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# The Influence of ChatGPT in Education: A Comprehensive Review

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***Abstract:*** **This study aims to examine how ChatGPT, a tool used in education, impacts the teaching and learning process. We reviewed 12 studies published since ChatGPT's launch in November 2022, using three major educational databases: Web of Science, Scopus, and Google Scholar. Our analysis used both descriptive and quantitative methods to highlight the most important findings. Our results show that ChatGPT has a positive influence on education, but it's crucial for teachers to receive proper training for its effective use. While ChatGPT can improve the educational experience, teachers need to understand how to use it. These insights lay the groundwork for future research and decision-making regarding ChatGPT's use in education.**

***Keywords:*** **ChatGPT; artificial intelligence; education; impact; systematic review**

## I. Introduction

In recent decades, artificial intelligence (AI) has grown rapidly, transforming various aspects of our society. AI now stands at the forefront of research in fields like medicine, robotics, education, and autonomous driving. In simple terms, AI involves computers learning to imitate human brain behavior by gathering external data and using that knowledge to achieve specific goals.

The integration of AI into education has made a significant impact, leading to improved efficiency in the educational process, the global spread of knowledge, personalized learning experiences, the creation of smarter educational content, and more effective management in education. Nowadays, technology plays a vital role in enhancing the teaching and learning process. Education isn't just about acquiring knowledge; it's a dynamic process that goes beyond the mere accumulation of facts. In this context, artificial intelligence, or AI, emerges as a powerful tool in the realm of education, offering the potential for tailored learning experiences that adapt to each student's unique needs and interests.

However, within the educational landscape, implementing AI presents critical challenges and ethical considerations. Issues such as data privacy, equal access to education, and the changing role of educators need careful attention. It's essential to handle these aspects responsibly, ensuring that AI benefits all learners fairly. Striking a balance between technology and the essential role of educators is crucial to maintain a focus on students' holistic development and their preparation for an ever-evolving world.

Given the relatively short time since the launch of ChatGPT (at the end of November 2022), no systematic reviews have yet explored its impact on education. Therefore, the primary goal of this systematic review is to examine the existing literature regarding ChatGPT's application in education, aiming to uncover its influence, advantages, challenges, and areas of application in teaching and learning. To achieve this, the following research questions will be addressed:

## II. Background

- How much scientific research exists about employing ChatGPT in education?
- What advantages and obstacles come with incorporating ChatGPT in the classroom?
- What can we anticipate as upcoming trends and new research areas in the utilization of ChatGPT in education?

The application of ChatGPT in the field of education has garnered significant interest due to its potential to enhance the learning experience for students. This system offers quick and personalized responses, catering to individual student needs, providing immediate feedback, and aiding in the comprehension of complex concepts. As a result, it emerges as a promising tool that encourages active student participation and cognitive development by adapting to their learning pace and offering continuous support in their knowledge acquisition process.

Additionally, ChatGPT has proven valuable in improving students' writing skills. Through interactions with the system, students can receive grammar corrections, suggestions for improvement, and detailed feedback on their writing, allowing them to enhance their written communication and achieve greater effectiveness in their expression. However, it's essential to recognize that while this application serves as a valuable aid for scientific writing, it should not be seen as a complete solution for generating scientific content. Writers should still apply their knowledge and experience to validate and complement the information provided by the tool. Furthermore, ChatGPT excels in facilitating group discussions and encouraging collaborative student involvement in projects and assignments, fostering a sense of community among learners by promoting interaction and the exchange of ideas.

Numerous studies have explored the potential impact of artificial intelligence in education, particularly using the well-known ChatGPT tool for students. Various applications of AI in education have been investigated, such as personalized learning experiences, adaptive testing, predictive analytics, and chatbots. The findings reveal the incredible potential of AI to enhance learning efficiency and offer personalized educational support to both students and teachers. However, it is crucial to consider the associated risks and limitations of these technologies, including concerns about data privacy, cultural disparities, language proficiency, and ethical implications.

In the past year, the influence of ChatGPT has generated growing interest in the field of education. This innovative tool has emerged as a disruptive technology, transforming how students are taught, promoted, and supported in academic environments. Consequently, educational institutions are reevaluating how to incorporate this technology into their teaching models to enhance the educational experience for all stakeholders. Teachers should introduce this tool in the classroom as an additional resource that complements the learning process. Nevertheless, it's essential to emphasize that this tool does not replace the cognitive processes

 

required for learning or other sources of information like books, articles, or interactions with peers.

## III. Methodology

In this section, we'll explain how we conducted our systematic review of the literature about ChatGPT in education.

### 3.1. Search Approach

We started by carefully searching for relevant articles using a clear and structured strategy. To maintain quality and reliability, we followed the recommendations provided by the PRISMA Statement [11].

Table 1. Search Parameters

| **Topic** | **Search Terms** |
|---|---|
| Artificial Intelligence | AI Technology |
| | Conversational Agents |
| | Chatbots |
| **Context** | **Search Terms** |
| Education | Learning Environment |
| | Educational Institutions |

#### 3.1.1. Search Criteria

We looked for articles in three major international databases: Web of Science, Scopus, and Google Scholar. We used specific keywords (see Table 1) to search in the titles, abstracts, and keywords of articles. Our search took place between May and June 2023, resulting in an initial identification of 154 records.

#### 3.1.2. Inclusion and Exclusion Rules

After removing duplicate articles (73 in total), we established strict criteria to ensure that the selected articles were relevant to our research goals. We applied these criteria independently through two reviewers to maintain fairness and minimize bias in the selection. We decided to focus on articles published from 2022 onwards because that's when ChatGPT was first introduced by OpenAI.

Table 2. Inclusion and Exclusion Criteria

| **Inclusion Criteria** | **Exclusion Criteria** |
|---|---|
| Publication period | Published between 2022—present (June 2023) | Published before 2022 |
| Type of document | Scientific article published in peer-reviewed journal | Not an article published in a peer-reviewed journal |
| Type of study | Theoretical and empirical research | Other research (review, opinions, letters to the editor...) |
| Language | English or Spanish | Neither in English nor in Spanish |
| Population | Education | No focus on education |
| Research topic | Use of ChatGPT in education | Does not use ChatGPT |

#### 3.1.3. Assessing Methodological Quality

To evaluate the quality of the studies, we used the Johanna Briggs Checklist (JBI). This tool helps us understand the strength and validity of each study by looking at aspects like research design, participant selection, data collection, and analysis. The 14 articles we identified went through a detailed evaluation process using an eleven-point checklist developed by Aromataris and Munn [12]. To ensure an impartial assessment, two independent researchers, not associated with this study, conducted a review of the checklist. This measure was taken to prevent any potential bias in the assessment. Studies needed to meet at least four of the checklist criteria to be included. The checklist assessed various aspects, such as the clarity of research goals, relevance to ChatGPT in education, appropriateness of data collection, and whether the conclusions were backed by data. It also looked for suggestions for future research. Two studies [7,13] did not meet at least four of these criteria and were excluded.

#### 3.1.4. Selection of Studies

Initially, we identified 154 records across the three electronic databases. After eliminating the duplicate records (73 in total), we reviewed the remaining studies based on their titles and abstracts (81 in total). We excluded 67 studies as they did not meet the inclusion and exclusion criteria. Then, we assessed the methodological quality of the remaining 14 studies, excluding 2 of them. This process left us with 12 studies eligible for our review.

#### 3.1.5. Data Collection and Analysis

To address our research questions, we conducted a comprehensive content analysis using both qualitative and quantitative approaches for the 12 selected studies. The

 

quantitative analysis helped us create graphs to understand the general trends in the field. For qualitative analysis, we employed the VOSviewer 1.6.15 tool to identify key trends and the scientific impact in this research area [14,15]. Each cluster in the analysis had different elements, colors, and sizes, with the size indicating the frequency of each keyword's use in the studies [16]. You can find the main characteristics of the studies included in the review in Table 3.

Table 3. Characteristics of Reviewed Studies

| **Authors/Year** | **Methodology** | **Country/Continent** | **Findings (Advantages)** | **Disadvantages** |
|---|---|---|---|---|
| Diego Olite et al. (2023) [17] | Theoretical | Cuba, America | Strategy that brings about changes in the educational process. | Lack of training |
| García Peñalvo (2023) [10] | Theoretical | Spain, Europe | Promotes the development of critical thinking. Provides training for both teachers and students for ethical and appropriate use. | |
| Sánchez García (2023) [6] | Theoretical | Mexico, America | Educational institutions should consider student concerns with AI. | |
| Halaweh (2023) [18] | Theoretical | United Arab Emirates, Asia | Provides opportunities for idea development for teachers. Provides teacher training on AI tool functions and proper evaluation and use. | |
| Rahman and Watanobe (2023) [19] | Quantitative | Bangladesh, Asia | Very useful as a support for educational work. | Lack of training, lack of common sense, difficulties in complex reasoning |
| Ausat et al. (2023) [20] | Quantitative | Malaysia, Asia | Offers improvements in learning. | Doesn't completely replace the teacher role; requires digital competence. |
| Rincón Castillo et al. (2023) [21] | Qualitative | Indonesia, Asia | ChatGPT significantly impacts the teaching-learning process. | Some students use it without learning. |
| Javaid et al. (2023) [22] | Theoretical | Mexico, America | Both students and faculty benefit from this tool. Faculty can save time on numerous tasks by using these technologies. Students can use it as a support tool. | Lack of training. |
| Qadir (2023) [8] | Theoretical | India, Asia | Offers numerous benefits in the teaching-learning process. Important to use these tools with caution, Provides equitable access to technology, reducing inequalities. | |

 

| | | | | |
|---|---|---|---|---|
| Firat (2023) [23] | Qualitative | Qatar, Asia | This tool can increase student engagement and satisfaction. It can enhance learning experiences and transform the role of educators. | Need to improve the training of teachers and students. |
| Fauzi (2023) [24] | Qualitative | Turkey, Asia | Offers learners the chance to improve their language skills. Facilitates collaboration. Increases time efficiency and effectiveness. Provides support and motivation. | Lack of training. |
| Strzelecki (2023) [25] | Quantitative | Indonesia, Asia | Tool accepted by university students. Increases students' performances. Increases students' motivation. | Lack of training. |

## IV. Results

Our systematic review identified 12 relevant articles concerning the impact of ChatGPT in education. All these articles were published in 2023, reflecting the recent introduction of ChatGPT into the education field in late 2022. These studies were primarily from Asian countries (66.67%), including the United Arab Emirates, Qatar, Indonesia, Turkey, India, and Bangladesh. There was also some research from the Americas (25%) and Europe (8.33%), including countries like Spain, Mexico, Poland, and Cuba. However, we didn't find any articles from Africa or Oceania.

When looking at the methodology used in these articles, we observed that most studies had a theoretical approach (50%). This approach aimed to understand the potential and challenges of ChatGPT in education. Some studies combined qualitative and quantitative methods (25%).

The main findings from our analysis showed that ChatGPT was seen as a valuable educational tool that enhances the teaching and learning experience (82%). It was associated with improved performance, motivation, organization, efficient time management, and the promotion of a more effective and collaborative learning environment. However, it was also noted that many teachers lacked the necessary training to use ChatGPT efficiently (58%). Responsible usage, in line with ethical guidelines, was emphasized to prevent any hindrance to students' learning (52%). Researchers also highlighted that ChatGPT could bring significant changes to the education system (46%). There was concern about the need for student training (32%) and potential problems that could arise from prolonged use (28%).

To identify research directions in this field, we divided the findings into three clusters using VOSviewer. Cluster 1 (red) focuses on the role of teachers in an AI-driven educational environment, including their training, the impact of AI tools, and their adaptation to changes in teaching methods. Cluster 2 (blue) revolves around the use of chatbots in education and their impact on students. Cluster 3 (green) delves into the effects of chatbots on teaching and learning processes, considering factors such as the socioeconomic, cultural, institutional, and technological context in which they are used.

## V. Discussion

In this section, we'll explore the findings obtained through the qualitative and quantitative content analysis of the 12 selected research studies to address the research questions posed in this study.

**Q1: The State of Scientific Research on ChatGPT in Education**

The state of scientific research on ChatGPT in education is somewhat limited due to its recent introduction in educational settings. All 12 relevant articles included in our systematic review were published in 2023. This limitation is mainly because ChatGPT was launched towards the end of 2022. So, there hasn't been enough time for extensive, long-term studies to collect meaningful data on its impact in education.

It's noteworthy that a significant portion of the research originates from Asian countries. This might be due to the early adoption of technology in these regions and their strong focus on educational research. Factors such as research funding availability and collaborations between universities could also influence this trend. However, it's important to mention that in some countries, the use of ChatGPT in educational settings has been prohibited.

Regarding the research methodology used in these studies, there's a predominance of theoretical articles compared to qualitative and quantitative studies. This might be because the development and implementation of artificial intelligence technologies in education, including ChatGPT, are still in relatively early stages. Thus, the exploration of possibilities and challenges is taking a primarily theoretical approach before moving on to empirical research.

**Q2: Benefits and Challenges of Implementing ChatGPT in the Classroom**

In today's ever-changing society, technology plays a fundamental role, especially in education. OpenAI's innovative tool, ChatGPT, is making a significant impact on the way educators and students approach learning in the classroom. Its implementation brings various benefits and challenges that educators and other educational stakeholders should consider to enhance the quality of education in classrooms.

ChatGPT offers numerous advantages for learning. It allows content and activities to be customized to each student's specific

 

needs, enhancing the effectiveness of teaching and learning. This personalization leads to increased student motivation and commitment, making ChatGPT a crucial educational support for improving the teaching and learning process. Furthermore, ChatGPT promotes collaboration among students by facilitating research and the development of communication and teamwork skills.

The tool is user-friendly and accessible for both teachers and students, ensuring easy integration into the classroom. It also enables teachers to focus on crucial aspects of teaching, such as personalized interaction and feedback, by providing support in generating content and activities.

However, for the effective implementation of ChatGPT, it's vital to provide appropriate training to teachers. They need to acquire the necessary technological knowledge to use this tool effectively in the educational environment. Teachers should not only learn how to use the technology but also understand its capabilities, limitations, and the associated ethical and pedagogical challenges. The implementation of ChatGPT should be approached thoughtfully to ensure a responsible classroom environment. It should not replace important skills, and precautions need to be taken to avoid academic misuse for dishonest or unethical purposes.

It's also worth noting that ChatGPT's knowledge is limited and hasn't been updated beyond 2021. As a result, its responses may not always be accurate or reliable, especially for specialized topics and recent events. This limitation can pose challenges for students who rely on ChatGPT for information in their learning process, and there's a phenomenon known as "hallucinations." Hallucinations refer to responses that sound plausible but are actually incorrect or nonsensical, which can be problematic in an educational context.

**Q3: Future Trends and Emerging Research Areas in ChatGPT in Education**

After conducting a bibliometric analysis using VOSviewer, three main research areas and emerging trends in the use of ChatGPT in education were identified.

Teacher's Role in AI-Driven Education: One research area focuses on the teacher's role in the educational environment driven by artificial intelligence. Teachers play a crucial role in improving educational practices and developing new teaching methodologies. ChatGPT serves as a valuable tool for educators, helping them design curricula, teaching materials, and assessment activities.

Impact and Use of AI in the Classroom: Another area of research concentrates on the impact and use of artificial intelligence (AI) in the classroom, generating significant interest among educators and pedagogical experts. AI, particularly ChatGPT, has the potential to enhance student academic performance and stimulate critical thinking. It provides quick and accurate answers to specific questions, offering access to relevant and up-to-date information, which benefits students in their inquiry and understanding of various subjects. Additionally, AI adapts to individual learning paces, enhancing student motivation and engagement while allowing educators to focus on interactive tasks and constructive feedback. However, ethical considerations and challenges, such as student data privacy and the reliability of AI responses, must be taken into account.

Impact of AI on Teaching and Learning Processes: The third research area revolves around the impact of AI on teaching and learning processes, taking into account factors like the socioeconomic, cultural, institutional, and technological environment. AI technologies, including ChatGPT, can help educational institutions manage and allocate learning resources intelligently, improve the utilization of educational resources, enhance education quality and efficiency, offer better learning services, and prepare students for future societal needs.

This overview of emerging research trends highlights the transformative potential of ChatGPT in education and underscores the importance of conducting further research to fully understand and maximize its impact.

## VI. Conclusions

The systematic literature review has shown that scientific research on the use of the ChatGPT tool in education is still scarce, as it turns out to be a novel tool launched in late 2022. The use of ChatGPT in education has emerged as an innovative and promising tool that seeks to enhance the learning experience and foster greater interaction between students and teachers. As its possibilities are investigated and understood, the use of ChatGPT in education reveals a significant potential to transform teaching and learning methods. In this sense, this artificial intelligence tool proves to be a motivating tool for students, by having to apply Information and Communication Technologies, and significantly improves students' academic performances, if it is used appropriately. However, it is essential to bear in mind that its use presents a series of challenges, which teachers must be aware of to avoid incorrect use. Along these lines, proper training of teachers and students can be effective to know how to use the application and avoid its misuse in the academic environment. With ethical implementation and proper supervision, this technology can open new educational possibilities and enrich the teaching and learning process.

In this sense, although artificial intelligence is not something new, the emergence of ChatGPT has generated debate in education, questioning aspects such as traditional tasks, methodology and evaluation. Therefore, it is important to continue researching the potential of these tools and their impact, considering didactic and scientific aspects, and promoting an ethical and responsible integration of artificial intelligence in education.

The main limitation of this review lies in the limited amount of literature included in the analysis. This is because, so far, not enough studies that address the specific use of ChatGPT in higher education institutions have been conducted. Educational technology, such as ChatGPT, is a constantly developing and evolving field, and its implementation in higher education may be relatively new and therefore less researched compared to other levels of education. Despite this limitation, the review provides an overview of how ChatGPT has influenced the university level. As more research is conducted and knowledge about the use of ChatGPT in higher education expands, it will be useful to expand the study to gain a more complete understanding of its impact and benefits at this specific educational level. In future studies, other databases such as ERIC or Dialnet, among others, could be included to ensure an exhaustive and comprehensive search for relevant studies.

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