

# **The Impact of AI Tools on Education: ChatGPT in Focus**

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## **Abstract**

Education nowadays is irreversibly interrelated with technology, and AI has turned into an agent of change in learning environments. Among these AI tools, ChatGPT, developed by OpenAI, has emerged as one of the most sophisticated natural language processing models, which has revolutionized student interactions, research assistance, and academic support. This study will critically review the literature on the role of ChatGPT in education, focusing on its benefits, limitations, and ethical implications. The review highlights how ChatGPT enhances comprehension, critical thinking, and creativity by providing information that is instant, accurate, and contextually relevant. Its adoption rate has been phenomenal since its release in November 2022, with studies indicating that 60% of educators and 40% of students have already adopted ChatGPT into their academic practices. Technology is increasingly used for automated assessments, literature reviews, content generation, and tutoring, contributing to personalized learning experiences and engagement. However, concerns persist regarding AI bias, misinformation, ethical considerations, and student over-reliance on AI-generated content. This review categorizes ChatGPT's educational applications into four key areas: (1) pedagogical applications, (2) academic research assistance, (3) challenges and ethical concerns, and (4) future directions in AI-enhanced education. It examines the impact of AI-driven tools on curriculum integration, educator support, and student engagement, informed by peer-reviewed articles, policy reports, and case studies. The results of this study confirm that while ChatGPT holds great promise, the integration of AI responsibly does indeed require thoughtful regulation, educator training, and ethical considerations. This research informs ongoing discussions



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of AI-driven education, policy formulation, and responsible AI adoption in learning environments to ensure that technological advancements align with educational integrity and innovation.

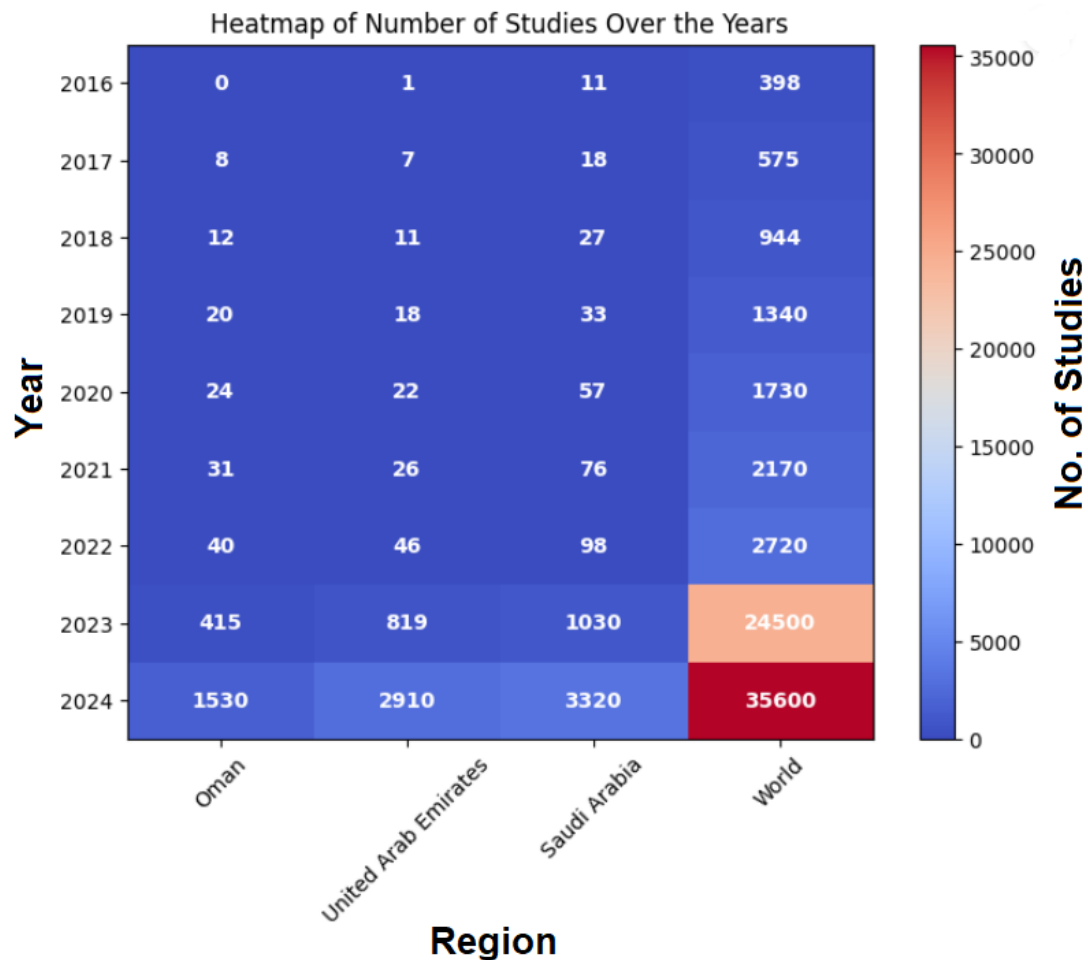
**Keywords:** AI applications; ChatGPT; education; artificial intelligence; enhance teaching quality.

## 1. Introduction

In this present age, education has become deeply integrated into the social life of humanity. Effectiveness, accuracy, and innovation in regard to information on education became important during this time, thanks to artificial intelligence (Yousif J., 2011), AI, and its tool. Amongst them is ChatGPT standing for Generative Pre-trained Transformer, developed by OpenAI and regarded as an innovative AI-powered language model. ChatGPT has undergone multiple iterations and refinements, making it one of the most sophisticated natural language processing models available today. It has revolutionized student interactions with education by generating instant, accurate, and contextually relevant information (Baidoo-Anu & Owusu Ansah, 2023). Figure 1 shows the number of research studies on ChatGPT in education within Oman, the UAE, Saudi Arabia, and the world for the period 2016-2024. In 2023 and 2024, it goes up, especially worldwide, to 35,600 studies. This trend denotes the rising research interest and implementation of AI tools in education, showing the rapid evolution and integration of ChatGPT in academic contexts.

This research paper examines the benefits of ChatGPT in promoting educational processes: improving comprehension, critical thinking, and creativity. ChatGPT has become a rich source of educational resources, assisting students in conducting research, writing, and solving problems. Yet, its use is not devoid of certain drawbacks. Ethical issues, the accuracy of information, and the need to verify sources remain highly important (McGee, 2023). Though AI-powered models like ChatGPT provide very valuable and credible information, it is the responsibility of a student and an educator to use them responsibly and ethically. Because it became public in November 2022, the adoption of ChatGPT has grown exponentially across education. According to a study, within the first week of its introduction, it had amassed over one million users. In a survey conducted in 2023, it was stated that as many as 60% of educators used GPT for teaching methodologies while 40% of students used it for academic purposes. The increasing adoption of ChatGPT and social media demonstrates the potential of the tool in remaking modern education by enabling personalized learning experiences, automating routine tasks, and fostering engagement in classrooms (Roumeliotis & Tselikas, 2023; Yousif et al., 2021). A critical review of research papers in this area reflects a myriad of opinions on the benefits and challenges that come with ChatGPT. The main discussed topics include its integration into the curriculum, assisting educators, and improving learning outcomes - Ray, 2023. Other research has investigated how models like ChatGPT can create critical thinking activities for students to check, compare, and synthesize information (Alkaissi & McFarlane, 2023).

**Figure 1.** the number of research studies on ChatGPT in education in GCC countries (google scholar).



Other scholars make the point that too much reliance on AI-generated content needs human moderation to ensure that factually accurate and contextually relevant information is created in the process. Moreover, the impact of ChatGPT is not limited to traditional learning environments. In medical and scientific education, its contribution has been above par-from generating case studies, coding assignments, simplification of theories (Currie, 2023). However, at the same time, it has many limitations on full integration, such as biased training data, ethical issues, inability to express human emotions, among so many others (Gentile et al., 2023; (Yousif & Saini, 2020).

With this understanding, this study consolidates existing research on efficacy, limitations, and recommendations that go along with integrating ChatGPT into current educational frameworks. Analyzing varied literature, we attempt to reach an answer for the following **research questions**:

1. RQ1: What research methodologies are employed to examine the role of ChatGPT in education?
2. RQ2: What are the potential benefits of integrating ChatGPT into learning environments?
3. RD3: What limitations and ethical considerations must be addressed for its effective implementation in education?

The results of this study will add to the general understanding of the place of AI in education, inform policy decisions, and further the best practices of AI-assisted learning. It will also provide a foundation for further exploration into responsible AI adoption, ensuring that technological advancements align with educational integrity and innovation.

## 2. Literature Survey

This section of the research reviews the literature survey related to and related to the 25 topics of ChatGPT in education, and its discussion highlights its negative and positive effects on many educational experiences. This literature was summarized and analyzed with a focus on several important points from each literature: a summary of the literature, a review of the most important results for each literature, a review of the methodology followed in each literature, and finally an explanation of the common connection between each paper with the two topics of ChatGPT in education. The study by Reza (Mogavi et al., 2024) discussed how to use ChatGPT in educational contexts through analyzing academic sources on social media sites, where the study showed that ChatGPT is widely used in higher education. In basic education, it is used in training skills. It was noted that ChatGPT helps improve the level of data and results. The study highlighted its concerns about total over-reliance on artificial intelligence, which is reflected in weakness in many skills such as critical and social thinking among students.

In the end, it is possible that there will be a major intervention by researchers and those interested in the Content to help provide a comprehensive understanding of the impact of ChatGPT on education to infer the most positive aspects of the potential of AI tools in improving efficiency in daily life.

Other study by Baidoo (Baidoo-Anu & Owusu, 2023) reviewed the benefits and the risks of using ChatGPT in the field of education. The technology was launched and used on November 3, 2022, ChatGPT has spread widely due to its high ability to carry out complex tasks and very accurate information. The study presented many benefits and disadvantages of ChatGPT through the information and results issued by the technology. The study confirmed and recommended the need for everyone's cooperation, especially policy makers and teachers. Researchers use these tools safely, improve education, and support students' learning of technology. In general, it can be said the potential of GPT chat to be a powerful tool in the field of education, and care must be taken to use it with extreme caution and full knowledge of all the risks expected from its use., there is a connection between the two studies. Both studies focus on GPT chat in education and present its effects, whether positive or negative. All of this contributes to expanding the circle of discussion on This is in the role of artificial intelligence tools at all educational levels the study (Rasul et al., 2023) discussed in general the role of ChatGPT and expressed that it is one of the tools of artificial intelligence of the

generative type and is used in the educational field. The focus of the research paper is on the benefits and challenges that are related to technology, as the study was limited to five of the main benefits of using ChatGPT, including: Promote adaptive learning with data, provide personalized feedback, and assist with research and analysis in general. In addition, the research study was limited to five important challenges, including: issues related to academic integrity, the number of reliability problems, the possibility of biases, and incorrect and misleading information. In general, one of the recommendations of this study is to be extremely careful when using the ChatGPT tool in the academic field to ensure that it is used correctly and ethically.

This research paper is related to the research paper on GPT chat in education in many points of similarity, including benefits and challenges, as both studies deal with the same elements and in an educational environment. On the other hand, both studies analyze the overall impact of using ChatGPT in education and producing results and recommendations that enhance understanding and efficiency and help develop more effective strategies. The study (Abdelghani et al., 2023) focused on how to use the GPT-3 large language model and specialized in training children in many skills in asking questions, all out of curiosity. It discussed the evaluation of the effectiveness of using GPT-3, which specializes in generating very beautiful educational content and helps children with many skills in formulating various questions that aim to obtain the most accurate results. The study conducted a comparison experiment on three types of content: Manual content that was created manually, and secondly, content supported by GPT-3 with closed tags. Thirdly, use content supported by GPT-3 with open signals. After conducting a comparison, the results showed that the content that supported GPT-3 was of good effectiveness and like the content that was created manually. It was noted that the open content was extremely successful in encouraging and helping children to ask questions in a curious manner. All of this means that, with these results, we conclude the ability of large language models to support children's thinking skills and teaching.

The common connection between the two studies is in a certain number of common points and in several aspects that the two studies produce effective results in the uses of artificial intelligence techniques, The applications of artificial intelligence in the field of education include, in addition, the two studies used both applications and tools, and as a result, the results may be similar. In fact, both studies enhance and contribute to how to introduce the tool into the educational field, all to improve education and using modern technologies. A study by Rahman (Rahman & Watanobe, 2023) discussed the impact of advanced artificial intelligence technologies, especially on ChatGPT tools, which encourage education as research in this field. ChatGPT is considered a major linguistic model and is considered

one of the distinguished opportunities for students and teachers, as well as in the frequent personal comments and support for interactive learning. In addition, ChatGPT in this message poses threats to the educational and traditional system. An example is the possibility of cheating on online exams, which has an impact on the decline of critical thinking skills. This study includes many different experiments that will support learning programming, which is one of the languages of designing and building applications, but here it is done via ChatGPT. However, we added questionnaires with students and teachers to evaluate how to support GPT chat in the educational process. The research paper discussed the importance of evaluating the benefits and threats that arise from using ChatGPT.

The connection between the research paper and ChatGPT in education is that there are several common points, such as common orientation, challenges, experiences, and practical applications. It can be said that the research paper serves as an addition to the existing literature in the field of GPT chat, and all of this makes it related to a wide range of another research. The study (Oranga, J., 2023) discussed the benefits and difficulties of using artificial intelligence. The study reviewed its focus on ChatGPT specializing in the field of education and indicated that this tool provides many advantages, an example of which is personal education and immediate feedback and can be available around the clock. The study showed that human teachers cannot solve it and discuss the flaws in the research paper, such as the inability to do critical thinking and be fully aware of the context. In addition, there is an inability to think about issues related to bias in misinformation. The importance of using GPT chat as an educational tool was emphasized. Instead of relying entirely on it as a final source of information.

Also, this research paper will examine the relationship and interconnection between ChatGPT in education at several points, starting with the common topic Both studies focused on how to use ChatGPT in the field of education and reviewed the similarities that several literatures largely Montenegro (Montenegro-Rueda et al., 2023). The study talked about the impact of GPT chat on education, through reviewing the available literature, the work was done. In fact, this study was conducted through various data from the published synchronization and between the chatting application GBT Chat, which was downloaded on November 3. The study was based on 12 studies using a quantitative methodology and a qualitative methodology to conduct the experiment. The results of the study showed that applying GPT chat in the educational environment had a positive impact on the learning and teaching process. It reviewed the positive impact on the learning and teaching process using GPT chat so that the importance and necessity of training teachers must be emphasized to obtain the maximum benefit and in the correct manner. The results also showed that GPT chat has the potential to enhance the educational process. Provided that teachers understand the administration's

work well for it to be successful. There is a connection between the two studies, as they can be linked, firstly, in the partnership between the two topics, and secondly, both studies use similar literature references and methodologies.

A study by (Pradana.et al., 2023) presented the current research on the use of GPT chat from Open AI in the field of education, all of which is based on a bibliometric analysis and several systematic literature reviews. Through the results of the study, the noticeable increase in the number of research and articles published on the topic of GPT chat as the period was Between 2022 and 2023. The number of research papers during this period reached 93 articles, and keywords such as education, challenge, and knowledge were identified as they have not yet been comprehensively researched. This paper focused on the challenges and opportunities that GBT chat presents in the field of education. The study also calls for more research on studying the effectiveness of this technology in improving learning outcomes. There is a connection between this article and my research in GBT Chat on education in several points, including the subject of the study, as there is a strong similarity between the two studies, in the methodology used in the study. Both studies use bibliometric analysis or literary references, and both studies seek to develop knowledge and understanding. About how to use GPT chat in the field of education

Another study by (Aktay.et al., 2023) is about collecting the opinions of a number of students about the use of GBT chat in education. The process was done by collecting and conducting interviews at regular times. with fourth-grade students in a school in Turkey. The results showed that students who use GBT chat in education are effective. More fun and attractive. GBT chat also enhances academic performance. It provides all the information, and more resources compared to traditional subjects, as students confirmed their initiation and support for GPT chat in many courses such as social studies and mathematics. They stated that this tool is of high value and can be expanded. There is a great similarity between this study and the title of my research on GBT chat in education, as the course of the two studies is in the same field, where many similar aspects can be looked at, including similar topics, methodology, results, recommendations, and the cultural or geographic context as well with reference to previous literature.

The study (Lo C., 2023) examines the impact of GPT chat on education, through a quick review of the literature that has been published and discusses this topic. The results showed that GPT chat differs in the field of education and has also shown outstanding performance in other fields such as Economics, while GBT Chat performed poorly in mathematics in addition, the potential benefits of using GPT chat as a tool to assist teachers and be a virtual guide for students are reviewed, with focus and caution on challenges such as producing incorrect and false information. The article recommends taking immediate measures to modernize educational methods and policies to confront the

situation. It can be said that these two studies can be rich. It can contribute to providing a comprehensive understanding of the impact of GPT chat in the field of education. This helps to develop powerful and effective strategies to exploit this technology safely in educational environments. The study (Halaweh M., .2023) reviewed the growing concern among This is all about the integration of these technologies and is tailored to all educational levels. This study provides arguments to support the use of GPT chat. Proposing strategies that are implemented responsibly and effectively. In fact, concerns related to the use of GBT chat include many issues, including bias, privacy, and loss of critical thinking. However, this research paper indicates that using this tool can enhance learning and thus ultimately help improve the quality of writing. The connection between the two studies stems from a common focus on the use of GBT chat in education, with possible intersections in challenges, recommendations, and methods.

The study (Zhu et al., 2023) discussed how to exploit the capabilities of GPT chat in the field of education through SWOT analysis (Strengths, Weaknesses, Opportunities, Threats). The study showed that GPT chat, with its ability to understand complex questions and respond, is like humans. Despite all this, GBT chat suffers. BT has some limitations such as providing inaccurate information. This technology requires responsible use to ensure an effective educational environment through study, and these analyzes provide a set of strategies for integrating GPT chat into the field of education to maximize its benefits and reduce the risks associated with it. There is a connection between this research paper and my research paper entitled GPT chat in the field of education, in many points, including the common topics. Both studies address the use of GPT chat. Also, both studies focus on analyzing opportunities, challenges, and threats. The study (Subiyantoro et al., .2023) addressed the negative and positive effects of using GBT chat in the fields of education through a qualitative methodology, where information was collected through interviews, observations, and questionnaires in educational settings. This study showed many results that showed that the use of chat supported by artificial intelligence enhances ease of access to educational materials. It provides support for education and helps overcome individual challenges. There were several infections because of social interaction between the governor and the students. In the end, the study emphasizes achieving justice between the benefits of this technology and its potential risks. There is a connection between this study and the study of GPT chat in many points, as both studies focus on the impact of this technology on the stages of education, and no matter how different the methodologies used in collecting information are, this helps to enhance the results and recommendations by comparing the results.

The study (Dempere et al., 2023) explored the impact of AI-driven bots and the focus on OpenAI's custom GBT chat tool will impact all education institutions at all levels. It presents a different set of opinions on the potential



benefits of GPT chat, including supporting research, automatic correction, and improving human-machine interaction. Many concerns were identified, such as online testing security, plagiarism, and social influences. One of the objectives of this study is to encourage faculty to use GPT chat in the field of higher education and to encourage its use in an ethical manner to reduce risks. There is a connection between the two studies, as both studies have the same topic, methods, and results. The study (Yu H., 2023) discussed an important opinion about whether the use of GPT chat should be banned in the academic field in terms of education and teaching. As the advanced technology on educational methods and the ability to learn, all of this contributes to the improvement in the field of efficiency and enhancement of educational methods, and it is explored in this paper that it is necessary to The process of regulating how to use GPT chat in the fields of education in order to obtain its real benefits without compromising academic values., it was concluded from this study that the responsible integration of GPT chat technology could provide many important opportunities for reform and development. It is implementing and applying the results, recommendations and main ideas, it is very important for the understanding and analysis process. It clarifies all the results to understand how they are integrated or different, a good indicator for development and obtaining effective results in this field.

The study (Candrasari et al., 2024) considered one of the studies related to the effects of GPT chat in the fields of education. This article focuses on exploring the benefits that this type of artificial intelligence tools can provide in higher education institutions, such as enhancing student interaction and accelerating the evaluation process, and all that. To increase the efficiency of education, this paper discusses the possibility of using GPT chat as a smart and innovative educational tool to support learning. It facilitates access to the required information and provides immediate feedback for students. This paper recommends that researchers conduct future studies targeting a larger number of students to understand the effects of GBT chat more deeply and in diverse educational environments. The study (Božić & Poola, 2023) referred to the use of GBT chat in education, as it discusses and reviews how to improve the learning experience for students by providing specialized educational resources, as it is possible to provide support in language learning to improve many skills, including writing and solving assignments more accurately. It points out the benefits of use and caution against relying on it through the ethical challenges related to verifying information and data, as well as information privacy. Therefore, this scientific study stipulates the use of GPT chat as a tool that supports learning rather than replacing human teachers. This article points out many of the challenges associated with using GPT chat, such as the excessive risks involved in the technology, the negatives in social interaction, and the problems of private data and privacy.

The study (Sallam M., 2023) discussed the large language GPT chat in many fields, including education, health, as well as research, in addition to pointing out the benefits and limitations. Many results have shown that GPT chat has a major role in contributing to improving scientific writing, data analysis, and enhancing the efficiency of health care, especially education. Although there are major concerns related to the issue of ethics, in addition to copyright and information errors, it must be used with extreme caution. It is also necessary to develop ethical standards for the use of GPT chat in these various fields, for the safety and quality of data and information. The focus of the study is to provide a comprehensive picture of how GBT chat affects the stages of education and several diverse fields such as health care. Study (Trust et al., 2023) reviewed the challenges and impact of the consequences of using GBT chat in education that result from the use of GPT chat in education. Despite all the benefits that have been gained from using GPT chat, there are many concerns related to many topics such as suicide, false information, and intellectual theft. The authors emphasize the importance of integrating artificial intelligence tools, including GPT chat, into education in a critical way. All of this can help enhance many students' critical thinking skills when they use this technology. The article stresses the need to deeply rethink practices due to the increasing influence on these smart tools. The study (Adiguzel et al., 2023) discussed the possibility of using artificial intelligence, especially GBTV chat, in education. It demonstrates how to create a radical transformation in traditional teaching and learning methods. To obtain better results and personalize education, in general, the study is considered an integrated view of smart applications and tools and provides immediate responses when requested, with an emphasis on ethical challenges as the processes involved. Although there are many potential benefits, there are many concerns related to disparities in the educational system and biases in artificial intelligence algorithms. The study urges the importance of training teachers in using these tools effectively. Promoting the uses of artificial intelligence, especially GPT chat, is the goal of the study, and the responsibility and ethics of these technologies must be considered.

The study (Rashel.et al., 2024) discussed the uses of artificial intelligence, specifically on GBT chat, in the field of education, and its impact through experiments on several students. The researchers focused on the benefits that could potentially occur, an example of which is improving communication between teachers and students and urging the promotion of highly efficient learning environments, all of this by integrating Education and Technology: Through this study, the results present participants' opinions regarding the benefits of the GPT chat tool With a focus on the potential applications of this tool in the field of university education. Through this study, researchers emphasize the importance of using GPT chat in a responsible, careful and ethical manner to enhance education and improve the

learning experience in recent years. The study (Fütterer et al., 2023) explained that the rapid and widespread launch of GPT One chat has aroused the interest of teachers all over the world, and others may see its potential in providing educational support. Others are concerned that it may cause a decline in many learning opportunities or contribute to the spread of misinformation. The study showed through analysis of data in the Twitter application, which includes several big data, which includes more than 16 million tweets Results were obtained about global reactions to GBT chat in the field of education, and the various topics varied between specific issues, including fraud, and general opportunities, including learning personalization. The study reviewed the need to address many of the challenges and opportunities provided by this technology, which is considered new in the field. Educational The study was collected during the period from November 30.2022, until January 31. 2023. The study included more than 5.5 million users, all to obtain these results.

The study (Loos et al., 2023) discussed the use of GBT chat in education and presents a brief analysis of the ability of this linguistic model for self-reflection and how to integrate it effectively into many educational processes. The study indicated that the GPT chat tool can contribute very widely to providing effective answers and results instead of the traditional method of providing individual lessons in automatic generation. but it is not a substitute for human teachers, as a Swot analysis was obtained to highlight strengths and weaknesses. And threats to use GPT chat in the fields of education, the research reviews the uses of GPT chat and helps add an educational character when used in educational fields, with the aim of exploring the effectiveness of this model in the field of supporting education and enhancing the educational experience. The research also seeks to open the door to discussion about the importance of moral responsibility in the use of this technology. The study (Mhlanga D.,2023) discussed open AI's GBT chat technology, which is focused on the education sector in emerging economies. This study reviews the potential benefits it has in terms of improving access to education at a high level of intelligence and increasing interaction between students. I review the challenges, including bias and lack of empathy with several students. The study indicated the importance and necessity of analyzing the impact of this tool of technology more deeply, all to obtain a guarantee of effective and ethical use at the same time to obtain highly efficient and accurate education.

The study (Klayklung et al., 2023) discussed how artificial intelligence and the GPT chat tool impact education and improve the learning experience in education. This research highlights the opportunities that GPT chat can provide by providing personal and interactive conversations that enhance learning. This study used a qualitative methodology by conducting. The interviews are in-depth to obtain accurate data about the impact of GBT chat in Thailand.

Considering the rapid changes in technology that occur in our current world, it has become necessary to explore how to integrate these modern tools into the educational system. GBT chat can understand natural language and provide responses appropriate to educational contexts. A summary of survived studies is illustrated in Table 1.

### **3. Research Methodology**

This research will be informed by a critical review in order to understand the role of ChatGPT and other AI tools in education. A wide range of literature sources will be reviewed for a critical assessment of the benefits and challenges, ethical concerns, and future directions regarding the integration of ChatGPT into educational settings. It provides a review incorporating peer-reviewed journal articles, conference papers, expert opinions, policy reports, and case studies from diverse sources that put the subject into a holistic perspective. This qualitative synthesis thus has the potential to provide an insight into how AI is reshaping education in a way that goes beyond a mere summary of available research.

#### **3.1. Research Design**

This study has adopted a qualitative, narrative-based research design to review and synthesize literature on implications pertinent to ChatGPT in education. The adopted approach does not restrict itself to the rigid systematic framework but is flexible, iterative, and analyzes a wide range of sources. It contextualizes and interprets rather than summarizes these findings and provides a critical discussion related to AI-assisted education (Yousif, M., 2023).

#### **3.2. Data Collection Process**

The review covers a wide range of literature from various academic and non-academic sources to capture different perspectives on the role of ChatGPT in education. The sources were selected from such academic databases as Google Scholar, IEEE Xplore, SpringerLink, ScienceDirect, and ACM Digital Library.

#### **3.3. Scope and Approach**

Early This review focuses on various dimensions of ChatGPT's role in education by categorizing these studies into thematic areas, such as:

- Pedagogical Applications
  - How does ChatGPT enhance personalized learning experiences?
  - Application in automated assessments, tutoring, and content creation.
  - The adoption of AI by teachers and students in various disciplines.
- Academic and Research Assistance
  - How effective is ChatGPT in doing research writing, literature reviews, and knowledge synthesis?
  - The accuracy and credibility of AI-generated information in education.
  - AI's role in higher education and professional learning environments.
- Challenges and Ethical Considerations

- The risks of AI bias, misinformation, and ethical concerns in student learning.
- Issues of data privacy, security, and responsible AI usage.
- Concerns regarding student dependency and plagiarism risks.

**Table 1.** Summary of literature studies

Author	Main Findings	Methodology	Gaps
Mogavi et al., 2024	ChatGPT is widely used in higher education (24.18%), K-12 (22.09%), and skills training (15.28%). It assists in writing, learning support, language enhancement, and communication skills.	Qualitative	Sample diversity, reliance on social media data, unclear categorization.
(Baidoo-Anu & Owusu, 2023)	ChatGPT offers personalized lessons, interactive assessments, and language learning support.	Qualitative	Produces false information, biases in training data, lack of human interaction.
(Rasul et al., 2023)	Facilitates adaptive learning, supports literature reviews, helps summarize research.	Qualitative	Limited scope, data bias, rapid technological changes.
(Abdelghani et al., 2023)	GPT-3-generated content closely matches manually created content, proving its efficiency.	Qualitative & Quantitative	Small sample size, short study duration, lack of diverse backgrounds.
(Rahman & Watanobe, 2023)	Supports learning, problem-solving, and programming; generates accurate code (95.83% with a basic translator, 75% in online evaluation).	Qualitative & Quantitative	Limited evaluation, ethical concerns, diversity in survey participants.
(Oranga, J, 2023)	24/7 availability, instant feedback on assignments, enhanced learning support.	Qualitative	Lack of critical thinking, limited contextual awareness, verification challenges.
Montenegro-Rueda et al., 2023	ChatGPT enhances student experience, writing skills, and teacher training effectiveness.	Qualitative & Quantitative	Limited studies, short study duration, focus only on English and Spanish.
(Pradana.et al., 2023)	93 articles published (2022-2023), research gaps in AI and education, opportunities for collaboration.	Quantitative	Limited study range, short time frame, potential focus on quantity over quality.
(Aktay.et al., 2023)	Students find ChatGPT engaging, enhancing academic success through quick, accurate responses.	Qualitative	Small sample size, limited to fourth-grade students, no comparison group.
(Lo. C., 2023)	ChatGPT excels in economics, is satisfactory in programming, but performs poorly in mathematics.	Qualitative	Reliance on preprint articles, focus only on original ChatGPT, lack of empirical validation.
(Halaweh M., .2023)	ChatGPT enhances writing skills, summarizes information, and aids research.	Qualitative	Lack of prior research, subjective results, rapid technological changes.

Author	Main Findings	Methodology	Gaps
(Zhu et al., 2023)	Simplifies complex concepts, provides solutions for complex tasks, generates human-like responses.	Qualitative	Lacks critical thinking, concerns over unethical use, integration challenges.
(Subiyantoro et al., 2023)	Enhances accessibility, provides personalized support, automates administrative tasks.	Qualitative	Response bias, reliance on personal opinions, subjective findings.
Dempere, et al., 2023	Supports academic research, improves content creation, and assists in automatic grading.	Qualitative	Based on literature review, lacks empirical validation.
(Yu, H., 2023)	Revolutionizes AI in education, enhances efficiency in teaching and learning.	Qualitative	Lacks quantitative analysis, external factors may influence results.
(Candrasari.et al., 2024)	Improves learning quality, accelerates student assessment, helps teachers with lesson delivery.	Quantitative	Small sample, does not replace human interaction.
(Božić & Poola, 2023)	Customizes learning, enhances writing skills through grammar and style feedback.	Qualitative	Biases in responses, risk of student over-reliance.
(Sallam, M., 2023)	Improves writing, enhances research efficiency, promotes critical thinking.	Qualitative	Bias in record collection, reliance on non-peer-reviewed articles.
(Trust.et al., 2023)	Gained rapid adoption, assistance in lesson planning, enables personalized learning.	Qualitative	Lacks empirical validation, potential bias from previous studies.
(Adiguzel et al., 2023)	Enhances student engagement, provides immediate feedback, improves learning outcomes.	Qualitative	Literature review only, lacks direct field research.
(Rashel.et al., 2024)	Enhances interaction, supports personalized learning, integrates well with traditional teaching strategies.	Qualitative	Small sample, results may be time-specific.
(Fütterer et al., 2023)	16.8M ChatGPT-related tweets analyzed, showing evolving perceptions.	Quantitative	Cannot confirm tweet authenticity, unclear user demographics.
(Loos.et al., 2023)	Provides immediate feedback, supports engagement, helps create study materials.	Qualitative	Lacks emotional intelligence, potential for misinformation.
(Mhlanga, D.,2023)	Expands educational access, personalizes learning, promotes critical thinking.	Qualitative & Quantitative	Infrastructure limitations in emerging economies, lacks human empathy.
(Klayklung et al., 2023)	Personalizes learning, enhances interactions, automates grading.	Qualitative	Limited to a single province in Thailand, small sample size.

## 4. Results and Discussion

This section focuses on discussing the results of the paper and answering research questions.

### 4.1. Answers to the Research Questions

The following section provides answers to the research questions based on the comprehensive review of literature on the role of ChatGPT in education.

#### **RQ1. What are the research methodologies adopted in the studies related to ChatGPT's role in education?**

Qualitative, quantitative, and mixed-methods approaches are widely used in most of the studies reviewed in this research while assessing the role of ChatGPT in education.

- **Qualitative Research Methods**

Qualitative research designs have been adopted in a number of studies, including interviews, surveys, and content analysis to comprehend the perceptions of students, educators, and policy makers.

- Mogavi (2024) relied on thematic analysis of social media discussions and educational content to look into the usage of ChatGPT in higher education and skill development.
- Halaweh (2023) relied on case studies to explore the impact of ChatGPT on writing and research skills, thereby offering insight into its strengths and challenges within an academic environment.
- Subiyantoro (2023) used observations and interviews to investigate students' experiences with ChatGPT-based learning support.

- **Quantitative Research Methods**

Statistical surveys and experimental studies have been conducted to assess the effectiveness of ChatGPT in different academic settings.

- Pradana et al. (2023) conducted a bibliometric analysis that traced research trends related to ChatGPT. The results indicated a significant increase in research interest between 2022 and 2023.
- (Rahman & Watanobe, 2023) conducted quantitative experiments by analyzing student performance before and after using ChatGPT for programming tasks.

- **Mixed-Methods Approaches**

Several have combined qualitative and quantitative approaches to provide an overall understanding of the applications of ChatGPT in education. For instance,

- Montenegro-Rueda et al. (2023) conducted both qualitative and quantitative analysis in order to evaluate ChatGPT on the dimensions of impact on students' learning performance and engagement.
- Lo (2023) employed a comparative approach, analyzing different academic disciplines. He found it much more effective when used in economic subjects than mathematics.

- **Literature Reviews and Meta-Analyses**

Some have consolidated findings from various studies through literature reviews and meta-analyses.

- Ray (2023) synthesized previous studies to identify key themes in the use of ChatGPT in education.
- Wu & Yu (2023) conducted a meta-analysis of 24 studies to explore the effectiveness of AI-powered chatbot applications on students' learning performances.
- **Key Findings**
  - Most of the current studies related to ChatGPT usage in education are exploratory because it was only introduced in 2022.
  - Qualitative methods are dominant, given the need to understand perceptions and attitudes of educators and students. Quantitative studies emerge, especially in assessing learning outcomes, but more controlled experiments are needed to validate findings.

## **RQ2. What are the possible advantages of ChatGPT in learning environments?**

The literature identifies some of the major advantages of ChatGPT in education:

- **Personalized and Adaptive Learning**
  - ChatGPT can provide personalized learning experiences to students by offering one-on-one tutoring and interactive lessons (Mogavi, 2024; Rasul et al., 2023).
  - Baidoo-Anu et al. (2023) reported that 60% of educators use ChatGPT to personalize lessons, enabling students to learn at their own pace.
- **Automated Assessment and Feedback**
  - ChatGPT instantly feeds students' assignments, quizzes, and research writing for mistake identification and enhancement of understanding (Rahman & Watanobe, 2023; Lo, 2023).
  - According to Sallam (2023) and Zhu et al. (2023), AI-powered tools lessen educators' workload in terms of grading and free them to interact with students.
- **Research and Knowledge Generation**
  - ChatGPT helps students in summarizing literature, drafting their research papers, and even brainstorming ideas for the same (Ray, 2023; Alkaissi & McFarlane, 2023).
  - Dempere et al. (2023) have also gone ahead to identify its role in academic research, where ChatGPT helps in the structuring of arguments and identification of key themes.
- **Improved Student Engagement and Motivation**
  - Lo (2023) and Pradana et al. (2023) established that using AI as a study assistant makes learning more engaging and interactive for students.
  - Aktay et al. (2023) mentioned that students in primary schools in Turkey enjoyed learning with the assistance of ChatGPT and found it more effective than traditional learning.
- **Multilingual and Inclusive Education Support**
  - ChatGPT supports multiple languages, enabling its use for students who are non-native speakers and even those with learning disabilities (Mogavi, 2024; Božić & Poola, 2023).



- Halaweh (2023) established that AI-driven tutoring closes learning gaps in students from different walks of life.
- **Key Findings**

Automating some tasks and providing immediate support, ChatGPT enhances learning efficiency. It allows personalized learning but also requires human supervision over educational quality and the development of critical thinking. AI-assisted learning may increase student motivation; however, students' over-reliance on it reduces deep learning and problem-solving skills.

**RQ3. What are the limitations and ethical considerations that need to be addressed for its effective implementation in education?**

Despite its advantages, ChatGPT has several drawbacks and raises a number of ethical issues:

- **Credibility and Reliability of AI-Generated Content**
  - ChatGPT may provide misleading or incorrect information; therefore, the responses need to be checked by the user (Lo, 2023; Zhu et al., 2023).
  - Yu, 2023; Trust et al., 2023 reported that AI models tend to hallucinate by providing fabricated citations or incorrect academic content.
- **Academic Integrity and Plagiarism Concerns**
  - (Rahman & Watanobe, 2023) and Montenegro-Rueda et al. (2023) warn of an increase in AI-assisted plagiarism, whereby students plagiarize work produced by AI without giving any recognition.
  - Adiguzel et al. (2023) suggest AI-detection tools and strict academic policies as measures to avoid unethical behavior.
- **Bias and Ethical Issues**
  - ChatGPT inherits biases from its training data, which may result in misrepresentation or exclusion of certain perspectives (Gentile et al., 2023; Yu, 2023).
  - Fütterer et al. (2023) warn that AI's cultural and gender biases could negatively impact students in diverse learning environments.
- **Data Privacy and Security Risks**
  - Many studies highlight concerns over user data collection and AI-driven surveillance in education (Sallam, 2023; Zhu et al., 2023).
  - Dempere et al. (2023) and Božić & Poola (2023) have pointed out that strict AI policies must be put in place to safeguard data about students.
- **Too Much Reliance on AI and Decline in Critical Thinking**
  - Excessive engagement with ChatGPT can reduce students' cognitive efforts and hence will not be conducive to problem-solving and creativity among students (Rasul et al., 2023; Mhelanga, 2023).
  - Lo (2023) and Halaweh (2023) view that though AI helps retrieve information, it does not promote independent reasoning.

- **Key Findings**

Accuracy, academic integrity, and ethical considerations are major concerns in ChatGPT's implementation. Plagiarism and over-reliance on AI must be mitigated through academic guidelines and detection systems. Data security and privacy regulations should be prioritized to ensure responsible AI integration.

#### **4.2. Comparative study results**

This section presents the results of the comparison study based on the key factors got from the literature survey of studies. It provides a critical review of the research findings on the role of ChatGPT in education, organized in three thematic areas of discussion, namely: Pedagogical Applications, Academic and Research Assistance, and Challenges and Ethical Considerations. Various studies that have been conducted present the results for and against the use of ChatGPT in education.

- **Pedagogical Applications**

1. Development of Personalised Learning

ChatGPT has been recognized in the ability to provide personalized learning experiences through content that caters to the learning needs of every student. Mogavi (2024) and (Baidoo-Anu & Owusu, 2023) provide evidence in the use of ChatGPT in higher learning institutions at 24.18%, K-12 learning at 22.09%, and skills training at 15.28%, providing students with skills in writing, learning their languages, and effective communication. Through these studies, ChatGPT is seen as supporting adaptive learning strategies through providing immediate feedback and customized lesson plans. However, Baidoo-Anu et al. (2023) and Rasul et al. (2023) warn of the overuse of AI that may reduce the critical thinking and problem-solving skills of the students. In as much as ChatGPT increases student's engagement, lack of human interaction may impact deeper learning experiences.

2. Automated Assessments, Tutoring, and Content Generation

ChatGPT has also been found to play important roles in automatic assessment, tutoring, and content creation. For instance, Rahman et al. (2023) and Abdelghani et al. (2023) demonstrate the ability of ChatGPT in developing clear summaries, quizzes, and explanations of complex ideas from educational content. In Lo's 2023 study, although ChatGPT fared well within the streams of economics and social sciences, it proved incapable in mathematics-a discipline-specific limitation. Pradana et al. (2023) conducted a bibliometric analysis and identified that the research interest was significantly raised, with 93 articles published in 2022-2023 on the topic. On the other hand, Oranga (Oranga, J, 2023), and Halaweh (2023) indicate that while ChatGPT helps to generate content, it cannot replace human educators due to its lack of emotional intelligence, ethical reasoning, and creativity.

3. AI Adoption by Teachers and Students

The adoption of AI tools by teachers and students varies based on institutional policies and technological readiness. Montenegro-Rueda et al. (2023) emphasize the need for teacher training programs to maximize the benefits of AI-driven learning. Similarly, Dempere et al. (2023) suggest that faculty members in higher education need structured training on how to integrate ChatGPT into the curriculum while maintaining academic integrity.

A survey conducted by Fütterer et al. in 2023, analyzing 16.8 million tweets on ChatGPT, reflected a wide range of opinions on the technology. While some educators welcome AI for lesson planning and assessments, others worry it could facilitate academic deceit and misinformation.

- **Academic and Research Support**

1. ChatGPT for Writing and Synthesis of Research Information

ChatGPT is increasingly being used in academic research to assist with literature reviews, citation generation, and summarization of scholarly articles. Sallam (2023) and Adiguzel et al. (2023) found that ChatGPT improves research efficiency by quickly processing large volumes of data. However, Emenike & Emenike (2023) argue that AI-generated summaries may lack depth and critical evaluation, requiring human intervention for accuracy. McGee, 2023; Ray, 2023 further observed that although ChatGPT provides valuable insight into information, it is never updated in real time, thus making it not accurate or holding incorrect information over rapidly changing subjects.

2. Credibility and Accuracy of AI-generated Information

So, ensuring the credence of artificial intelligence-generated content remains a huge challenge. Lo 2023; Zhu et al. 2023 were able to validate that though ChatGPT indeed provided correct answers, it provided a lot of wrong and highly biased information from time to time. In alleviating this, studies have shown that Gentile et al. (2023) and Roumeliotis & Tselikas (2023) recommended that ChatGPT should not be used as the main source of academic knowledge but rather as a supporting tool. These findings highlight the need for verification by students and researchers of the content generated by AI before using it in formal work.

3. Role of ChatGPT in Higher Education and Professional Learning

It has been integrated into higher education and professional learning related to law, medicine, and business studies. Currie, 2023; Eysenbach, 2023, discussed the role of ChatGPT in medical studies. It helps students with clinical case studies and theoretical learning. However, they showed concern that the ChatGPT could not emulate human decision-making processes in fields which require ethical consideration and interaction with patients. In business education, Božić & Poola, 2023 found that ChatGPT helps students improve writing and analytical competencies. However, modugu et al., 2023; Mhelanga, 2023 called for regulatory frameworks to be enacted to guide the use of AI in professional certification programs.

- **Challenges and Ethical Considerations**

1. AI Bias, Misinformation, and Ethics

One of the most pivotal concerns surrounding ChatGPT is that it holds biases and misinformation. Yu 2023 and Trust et al. 2023 alerted that the data used to train ChatGPT could have biases, which can affect the neutrality of the responses. In a similar vein, Thurzo et al. 2023 noted inaccuracies in anatomy in AI-generated content related to dental education and questioned the reliability of AI in specialized fields. Fütterer et al. (2023) also emphasize the risk of AI-generated misinformation, which becomes particularly harmful in academic contexts where precision is expected across the board.

## 2. Data Privacy, Security, and Responsible Use of AI

ChatGPT application in education involves ethical issues about data privacy. Mogavi (2024) and Halaweh (2023) both highlight that the AI-powered learning tools collect and store user data, which eventually leads to breaches in security when unchecked mechanisms exist. It is recommended that institutions institute rigid policies to guide the use of AI in classrooms. These policies will address the need for compliance with data protection laws, as stated by Zhu et al. (2023) and Subiyantoro (2023).

## 3. Student Dependency and Plagiarism Risks

Increased student dependence on AI tools for academic work is an emerging concern. Students who overuse ChatGPT, Rahman (Rahman & Watanobe, 2023) and Lo (2023) note, appear to struggle with independent problem-solving and creative thinking. Moreover, Sallam (2023) and Modugu et al. (2023) proved that ChatGPT is widely used for academic dishonesty, thus raising concerns about plagiarism and unauthorized content generation. These findings underpin calls for educators and policymakers to develop guidelines on the ethical use of AI in education.

## 5. Conclusion

Future While ChatGPT is a powerful educational tool, its integration needs to be informed by ethics, critically assessed, and continuously monitored for effective and responsible AI-assisted learning. This also leaves hope that future research will develop AI policies, enhance model transparency, and strengthen human-AI collaboration in education. ChatGPT is but one tool that revolutionizes education both for better and worse. While great is the potential of these tools in helping individualized learning and improving academic research, so are the issues which concern the responsible use of AI, student dependency on it, and information reliability. Further research is needed in policy development, regulation of AI, and teacher training so that the technology of AI becomes an asset rather than a liability to education. A large group of studies was highlighted, numbering 25 studies with diverse results and analyses. Studies have focused on the uses of GPT chat and its impact on learning styles and the relationship between teachers and students. The statistics related to the number of research papers that were discussed in this research in the Sultanate of Oman, the United Arab Emirates, Saudi Arabia, and countries around the world indicate the noticeable increase in interest in research related to this technology, and this indicates the growing awareness about artificial intelligence and in enhancing education.

### • Summary of Findings

- Most of the studies have used qualitative, quantitative, and mixed-methods approaches. Literature reviews, interviews, and surveys are used.
- ChatGPT will enhance personalized learning, automate assessments, support research, and improve student engagement.
- Pedagogical Applications: ChatGPT enhances personalized learning, assists in content generation, and provides automated assessments. On the other hand, over-reliance on AI does not allow critical thinking to develop.

- **Academic and Research Assistance:** Many researchers use ChatGPT for writing and summarizing; however, accuracy and bias remain a challenge that needs human supervision.
- **Challenges and Ethical Considerations:** Bias, misinformation, privacy concerns, and plagiarism risks highlight the need for responsible AI usage in education.
- **Limitations of the Review**  
While this review presents a broad and in-depth analysis, there are some limitations:
  - Primary data collection, like a survey or interviews of educators and students, is beyond the scope of the study.
  - Due to the fast-developing nature of AI technology, some findings might have already become outdated by the time new advancement opportunities appeared.
  - Since most of the literature reviewed in this research was in the English language, little insight was offered regarding the state of affairs within non-English-speaking educational systems.
- **Ethical Considerations**  
Since this study is based on publicly available literature, there were no human participants involved in the research work, hence a minimum level of ethical concern. However, regarding academic integrity:
  - All sources are properly cited to acknowledge original authors.
  - The review presents a balanced discussion on the benefits and drawbacks of ChatGPT in education.
  - Ethical considerations dealing with bias in AI, misinformation, and academic integrity are deeply questioned.
- **Suggestions for Future Research**
  - **Developing Ethics-Based AI Policies:** The future should discuss how institutions could implement an ethical framework that governs AI applications in higher education.
  - **Improving the Accuracy of AI:** Researchers should conduct more studies on the improvement of the knowledge base within ChatGPT to reduce misinformation and bias.
  - **Longitudinal Effects of AI:** More longitudinal studies should be conducted on how AI is influencing student learning and academic integrity over time.

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