medicine, science, and academic publishing, but ethical and legal considerations need to be addressed.
Tiwary (2023)	To examine the opinions of netizens, academicians, and information professionals about AI, with a special reference to ChatGPT	Online survey	Most participants had a positive view of AI and ChatGPT, but concerns were raised about job displacement and ethical considerations.
Zarifhonarvar, (2023)	To examine the potential economic impact of ChatGPT on the labor market.	Literature review, economic analysis	ChatGPT has the potential to create new jobs and change the nature of existing jobs. However, it may also lead to job displacement in certain sectors.

6 ChatGPT Impacts on Education

The impact of ChatGPT on education has been a topic of interest for researchers in different fields (see Table 4). A systematic review by Sallam (2023) highlighted the potential of ChatGPT in healthcare education, research, and practice; however concerns about its impact on patient privacy, security, and trust need to be addressed. In contrast, Baidoo-Anu and Owusu Ansah (2023) conducted a literature review and identified potential benefits of ChatGPT in promoting teaching and learning in education. ChatGPT has the potential to enhance personalized learning, encourage student engagement, and facilitate the development of critical thinking skills.

Other researchers have also discussed the potential of ChatGPT in enhancing specific fields, such as science education (Cooper, 2023), medical education (Eysenbach, 2023; Hisan and Amri, 2023), foreign language teaching and learning (Hong, 2023), and tourism education (Ivanov and Soliman, 2023; Skavronskaya et al., 2023). Kalla and Smith (2023) find that ChatGPT can enhance research capabilities in various fields, while Atlas (2023) suggests that it can be used for personalized learning, training, and professional development.

ChatGPT has had significant impacts on education, particularly in the areas of language learning and personalized education. As a large language model, ChatGPT has the ability to generate natural language responses to a wide range of questions and prompts, which makes it a valuable tool for language learners. ChatGPT can provide instant feedback, explanations, and examples. This way it helps learners to improve their grammar, vocabulary, and comprehension. ChatGPT can also be used to create interactive and engaging learning experiences (e.g., chatbots and virtual assistants), that can personalize the learning process and adapt to the needs and preferences of individual learners.

Moreover, ChatGPT can also enhance the accessibility and inclusivity of education by provision of support for students with disabilities or language barriers. For example, ChatGPT can be used to develop speech-to-text and text-to-speech tools, which make it easier for students with hearing or speech impairments to participate in class. Similarly, ChatGPT can be used to develop translation tools that can assist non-native speakers of a language to understand and communicate in a foreign language. In this way, ChatGPT can help to break down linguistic barriers and promote equal access to education for all students.

Table 3. Related literature on ChatGPT impacts on education

Authors/Date	Research Objectives/Questions	Methodology	Results/Implications
Sallam (2023)	To review the utility of ChatGPT in healthcare education, research, and practice and identify valid concerns	Systematic review	ChatGPT can provide promising perspectives for healthcare education, research, and practice, but valid concerns about its impact on patient privacy, security, and trust need to be addressed.

Baidoo-Anu, and Owusu Ansah (2023)	To understand the potential benefits of ChatGPT in promoting teaching and learning in education	Literature review	ChatGPT has the potential to enhance personalized learning, encourage student engagement, and facilitate the development of critical thinking skills in education.
Arif et al. (2023)	To discuss the potential impact of ChatGPT on medical education and research.	Literature review	ChatGPT can enhance medical education by providing interactive simulations, adaptive learning, and personalized feedback. It can also facilitate medical research by analyzing large datasets and generating hypotheses. However, it also raises ethical concerns about patient privacy, data quality, and accountability.
Teng (2023)	To investigate the role of ChatGPT in scientific writing, reviewing, and editing for open-access TESOL journals.	Case study	ChatGPT can assist non-native English-speaking authors in improving their writing, especially in terms of grammar and syntax. However, it cannot replace human editors in terms of language style, logic, and content accuracy.
Alkhaqani (2023)	To identify the challenges and opportunities of using ChatGPT in nursing education	Literature review	ChatGPT can provide opportunities for nursing education such as enhancing clinical decision-making and promoting critical thinking. However, challenges such as lack of resources and limited access to technology need to be addressed.
Zhai (2022)	To explore ChatGPT user experience and its implications for education	Survey	ChatGPT has the potential to enhance student engagement and learning experience in education, but privacy concerns need to be addressed.
Jalil etal. (2023)	To examine the promises and perils of ChatGPT in software testing education	Survey	ChatGPT can provide opportunities for software testing education such as enhancing student engagement and automating repetitive tasks. However, concerns about accuracy and security need to be addressed.
Ivanov and Soliman (2023)	To explore the implications of ChatGPT for tourism education and research	Literature review	ChatGPT can enhance personalized learning and provide opportunities for research in tourism education. However, ethical and privacy concerns need to be addressed.
Hong (2023)	To examine the impact of ChatGPT on foreign language teaching and learning	Literature review	ChatGPT has the potential to enhance foreign language teaching and learning by providing personalized feedback and enhancing communication skills. However, concerns about the lack of human interaction need to be addressed.
Farrokhnia et al. (2023)	To conduct a SWOT analysis of ChatGPT and identify implications for educational practice and research	SWOT analysis	ChatGPT has strengths such as enhancing personalized learning and weaknesses such as accuracy and security concerns. Opportunities include promoting critical thinking and threats include lack of human interaction. Educational institutions need to address these factors to effectively incorporate ChatGPT in education.
Cooper (2023)	To examine the potential of ChatGPT to enhance science education	Qualitative research design: exploratory case study	ChatGPT has the potential to enhance science education by providing personalized learning experiences, facilitating discussion and collaboration, and improving student engagement. However, there are also concerns about the accuracy and reliability of the information generated by ChatGPT, as well as the ethical implications of using AI in education.
Eysenbach (2023)	To explore the role of ChatGPT, generative language models, and artificial intelligence in medical education	Opinion piece	ChatGPT has potential in medical education for enhancing clinical reasoning skills, facilitating the creation of medical case studies, and improving patient communication. However, concerns exist regarding the accuracy and ethics of using AI in medicine, and the need to balance human judgement and machine learning.
Skavronskaya et al. (2023)	Does ChatGPT have the potential to enhance tourism education	Opinion piece	ChatGPT has the potential to enhance tourism education by providing students with a personalized learning experience, facilitating language learning and cultural exchange, and improving student engagement. However, there are concerns about the potential impact of AI on employment in the tourism industry, as well as the ethical implications of using AI in education.

Malinka et al. (2023)	To examine the potential of ChatGPT in higher education	Qualitative research design: exploratory case study	ChatGPT has potential in higher education for facilitating personalized learning experiences, improving student engagement, and enhancing the efficiency of assessment processes. However, concerns exist regarding the accuracy and reliability of the information generated by AI, as well as the ethical implications of using AI in education.
Hisan and Amri (2023)	To explore the potential of ChatGPT in medical education	Opinion piece	ChatGPT has the potential to enhance medical education by facilitating personalized learning experiences, improving clinical reasoning skills, and enhancing the efficiency of medical case studies. However, concerns exist regarding the accuracy and ethics of using AI in medicine, and the need to balance human judgement and machine learning.
Rudolph et al. (2023)	To examine the potential of ChatGPT in higher education	Opinion piece	ChatGPT has the potential to enhance higher education by facilitating personalized learning experiences, improving student engagement, and enhancing the efficiency of assessment processes. However, concerns exist regarding the accuracy and reliability of the information generated by AI, as well as the ethical implications of using AI in education.
Tlili et al. (2023)	To explore the potential of ChatGPT in higher education	Qualitative research design: case study	ChatGPT has potential in education for enhancing student engagement, improving language learning and communication skills, and facilitating personalized learning experiences. However, concerns exist regarding the accuracy and reliability of the information generated
Kasneci et al. (2023)	To examine the opportunities and challenges of ChatGPT for education	Literature review and critical analysis	ChatGPT can support personalized and adaptive learning, enhance student engagement, and facilitate content creation. However, there are also concerns about potential biases, data privacy, and ethical considerations.
Talan and Kalinkara (2023)	To evaluate the use of ChatGPT as an assessment tool for an anatomy course	Experimental study with 20 participants	ChatGPT achieved 80% accuracy in grading anatomy essays, which is comparable to human graders. However, it also highlighted the importance of designing appropriate prompts and providing clear instructions for students.
Bishop (2023)	To discuss the implications of ChatGPT for education, research, and writing	Literature review and critical analysis	ChatGPT can facilitate writing and research tasks, but it also raises questions about authorship, intellectual property, and authenticity. Moreover, it can reinforce existing biases and perpetuate misinformation if not properly trained and evaluated.
Curtis (2023)	To examine the impact of artificial intelligence, including ChatGPT, on academic publishing.	Literature review	ChatGPT can assist in writing, editing, and peer-reviewing academic manuscripts. It can also automate certain publishing processes and reduce publication costs. However, it also raises concerns about authorship, plagiarism, and the role of human editors and reviewers.
Ali et al. (2023)	To investigate the impact of ChatGPT on motivation for learning English among teachers and students	Survey of teachers and students in a Saudi Arabian university	ChatGPT can be a useful tool to supplement English language learning, particularly for providing instant feedback, generating creative ideas, and improving speaking and writing skills. The study found that both teachers and students had positive attitudes towards ChatGPT, but some concerns were raised, such as the need for human interaction and the lack of personalization.
Macdonald et al. (2023)	To investigate whether ChatGPT can draft a research article using population-level vaccine effectiveness analysis as an example	A population-level vaccine effectiveness analysis as input to ChatGPT and evaluation using human evaluation metrics (adequacy, coherence, and fluency) and	The study found that ChatGPT was able to draft a research article that achieved a moderate level of quality, with high fluency but lower adequacy and coherence. The study suggests that ChatGPT can potentially save time and effort for researchers by automating some of the drafting process of research articles. However, the authors caution that human editing is still necessary to improve the quality of the article.

		automated metrics (ROUGE and BLEU).	
Kung et al. (2023)	To investigate the potential of using ChatGPT as an AI-assisted tool for medical education, specifically for the United States Medical Licensing Examination (USMLE)	A dataset of USMLE-style questions. The evaluation metrics used were accuracy, F1-score, and time to answer.	The study found that ChatGPT's performance was comparable to that of human examinees on the USMLE questions, with high accuracy and F1-score. ChatGPT's time to answer was much shorter than that of human examinees.
Subramani et al. (2023)	To evaluate the performance of ChatGPT in medical physiology university examination.	Quantitative research involving 125 medical students and a test.	The study found that ChatGPT was not able to perform well in answering medical physiology questions in the university examination. However, it showed potential in providing hints and guiding students in their learning process. The study suggests that ChatGPT can be a useful tool for students to enhance their learning and understanding of the subject, but it cannot replace human expertise in the evaluation process.
Alshater (2022)	To explore the role of ChatGPT in enhancing academic performance in higher education.	Case study	The study found that the use of ChatGPT improved the academic performance of university students, especially in writing assignments and exams. ChatGPT was found to be a useful tool in enhancing students' learning and understanding of the subject. The study suggests that ChatGPT can be integrated into the educational system to enhance the quality of education and learning outcomes.
Firaina and Sulisworo (2023)	To explore the frequency and impact of using ChatGPT on productivity in higher education.	Quantitative survey research involving 100 university students and a questionnaire.	The study found that ChatGPT was frequently used by university students to enhance their productivity. Students reported that the use of ChatGPT improved their productivity in academic tasks such as writing assignments and conducting research.
Kalla and Smith (2023)	To examine the impact of ChatGPT on different fields of study	Survey and literature review	The authors find that ChatGPT has the potential to greatly enhance research capabilities in various fields. They also suggest that future research should explore ethical considerations surrounding the use of AI in research.
Pettinato Oltz (2023)	To examine the potential of ChatGPT in legal education	Case study	ChatGPT can be used to enhance legal education by providing interactive and personalized learning experiences.
Lee (2023)	To explore the potential of ChatGPT in medical education	Literature review	ChatGPT can be used for medical education in various ways, such as virtual patient simulations and personalized learning.

7 ChatGPT Impacts and Ethics

Most of the studies in Table 1-3 suggest that ChatGPT has limitations that need to be considered in practice. Antaki et al. (2023) reported that ChatGPT can provide accurate information in ophthalmology, but its limitations in understanding context and tone of conversation need to be addressed. Likewise, Subramani et al. (2023) found that ChatGPT was not able to perform well in answering medical physiology questions in university examination. It only showed potential in the provision of hints and the guide to students in their learning process. In context of healthcare, an AI model such as ChatGPT may make recommendations that are not suitable for certain populations due to underrepresentation of these populations in training data (Sallam, 2023).

Lund and Wang (2023), and Biswas (2023) argue that it poses ethical concerns such as privacy, bias, and control over data. Similarly, Arif et al. (2023) discuss ethical concerns about patient privacy, data quality, and accountability. Curtis (2023) raises concerns about authorship, plagiarism, and the role of human editors and reviewers in academic publishing. Iskender (2023) emphasizes need to use the technology responsibly, while Taecharungroj (2023) finds that there were concerns about ethical considerations in public reactions to ChatGPT on Twitter. Homolak (2023) also highlights importance of addressing ethical and legal considerations in use of ChatGPT. Beerbaum's (2023) conceptual study highlights the need for a Generative Artificial Intelligence (GAI) Ethics Taxonomy to mitigate ethical risks associated with ChatGPT; the study argues that the use of ChatGPT in GAI-RPA requires careful consideration of ethical issues.

In line with the reviewed studies, the development and use of ChatGPT has raised numerous ethical concerns, particularly in areas of privacy, fairness, and transparency. As a large language model that relies on vast amounts of data to generate

responses, ChatGPT raises questions regarding the collection, storage, and use of personal data. There is a risk that personal information may be inadvertently shared or misused, which could lead to breaches of privacy and security. Moreso, the use of ChatGPT in decision-making processes raises concerns about fairness and accountability, as well as the potential for bias and discrimination.

Further, the development and use of ChatGPT raise broader ethical questions about the role of artificial intelligence in society. As ChatGPT becomes increasingly sophisticated and ubiquitous, it raises questions about its potential impact on employment, education, and social interaction. There is a risk that the widespread use of ChatGPT may lead to the displacement of certain jobs, the automation of certain tasks, and the loss of human interaction and socialization. There is also a risk that ChatGPT may perpetuate existing biases and stereotypes in the data on which it is trained, which might lead to discriminatory outcomes. Therefore, it is important to carefully consider the ethical implications of ChatGPT and to ensure that it is developed and used in a way that respects privacy, promotes fairness, and mitigates the potential for bias and discrimination (Beerbaum, 2023; Iskender, 2023).

However, the use of ChatGPT in education also raises concerns about the potential for over-reliance on technology and the loss of human interaction and socialization. While ChatGPT can provide valuable feedback and support, it cannot fully replace the benefits of face-to-face interactions with teachers and peers. The use of ChatGPT in education may also require additional resources and training for teachers to effectively integrate the technology into the classroom. Therefore, while ChatGPT has the potential to transform education, it is important to carefully consider its impacts and limitations and to ensure that it is used in a way that complements, rather than replaces, human teachers and interactions.

8 Discussion

The use of ChatGPT in various fields can bring about both positive and negative implications, and its potential to revolutionize industries such as healthcare, education, and business must be carefully considered in light of ethical and privacy concerns (Arif et al., 2023; Biswas, 2023; Curtis, 2023; Lund & Wang, 2023, Taecharungroj, 2023). Technological determinism theory suggests that the introduction of ChatGPT can lead to a paradigm shift in different sectors, providing 24/7 access to information, support, and advice, but it also raises concerns about privacy, bias, and control over data. Similarly, in academic and library settings, ChatGPT can enhance information access and retrieval, personalization, and efficiency, but it can also lead to overreliance, reduced creativity, and biased outputs. In medical education and research, ChatGPT has significant impacts, but ethical concerns around patient privacy, data quality, and accountability must be addressed. Ethical guidelines and best practices must be implemented to mitigate potential risks and ensure responsible use of technology (Arif et al., 2023; Biswas, 2023; Curtis, 2023; Lund & Wang, 2023, Taecharungroj, 2023).

The social construction of technology theory suggests that technology is not neutral, but rather shaped by social and cultural factors. use of ChatGPT in various domains highlights its potential benefits and challenges, particularly in relation to ethical concerns, bias, and human oversight. To mitigate these risks, ethical guidelines and best practices must be implemented, and human involvement should be maintained. This study also identified potential applications of ChatGPT in various domains such as healthcare, education, and finance. However, the use of ChatGPT in these areas also requires careful consideration of ethical issues and potential risks. While ChatGPT has the potential to revolutionize various fields, ethical concerns and human oversight must be maintained to ensure its safe and effective use.

Studies on ChatGPT reveal its potential to transform various fields such as education, healthcare, journalism, and research. However, some studies suggest that ChatGPT has limitations in understanding context and tone of conversation, and it may not perform well in answering certain types of questions. Moreover, ethical concerns associated with use of ChatGPT, such as bias and data privacy, need to be addressed.

The use of ChatGPT can save time and effort for researchers, improve the efficiency of library systems, and reduce documentation time for urologists. However, its potential in transforming fields must be accompanied by responsible use, addressing its limitations and ethical concerns. According to social construction of technology theory, technology is not an objective or neutral force, but rather is shaped by social and cultural factors. Studies on ChatGPT highlight the importance of considering social and ethical concerns and suggest that technology must be integrated and adapted to suit specific contexts and social practices. The studies on ChatGPT highlight the importance of considering social and cultural factors that shape its use and impact in different contexts.

The introduction of ChatGPT is expected to have a significant impact on various industries and labor market. According to technological determinism theory, this impact will be determined by technology itself, independent of social and cultural factors. While technology is predicted to create new job opportunities in some sectors, it may also displace jobs in others, highlighting the need for upskilling and reskilling programs. Moreover, ethical considerations such as responsible use of technology must be addressed to ensure that benefits are distributed equitably and that existing inequalities in labor market are not exacerbated.

However, social construction of technology theory suggests that impact of ChatGPT on labor market and various industries will depend on how it is socially constructed and used. While some researchers predict job displacement in some sectors, others emphasize potential for creating new job opportunities and the need for upskilling and reskilling programs to help workers

transition into new roles. Additionally, positive impact of ChatGPT on various fields, including research, education, and healthcare, depends on its social construction and use. Its advanced language processing capabilities can be used in various industries, but ethical considerations must be addressed to use technology responsibly.

In field of education, ChatGPT is expected to have both opportunities and challenges, as identified by social construction of technology theory. While it has the potential to enhance personalized learning, encourage student engagement, and promote critical thinking skills, there are concerns about accuracy, reliability, security, privacy, and ethical implications. Educational institutions need to balance human judgement and machine learning to effectively incorporate ChatGPT in education. A SWOT analysis has identified its strengths, weaknesses, opportunities, and threats for educational practice and research, and educational institutions need to address these factors to effectively incorporate ChatGPT in education.

To prepare for impact of ChatGPT, policymakers and organizations must ensure that benefits are distributed equitably and ethical considerations are addressed. Educational institutions must balance human judgement and machine learning and consider ethical implications of using AI in education. impact of ChatGPT on labor market and various industries will depend on how it is socially constructed and used, and adoption and implementation of ChatGPT will depend on social and cultural factors. Therefore, it is important to carefully consider implications of using ChatGPT and address any concerns before implementing it in various fields.

9 Conclusion

The literature review highlights the potential benefits and challenges associated with the use of ChatGPT in various fields such as healthcare, education, and business. The technological determinism theory suggests that ChatGPT has the potential to revolutionize industries by providing 24/7 access to information, support, and advice. However, ethical concerns around privacy, bias, and control over data must be considered to ensure responsible use of the technology. The implementation of ethical guidelines and best practices can help mitigate potential risks and ensure its safe and effective use.

The social construction of technology theory suggests that technology is shaped by social and cultural factors, and therefore, the impact of ChatGPT on various domains must be considered in light of ethical concerns, bias, and human oversight. The literature review highlights the various limitations of ChatGPT, particularly in understanding context and tone of the conversation. The literature reviewed also highlights the need to maintain human involvement and implement ethical guidelines and best practices to address these concerns. While ChatGPT has the potential to bring significant changes to various fields, its limitations and ethical concerns need to be carefully considered.

Moreover, in line with the social construction of technology theory, the impact of ChatGPT on the labor market and various industries will depend on how it is socially constructed and used. While some studies predict job displacement in some sectors, others emphasize the potential for creating new job opportunities and the need for upskilling and reskilling programs to help workers transition to new roles. Thus, the positive impact of ChatGPT on various fields, including research, education, and healthcare, depends on its social construction and use.

In the field of education, ChatGPT has the potential to enhance personalized learning, encourage student engagement, and promote critical thinking skills. However, accuracy, reliability, security, privacy, and ethical implications must be considered. Educational institutions must balance human judgement and machine learning and consider the ethical implications of the use of AI in education. Increased research can help identify the strengths, weaknesses, opportunities, and threats to educational practice and research.

9.1 Policy Recommendations

Based on the literature reviewed, the following policy recommendations can be made to ensure the responsible use of ChatGPT in various fields. First, ethical guidelines and best practices must be implemented to mitigate potential risks and ensure responsible use of the technology. Policymakers and organizations should collaborate with experts in AI and ethics to develop comprehensive guidelines that address concerns around privacy, bias, and control over data. These guidelines should be regularly reviewed and updated to reflect the evolving landscape of AI technology.

Second, human involvement should be maintained in the use of ChatGPT. While technology has the potential to enhance efficiency and productivity, it should not replace human judgement entirely. Also, policymakers and organizations can invest in training and reskilling programs for workers whose jobs may be impacted by the adoption of ChatGPT. This will help ensure a smooth transition to the new technology and reduce the risk of job displacement.

Third, educational institutions must balance human judgement and machine learning to effectively incorporate ChatGPT in education. This includes addressing concerns around accuracy, reliability, security, privacy, and ethical implications. Educational policymakers and organizations should collaborate with experts in AI and education to develop comprehensive guidelines and best practices for the use of ChatGPT in education. This will help ensure that the technology is effectively integrated into existing educational practices and does not compromise the quality of education.

Fourth, the impact of ChatGPT on the labor market and various industries must be carefully considered. Policymakers and organizations should collaborate with experts in labor market analysis to identify the potential impact of ChatGPT on different

sectors and design appropriate policies and programs to mitigate likely job displacement. This may include upskilling and reskilling programs, job placement services, and social safety nets for affected workers.

Finally, the social and cultural factors that shape the use and impact of ChatGPT in different contexts must be considered. Policymakers and organizations should collaborate with experts in social and cultural studies to identify the potential social and cultural implications of the adoption of ChatGPT and design appropriate policies and programs to address these concerns. This will help to ensure that the technology is effectively integrated into existing social and cultural practices and does not compromise the values and norms of different communities.

9.2 Future Research Directions

Despite the numerous benefits and potential applications of ChatGPT, there are still several limitations that need to be addressed, and future research can help to improve the technology and mitigate potential risks. Some studies suggest that ChatGPT may struggle to understand the context and tone of the conversation, and may not perform well in answering certain types of questions. To overcome these limitations, researchers can explore ways to improve the technology's ability to understand nuances in language and context. Ethical concerns (e.g., biases and data privacy) need to be addressed, and further research can help to develop ethical guidelines and best practices for the responsible use of ChatGPT. Future research can also explore the impact of ChatGPT on society and culture, including its potential to exacerbate existing inequalities and impact the labor market.

In addition to addressing the limitations of ChatGPT, future research can also explore new applications of the technology and its potential to transform industries and society. For example, the use of ChatGPT in journalism and media can enhance the efficiency of news production and improve the quality of news reporting. In finance, ChatGPT can be used for risk management and fraud detection. Further research can also explore the potential of ChatGPT in fields such as law, psychology, and social work. However, as ChatGPT becomes more widely used, it is important to ensure that ethical considerations are taken into account and that the technology is used responsibly. On the whole, future research can help to maximize the potential benefits of ChatGPT while mitigating potential risks and ethical concerns.

References

Abdullah, M., Madain, A., & Jararweh, Y. (2022, November). ChatGPT: Fundamentals, Applications and Social Impacts. In *2022 Ninth International Conference on Social Networks Analysis, Management and Security (SNAMS)* (pp. 1-8). IEEE.

Adeola, O., & Evans, O. (2023). Digital Technology and Emergency Risk Communications of African Governments: Experiences and Lessons from Covid-19 Pandemic. In *Public Sector Marketing Communications, Volume II: Traditional and Digital Perspectives* (pp. 105-129). Cham: Springer International Publishing.

Adeola, O., Evans, O., & Okafor, L. E. (2023). Does social media moderate the link between tourism and economic wellbeing? Evidence from the iterated GMM approach. *Tourism Analysis*. https://doi.org/10.3727/108354223X16820219583340.

Alberts, I. L., Mercolli, L., Pyka, T., Prenosil, G., Shi, K., Rominger, A., & Afshar-Oromieh, A. (2023). Large language models (LLM) and ChatGPT: what will the impact on nuclear medicine be?. *European journal of nuclear medicine and molecular imaging*, 1-4.

Ali, J. K. M., Shamsan, M. A. A., Hezam, T. A., & Mohammed, A. A. (2023). Impact of ChatGPT on Motivation for Learning English: Teachers and Students' Voices.

Aljanabi, M. (2023). ChatGPT: Future directions and open possibilities. *Mesopotamian Journal of Cybersecurity*, *2023*, 16-17.

Alkhaqani, A. L. (2023). ChatGPT and Nursing Education: Challenges and Opportunities. *Al-Rafidain Journal of Medical Sciences (ISSN: 2789-3219)*, *4*, 50-51.

Alshater, M. (2022). Exploring the role of artificial intelligence in enhancing academic performance: A case study of ChatGPT. *Available at SSRN*.

Alshurafat, H. (2023). The usefulness and challenges of chatbots for accounting professionals: application on ChatGPT. *Available at SSRN 4345921*.

Antaki, F., Touma, S., Milad, D., El-Khoury, J., & Duval, R. (2023). Evaluating the performance of chatgpt in ophthalmology: An analysis of its successes and shortcomings. *medRxiv*, 2023-01.

Arif, T. B., Munaf, U., & Ul-Haque, I. (2023). The future of medical education and research: Is ChatGPT a blessing or blight in disguise?. *Medical education online*, *28*(1), 2181052.

Atlas, S. (2023). ChatGPT for higher education and professional development: A guide to conversational AI.

Azam, J. A. N., Shakirullah, S., Sadaf, N. A. Z., Owais, K. H. A. N., & Khan, A. Q. (2020). Marshal McLuhan's technological determinism theory in the arena of social media. *Theoretical and Practical Research in the Economic Fields*, *11*(2), 133-137.

Baidoo-Anu, D., & Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Available at SSRN 4337484*.

Beerbaum, D. O. (2023). Generative Artificial Intelligence (GAI) Ethics Taxonomy-Applying Chat GPT for Robotic Process Automation (GAI-RPA) as Business Case. *Available at SSRN 4385025*.

Bettany-Saltikov, J. 2010. How to do a systematic literature review in nursing: a step-by-step guide. McGraw-Hill Education.

Bishop, L. (2023). A computer wrote this paper: What chatgpt means for education, research, and writing. *Research, and Writing (January 26, 2023)*.

Biswas, S. S. (2023). Role of Chat GPT in Public Health. *Annals of Biomedical Engineering*, 1-2.

Carvalho, I., & Ivanov, S. (2023). ChatGPT for tourism: applications, benefits and risks. *Tourism Review*.

Chen, X. (2023). Chatgpt and its possible impact on library reference services. *Internet Reference Services Quarterly*, 1-9.

Cooper, G. (2023). Examining Science Education in ChatGPT: An Exploratory Study of Generative Artificial Intelligence. *Journal of Science Education and Technology*, 1-9.

Creswell, J. W. 2014. Research design: qualitative, quantitative, and mixed methods approaches. Sage publications.

Curtis, N. (2023). To ChatGPT or not to ChatGPT? The impact of artificial intelligence on academic publishing. *The Pediatric Infectious Disease Journal*, *42*(4), 275.

Diniasti, T. H., & Haqqu, R. (2022, December). Receiving Messages of Technological Determinism in the Documentary Film "The Social Dilemma": Analysis of Receptions in Teenagers. In *7th International Conference on Social and Political Sciences (ICoSaPS 2022)* (pp. 74-85). Atlantis Press.

Doshi, R. H., Bajaj, S. S., & Krumholz, H. M. (2023). ChatGPT: Temptations of Progress. *The American Journal of Bioethics*, 1-3.

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... & Wright, R. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, *71*, 102642.

Evans, O. (2022). ICT and the provision of social services in low-income countries: the moderating role of institutional quality. *Journal of Enterprising Communities: People and Places in the Global Economy*, https://doi.org/10.1108/JEC-07-2021-0094.

Evans, O. (2023). The investment dynamics in renewable energy transition in Africa: The asymmetric role of oil prices, economic growth and ICT. *International Journal of Energy Sector Management*. https://doi.org/10.1108/JEC-07-2021-0094

Evans, O., & Mesagan, E. P. (2022). ICT-trade and pollution in Africa: Do governance and regulation matter?. *Journal of Policy Modeling*, *44*(3), 511-531.

Evans, O., & Oni, O. (2022). Fintech, Cryptocurrency and Blockchain Technology: Towards Promoting a Digital Africa. In *Digital Business in Africa: Social Media and Related Technologies* (pp. 193-215). Cham: Springer International Publishing.

Evans, O., Nwaogwugwu, I., Vincent, O., Wale-Awe, O., Mesagan, E., & Ojapinwa, T. (2023). The socio-economics of the 2023 fuel subsidy removal in Nigeria. *BizEcons Quarterly*, *17*, 12-32.

Eysenbach, G. (2023). The role of chatgpt, generative language models, and artificial intelligence in medical education: A conversation with chatgpt and a call for papers. *JMIR Medical Education*, *9*(1), e46885.

Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*, 1-15.

Felten, E., Raj, M., & Seamans, R. (2023). How will Language Modelers like ChatGPT Affect Occupations and Industries?. *arXiv preprint arXiv:2303.01157*.

Fink, A. 2014. Conducting research literature reviews: From the internet to paper. Sage publications.

Firaina, R., & Sulisworo, D. (2023). Exploring the Usage of ChatGPT in Higher Education: Frequency and Impact on Productivity. *Buletin Edukasi Indonesia*, *2*(01), 67-74.

Gabrielson, A. T., Odisho, A. Y., & Canes, D. (2023). Harnessing Generative Artificial Intelligence to Improve Efficiency Among Urologists: Welcome ChatGPT. *The Journal of Urology*, 10-1097.

George, A. S., & George, A. H. (2023). A Review of ChatGPT AI's Impact on Several Business Sectors. *Partners Universal International Innovation Journal*, *1*(1), 9-23.

Gergen, K. J. 2001. Social construction in context. Sage Publications.

Grant, M. J. and Booth, A. 2009. A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal, 26*(2), pp. 91-108.

Guevara, S. (2022). The forced adoption of technology: a qualitative study on television journalists'adaptation during the coronavirus pandemic through the lens of technological determinism.

Haleem, A., Javaid, M., & Singh, R. P. (2023). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. *BenchCouncil transactions on benchmarks, standards and evaluations*, 100089.

Hisan, U. K., & Amri, M. M. (2023). ChatGPT and Medical Education: A Double-Edged Sword. *Journal of Pedagogy and Education Science*, *2*(01).

Homolak, J. (2023). Opportunities and risks of ChatGPT in medicine, science, and academic publishing: a modern Promethean dilemma. *Croatian Medical Journal*, *64*(1), 1-3.

Hong, W. C. H. (2023). The impact of ChatGPT on foreign language teaching and learning: opportunities in education and research. *Journal of Educational Technology and Innovation*, *3*(1).

Hopkins, A. M., Logan, J. M., Kichenadasse, G., & Sorich, M. J. (2023). Artificial intelligence chatbots will revolutionize how cancer patients access information: ChatGPT represents a paradigm-shift. *JNCI Cancer Spectrum*, *7*(2), pkad010.

Iskender, A. (2023). Holy or unholy? Interview with open AI's ChatGPT. *European Journal of Tourism Research*, *34*, 3414-3414.

Ivanov, S., & Soliman, M. (2023). Game of algorithms: ChatGPT implications for the future of tourism education and research. *Journal of Tourism Futures*.

Jalil, S., Rafi, S., LaToza, T. D., Moran, K., & Lam, W. (2023). Chatgpt and software testing education: Promises & perils. *arXiv preprint arXiv:2302.03287*.

Kalla, D., & Smith, N. S. (2023) Study and Analysis of Chat GPT and its Impact on Different Fields of Study.

Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., ... & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, *103*, 102274.

Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., ... & Tseng, V. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLoS digital health*, *2*(2), e0000198.

Kwok, A. O., & Koh, S. G. (2021). Deepfake: a social construction of technology perspective. *Current Issues in Tourism*, *24*(13), 1798-1802.

Lahvis, A. (2023) Artificial vs. Non-Artificial Intelligence: What Does ChatGPT Mean for Labor and Employment?.

Lee, H. (2023). The Rise of ChatGPT: Exploring its Potential in Medical Education. *Anatomical Sciences Education*.

Liebrenz, M., Schleifer, R., Buadze, A., Bhugra, D., & Smith, A. (2023). Generating scholarly content with ChatGPT: ethical challenges for medical publishing. *The Lancet Digital Health*, *5*(3), e105-e106.

Lund, B. D., & Wang, T. (2023). Chatting about ChatGPT: how may AI and GPT impact academia and libraries?. *Library Hi Tech News*.

Lund, B. D., Wang, T., Mannuru, N. R., Nie, B., Shimray, S., & Wang, Z. (2023). ChatGPT and a new academic reality: Artificial Intelligence-written research papers and the ethics of the large language models in scholarly publishing. *Journal of the Association for Information Science and Technology*.

Macdonald, C., Adeloye, D., Sheikh, A., & Rudan, I. (2023). Can ChatGPT draft a research article? An example of population-level vaccine effectiveness analysis. *Journal of Global Health*, *13*, 01003.

Malinka, K., Perešíni, M., Firc, A., Hujňák, O., & Januš, F. (2023). On the Educational Impact of ChatGPT: Is Artificial Intelligence Ready to Obtain a University Degree?. *arXiv preprint arXiv:2303.11146*.

Mathew, A. (2023). Is Artificial Intelligence a World Changer? A Case Study of OpenAI's Chat GPT. *Recent Progress in Science and Technology Vol. 5*, 35-42.

Mattas, P. S. (2023). ChatGPT: A Study of AI Language Processing and its Implications. *Journal homepage: www. ijrpr. com ISSN*, *2582*, 7421.

Noviani, A. I. (2022). Social Construction of Social Media Technology in Community in Indonesia.

Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative artificial intelligence. *Available at SSRN 4375283*.

Patel, S. B., & Lam, K. (2023). ChatGPT: the future of discharge summaries?. *The Lancet Digital Health*, *5*(3), e107-e108.

Paul, J., & Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know?. *International Business Review*, *29*(4), 101717.

Peters, M. D., Marnie, C., Tricco, A. C., Pollock, D., Munn, Z., Alexander, L., ... & Khalil, H. (2020). Updated methodological guidance for the conduct of scoping reviews. *JBI evidence synthesis*, *18*(10), 2119-2126.

Pettinato Oltz, T. (2023). ChatGPT, Professor of Law. *Professor of Law (February 4, 2023)*.

Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?. *Journal of Applied Learning and Teaching*, *6*(1).

Salah, M., Alhalbusi, H., Abdelfattah, F., & Ismail, M. M. (2023). Chatting with ChatGPT: Investigating the Impact on Psychological Well-being and Self-esteem with a Focus on Harmful Stereotypes and Job Anxiety as Moderator.

Sallam, M. (2023, March). ChatGPT Utility in Health Care Education, Research, and Practice: Systematic Review on the Promising Perspectives and Valid Concerns. In *Healthcare* (Vol. 11, No. 6, p. 887). MDPI.

Skavronskaya, L., Hadinejad, A., & Cotterell, D. (2023). Reversing the threat of artificial intelligence to opportunity: a discussion of ChatGPT in tourism education. *Journal of Teaching in Travel & Tourism*, 1-6.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of business research*, *104*, 333-339.

Subramani, M., Jaleel, I., & Krishna Mohan, S. (2023). Evaluating the performance of ChatGPT in medical physiology university examination of phase I MBBS. *Advances in Physiology Education*, *47*(2), 270-271.

Taecharungroj, V. (2023). "What Can ChatGPT Do?" Analyzing Early Reactions to the Innovative AI Chatbot on Twitter. *Big Data and Cognitive Computing*, *7*(1), 35.

Talan, T., & Kalinkara, Y. (2023). The Role of Artificial Intelligence in Higher Education: ChatGPT Assessment for Anatomy Course. *Uluslararası Yönetim Bilişim Sistemleri ve Bilgisayar Bilimleri Dergisi*, *7*(1), 33-40.

Teng, M. F. (2023). Scientific Writing, Reviewing, and Editing for Open-access TESOL Journals: The Role of ChatGPT.

Țicău, I. R., & Hadad, S. (2021). Technological Determinism vs. Social Shaping of Technology. The influence of activity trackers on user's attitudes. *Management dynamics in the knowledge economy*, *9*(2), 147-163.

Tiwary, N. (2023). Netizens, Academicians, and Information Professionals' Opinions About AI With Special Reference To ChatGPT. *arXiv preprint arXiv:2302.07136*.

Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, *10*(1), 15.

Varney, V., & May, D. (2021, July). Examining the Social Construction of Cross-reality Technologies in Learning. In *2021 ASEE Virtual Annual Conference Content Access*.

Verma, M. (2023). Novel Study on AI-Based Chatbot (ChatGPT) Impacts on the Traditional Library Management.

Wang, S., Scells, H., Koopman, B., & Zuccon, G. (2023). Can chatgpt write a good boolean query for systematic review literature search?. *arXiv preprint arXiv:2302.03495*.

Zarifhonarvar, A. (2023). Economics of ChatGPT: A Labor Market View on the Occupational Impact of Artificial Intelligence. *Available at SSRN 4350925*.

Zhai, X. (2022). ChatGPT user experience: Implications for education. *Available at SSRN 4312418*.

Zuccon, G., & Koopman, B. (2023). Dr ChatGPT, tell me what I want to hear: How prompt knowledge impacts health answer correctness. *arXiv preprint arXiv:2302.13793*.