

*Systematic Review*

# ChatGPT in Education: A Systematic Review on Opportunities, Challenges, and Future Directions

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**Abstract:** This study presents a systematic review on the integration of ChatGPT in education, examining its opportunities, challenges and future directions. Utilizing the PRISMA framework, the review analyzes 40 peer-reviewed studies published from 2020 to 2024. Opportunities identified include the potential for ChatGPT to foster individualized educational experiences, tailoring learning to meet the needs of individual students. Its capacity to automate grading and assessments is noted as a time-saving measure for educators, allowing them to focus on more interactive and engaging teaching methods. However, the study also addresses significant challenges associated with utilizing ChatGPT in educational contexts. Concerns regarding academic integrity are paramount, as students might misuse ChatGPT for cheating or plagiarism. Additionally, issues such as ChatGPT bias are highlighted, raising questions about the fairness and inclusivity of ChatGPT-generated content in educational materials. The necessity for ethical governance is emphasized, underscoring the importance of establishing clear policies to guide the responsible use of AI in education. The findings highlight several key trends regarding ChatGPT's role in enhancing personalized learning, automating assessments, and providing support to educators. The review concludes by stressing the importance of identifying best practices to optimize ChatGPT's effectiveness in teaching and learning environments. There is a clear need for future research focusing on adaptive ChatGPT regulation, which will be essential as educational stakeholders seek to understand and manage the long-term impacts of ChatGPT integration on pedagogy.

**Keywords:** ChatGPT in education; artificial intelligence; AI in pedagogy; AI-powered learning



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## 1. Introduction

The rapid advancement of artificial intelligence (AI) has significantly transformed various sectors, including education. Among AI-driven tools, chat generative pre-trained transformer (ChatGPT), developed by OpenAI, has gained prominence due to its ability to generate human-like text, assist in tutoring, content creation, and interactive discussions, and support students and educators in diverse learning environments [1] with significant benefits, including personalized learning, automated assessments, and administrative efficiency. However, its integration into education also raises concerns regarding academic integrity, data privacy, AI biases, and its long-term impact on pedagogy [2].

Although the governance and ethical implications of ChatGPT in education remain underexplored [3], some researchers argue that AI could enhance critical thinking and engagement, while others warn of plagiarism risks, misinformation, and the erosion of teacher authority [4]. Additionally, disparities exist in institutional AI consistency in its use across educational settings [5]. To address these complexities, this study conducts a systematic review using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework, evaluating ChatGPT's role in teaching, learning, governance, and policy challenges. By analyzing both its opportunities and risks, the study provides insights into best practices for responsible AI integration in education.

Despite its transformative potential, the integration of ChatGPT in education presents several critical challenges that require urgent attention. One of the most pressing concerns is that students increasingly rely on ChatGPT for assignments and assessments, raising risks of plagiarism and reduced critical thinking skills [6]. Educational institutions must establish clear guidelines to ensure AI is utilized as a learning aid rather than a substitute for independent intellectual engagement [7]. Another major challenge is bias and misinformation in AI-generated content. Since ChatGPT is trained on vast datasets, it can sometimes produce inaccurate, misleading, or biased responses, which may reinforce harmful stereotypes and misinform students [8]. To mitigate this risk, continuous refinement of AI models and AI literacy programs is necessary, equipping students with critical evaluation skills when engaging with AI-generated content [9]. Additionally, privacy and ethical concerns surrounding AI adoption in education remain significant. ChatGPT processes large amounts of user data, raising concerns about data security, student privacy, and compliance with regulatory frameworks [10]. However, the absence of standardized AI governance policies further complicates responsible AI integration in educational settings [11]. Addressing these issues requires the development of robust ethical guidelines and governance structures to ensure the safe, transparent, and equitable use of AI in education.

Furthermore, educators face difficulties in adapting to AI-driven teaching methodologies. While AI can automate administrative tasks, its effective classroom integration demands teacher training and institutional support. Without proper training, educators may struggle to leverage AI while maintaining pedagogical effectiveness. Research must explore how AI literacy and professional development programs can empower educators to maximize AI's benefits while mitigating its risks [12,13]. Moreover, to address these complexities, this study explores the following research questions:

- (1) How has ChatGPT been applied in education?
- (2) What are the major governance and policy challenges associated with its adoption?
- (3) What future research directions can optimize its effectiveness while ensuring ethical implementation?

By investigating these questions, this study aims to provide a comprehensive analysis of ChatGPT's role in education, offering insights into its applications, challenges, and future implications. The findings will contribute to ongoing discussions on responsible AI adoption in academic settings, guiding educators, policymakers, and researchers toward effective and ethical AI integration. Therefore, the main contributions of this work are summarized as follows:

- (1) **Comprehensive Analysis of ChatGPT in Education:** This study presents a systematic review of 40 peer-reviewed studies (2020–2024) using the PRISMA framework, offering a structured and evidence-based understanding of ChatGPT's applications in educational settings.
- (2) **Identification of Opportunities for Educational Enhancement:** The review highlights how ChatGPT can personalize learning, automate grading, and support educators, displaying its potential to enhance student engagement and optimize teaching efficiency.

- (3) **Critical Examination of Challenges:** It addresses major concerns such as academic integrity, AI bias, and the lack of inclusivity, contributing to a balanced understanding of both the benefits and risks of integrating ChatGPT into education.
- (4) **Call for Ethical Governance and Future Research:** The study emphasizes the need for ethical policy frameworks and future research on adaptive regulation and long-term pedagogical impact, guiding stakeholders in responsible AI adoption in education.

Finally, this paper is organized as follows: Section 1 provides an overview of ChatGPT, Section 2 discusses its applications in education, Section 3 outlines the systematic review methodology, Section 4 explores the identified opportunities and future directions, and Section 5 presents the conclusion along with recommendations for future research.

## 2. Methods and Materials

### 2.1. Inclusion and Exclusion Criteria

#### 2.1.1. Inclusion

Peer-reviewed journal articles, conference papers, and empirical studies focusing on ChatGPT's role in education and its governance were included. Studies on broader AI-related challenges in education, even if they do not focus exclusively on ChatGPT, were also included as shown in Table 1.

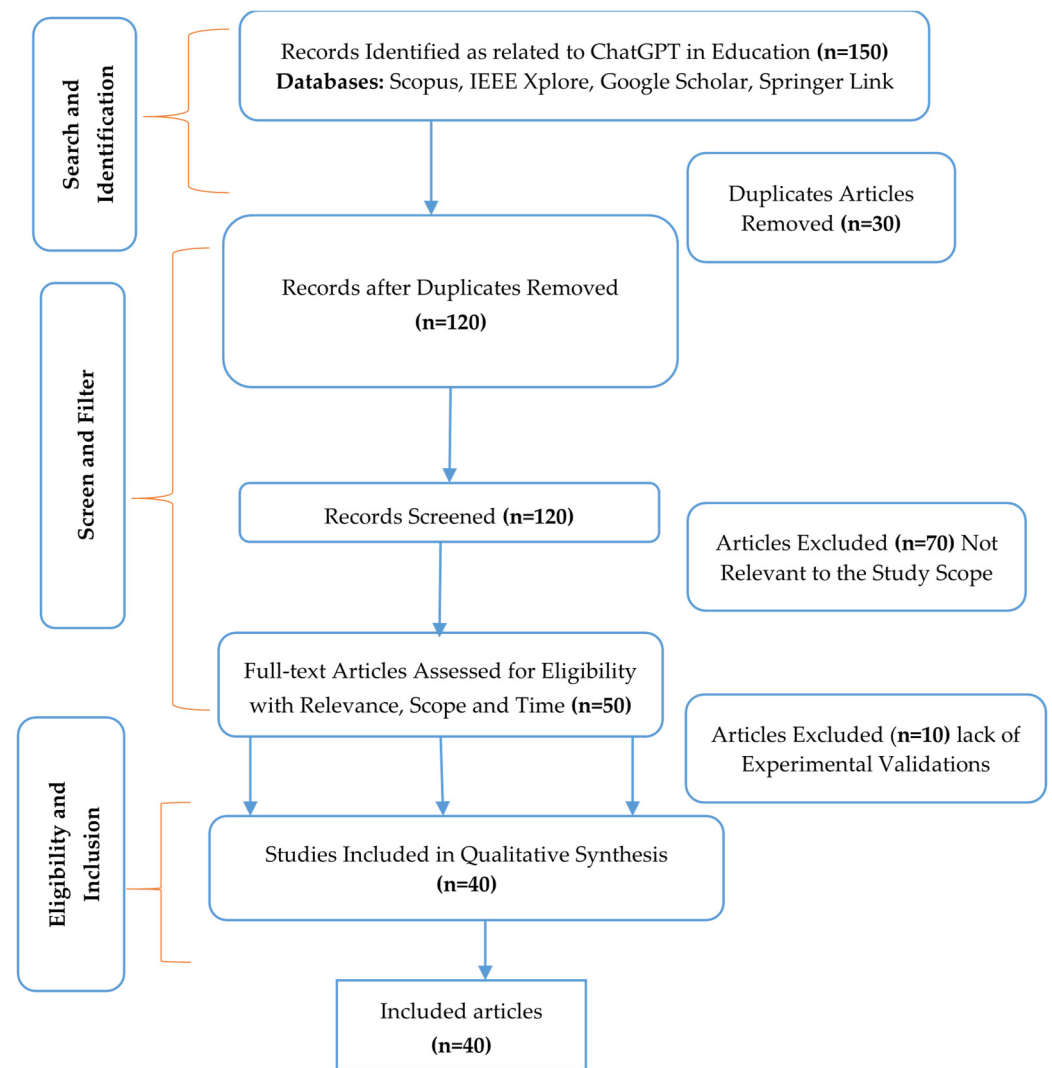
**Table 1.** Summary of inclusion and exclusion criteria.

Stage	Number of Studies	Criteria Applied
Identification	150	Initial search results from databases
Duplicate removal	20	Studies appearing multiple times in searches
Screening	130	Title and abstract reviewed for relevance
Exclusion (Abstract)	50	Not related to ChatGPT, general AI topics only
Full-Text Assessment	80	Studies with relevant research scope
Exclusion (Full-Text)	40	Missing methods, weak evidence, outdated sources
Final Inclusion	40	Studies that met all inclusion criteria

#### 2.1.2. Exclusion

Non-peer-reviewed articles, opinion pieces, and studies lacking empirical validation were excluded. Additionally, we reviewed research considering ethics, collaboration, and policy development in AI education, taking inspiration on systematic AI in education.

This study employs a systematic approach to reviewing the literature on the applications, potential, and challenges associated with ChatGPT in education. As shown in Figure 1, 40 papers were chosen from an initial pool of 150 studies gathered between 2020 and 2024 using Scopus, Web of Science, IEEE Xplore, Google Scholar, and Springer Link. The compilation of data from these 40 publications yielded 10 primary themes, including 15 benefits, 15 drawbacks and various opportunities and problems linked with ChatGPT's integration into teaching and learning.



**Figure 1.** Collection of articles using the PRISMA paradigm.

## 2.2. Source of Information

To ensure comprehensive literature coverage, multiple databases were used. The selected databases include Scopus, Web of Science, IEEE Xplore, Google Scholar, and Springer Link, which contain a wealth of peer-reviewed academic articles relevant to AI in education. This multi-database approach enhances the reliability and depth of the literature review as illustrated in Table 2.

**Table 2.** Criteria for paper selection.

Phase	Criteria	Papers Identified	Explanation for Search and Identification
Search and Identification	Use of multiple databases (Scopus, Web of Science, IEEE Xplore, Google Scholar, and Springer Link) with relevant keywords and Boolean operators	150	Initial search across selected databases targeting ChatGPT applications, opportunities, and challenges in education.
Screening	Studies published between 2020 and 2024, written in English, and peer-reviewed	120	Abstract screening and relevance check to ensure alignment with research focus.

Table 2. *Cont.*

Phase	Criteria	Papers Identified	Explanation for Search and Identification
Eligibility	Studies specifically discussing ChatGPT's applications, opportunities, and challenges in education	50	Detailed review of abstracts to filter studies most relevant to the research questions.
Inclusion	Studies with empirical data, theoretical discussions, and case studies on ChatGPT in education	40	Full-text review and thematic coding to finalize included studies.

### 2.3. Search Process

A systematic search strategy was employed to identify relevant research. This approach resulted in the collection of 150 papers using specific search strings targeting ChatGPT's applications, opportunities, and challenges in education. The search process involved

- Defining relevant keywords related to ChatGPT's role in education;
- Applying Boolean operators (e.g., AND, OR) to refine search queries;
- Implementing inclusion and exclusion criteria to filter the most relevant studies;
- Using reference management software to organize and manage selected articles.

### 2.4. Paper Selection Criteria

The study adhered to the PRISMA guidelines. The selection criteria included:

- Timeframe: Studies published between 2020 and 2024;
- Language: Only studies published in English were considered;
- Publication Type: Peer-reviewed journal articles and conference papers;
- Relevance: Articles focused on the applications, opportunities, and challenges of ChatGPT in education.

### 2.5. Selection Process

A multi-stage selection process was employed to filter the most relevant papers:

- Initial Screening: Abstracts were reviewed to assess relevance. Only studies discussing ChatGPT's role in education were considered.
- Full-Text Review: The selected papers (40 articles) were read in full to evaluate their contribution to the research questions.
- Coding Process: The review papers were analyzed using grounded theory coding, which included
  - Open Coding: Identifying key research themes, opportunities, and challenges.
  - Axial Coding: Categorizing themes into broader topics.
  - Selective Coding: Synthesizing the most critical findings.

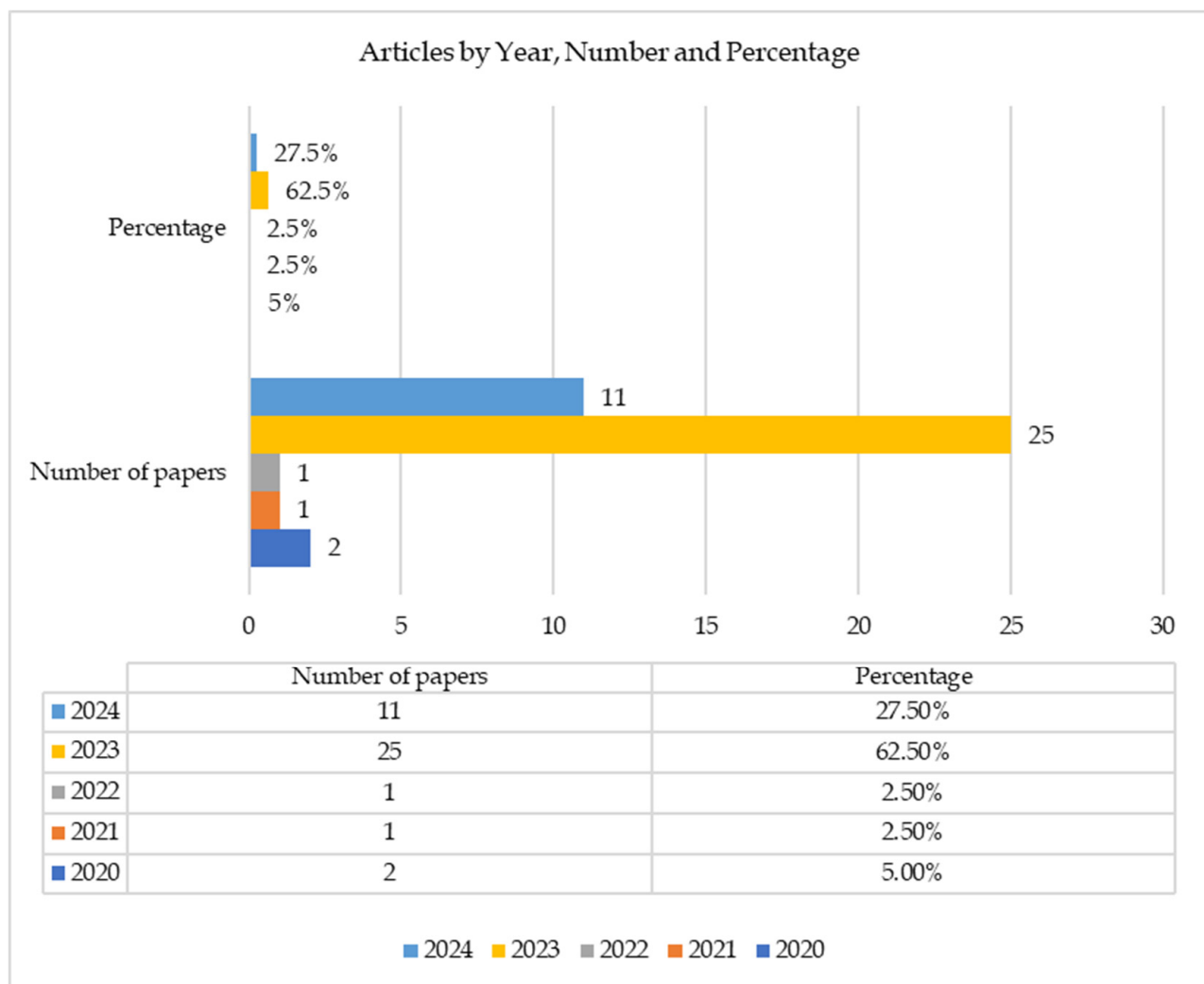
### 2.6. PRISMA Flowchart

The selection process for this systematic review follows the PRISMA guidelines, as illustrated in the flowchart in Figure 1. This study systematically selected and reviewed research papers published from 2020 to 2024. The data included search terms such as ChatGPT in education, ChatGPT opportunities, ChatGPT governance in education, ChatGPT and teacher workload, and ethical concerns in ChatGPT-driven education.

### 2.7. Distribution of Articles Used in Systematic Review

The majority of relevant studies were published between 2023 and 2024, reflecting the growing interest in ChatGPT's role in education. These findings align with related

works, emphasizing recent AI advancements and their educational implications. This study follows a systematic review approach to analyze the applications, benefits, challenges, and future directions of ChatGPT in education. As illustrated in Figure 1, 150 studies published between 2020 and 2024 were initially collected. After applying inclusion and exclusion criteria, 40 relevant papers were selected for in-depth analysis. Furthermore, Figure 2 presents the distribution of selected papers by publication year, highlighting the percentage of studies included in our systematic review. This visualization provides insights into the temporal trends in research on the topic, highlighting the evolution of scholarly interest and contributions over time. This shows that over 90% of the references are from 2023 and 2024, indicating that this study is supported by recent and relevant research.



**Figure 2.** Yearly published articles used for systematic review in percent.

Moreover, as illustrated in Figure 3, an extensive search was conducted across multiple academic databases to identify relevant articles for our systematic review. Various databases were explored to ensure comprehensive coverage of the topic, and the selection of the most relevant sources is highlighted in the figure. This rigorous search strategy aimed to include high-quality, peer-reviewed studies that contribute valuable insights to our research.



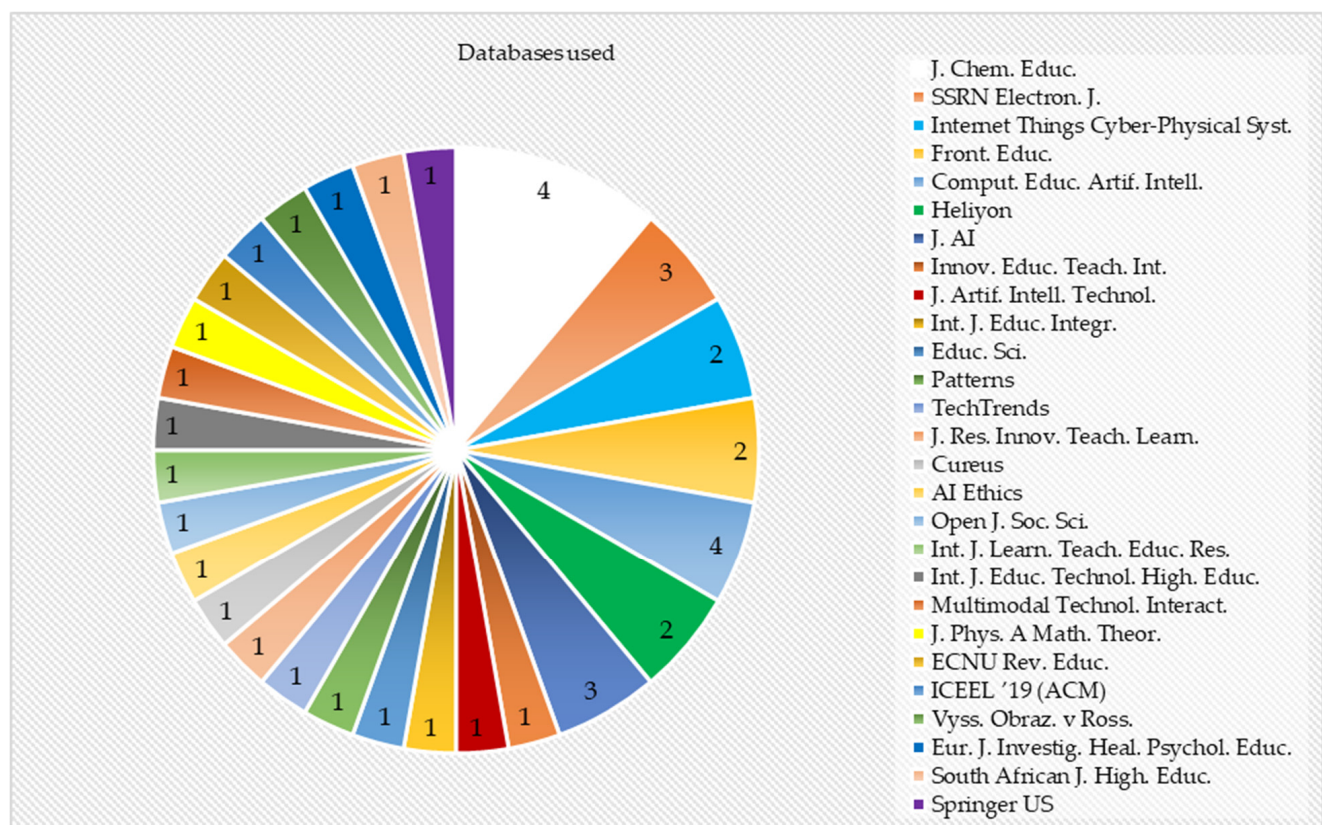


Figure 3. Selected databases for paper selection.

### 3. Related Works

Table 3 is a key component of our study, providing a systematic overview of the selected sample and relevant articles reviewed. This table includes essential details such as the reference list, year of publication, models employed, datasets utilized, methodological approaches, performance metrics, study objectives, key findings, strengths, and limitations of each study. By systematically organizing this information, Table 3 facilitates a clearer understanding of existing research, enabling comparisons across studies and identifying research gaps that our work aims to address.

Table 3. Summary of related articles reviewed.

Ref.	Year	Methods	Dataset	Findings	Limitations
[1]	2024	SWOT Analysis	Not specified	ChatGPT uses a sophisticated natural language model to generate plausible answers, with self-improving capability, and provides personalized and real-time responses. Increases access to information, facilitates complex learning, and decreases teaching workload.	Lack of deep understanding, difficulty in evaluating the quality of responses, a risk of bias and discrimination, and lack of higher-order thinking skills.
[2]	2023	Descriptive Analysis	Not specified	ChatGPT, as a language processing tool, can answer user questions, complete tasks, and continuously optimize performance. It holds great potential for promoting educational transformation and school education reform.	Issues include the accuracy of answering questions, data pollution, ethical and safety concerns, and the risk of knowledge plagiarism.

Table 3. Cont.

Ref.	Year	Methods	Dataset	Findings	Limitations
[3]	2024	Empirical Study	30 theory-based and application-based ChatGPT tests	ChatGPT provides a platform for students to seek answers to theory-based questions and generate ideas for application-based questions and allows instructors to integrate technology in classrooms. It can replace search engines by providing accurate and reliable input to students.	ChatGPT may lead to unethical use by students, contributing to human unintelligence and unlearning. It presents challenges for instructors in differentiating between students who rely on automation and those who do not, and measuring learning outcomes.
[4]	2024	Online Survey	201 HE students in Peru	Perceived Ethics (B = 0.856) and Student Concerns (B = 0.802). Findings suggest that students' knowledge and positive attitudes toward ChatGPT do not guarantee its effective adoption and use. The dependence on ChatGPT raises ethical concerns.	No differences found between sex and age in the relationship between the use of ChatGPT and perceived ethics. Further studies with diverse HE samples needed.
[5]	2023	Literature Review	Not specified	ChatGPT has demonstrated remarkable proficiency, including passing the US bar law exam, and quickly gained over a million subscribers. It can generate humanlike text and facilitate automated conversations.	Mixed reactions in education—some educators view it as a progressive step, while others are concerned it may reduce analytical skills and promote misconduct. Concerns regarding its widespread use and opacity remain within the scientific community.
[6]	2023	Ethical Reflection and Argumentation	Personal experience, academic policy review	The paper presents a perspective on how students could defend their use of ChatGPT in academic settings, arguing that AI is a tool and not a person, and thus does not require attribution. The author suggests that the use of AI like ChatGPT might not constitute cheating or plagiarism, as long as the process aligns with educational goals and standards.	The need for universities to adjust academic dishonesty definitions to address AI use, but also to avoid automatic reactions like banning AI. The author suggests that defining cheating to include AI use only when prohibited by the instructor would offer more flexibility. However, a change in academic policy might not universally resolve ethical concerns.
[7]	2024	Systematic Literature Review (SLR)	44 peer-reviewed articles	ChatGPT can assist with teaching support, task automation, and professional development. Student Uses: 24/7 support, explaining difficult concepts, acting as a conversational partner, providing personalized feedback and materials, offering writing support, self-assessment, facilitating engagement, and promoting self-determination.	Inaccuracies and hallucinations, potential bias, tool limitations, plagiarism, cheating, privacy issues, and the spread of false information. These issues highlight the challenges of using ChatGPT effectively in education.
[8]	2023	Case Study (Activity-based)	Georgia Gwinnett College (GGC) students in introductory chemistry courses	ChatGPT-based activity led to improvements in students' confidence to ask insightful questions, analyze information, and comprehend complex concepts. Students reported that ChatGPT provided diverse perspectives and challenged their current thinking. They were also willing to recommend it to others.	Low-quality student comments, difficulties in validating information sources.



Table 3. Cont.

Ref.	Year	Methods	Dataset	Findings	Limitations
[9]	2024	Qualitative Evaluation	Insights from leading academics, scientists, and engineers	ChatGPT can help educators by creating instructional content, offering suggestions, acting as an online educator, and promoting group work. It performs differently across subjects (finance, coding, math, general queries) and can transform education through smartphones and IoT gadgets.	Possibility of producing inaccurate or false data, circumventing plagiarism detectors, and incorrect outputs, which limit its overall benefit in some educational contexts.
[10]	2024	SLR	51 articles from Scopus, ERIC, Google Scholar (2022–2023)	Data extracted from 51 studies revealed 32 topics including 13 strengths, 10 weaknesses, 5 opportunities, and 4 threats of using ChatGPT in teaching and learning. The study applied Biggs’s Presage–Process–Product (3P) model to categorize these topics. The results highlight how ChatGPT interacts with student characteristics and teaching contexts, how it affects teaching and learning activities, and how it contributes to student learning outcomes.	The study does not mention specific limitations, but as a systematic review, it may have limitations in terms of the quality and scope of selected studies. The included articles’ methodologies and focus areas could influence the synthesis of data.
[11]	2023	SLR	PubMed, IEEE Xplore, Google Scholar (peer-reviewed articles, prominent media outlets, English publications)	AI chatbots like ChatGPT have potential benefits in Higher Education Institutions (HEIs), such as research support, automated grading, and improved human–computer interaction. It also offers applications in enrollment, student services, teaching enhancements, research aid, and student retention. However, risks include plagiarism, online testing security concerns, privacy breaches, misuse, bias, and decreased human interaction.	Incomplete representation of AI’s overall effect on education, lack of concrete guidelines for integration, and focus only on selected peer-reviewed and media-based sources.
[12]	2023	Comprehensive Review	Literature review on ChatGPT and its applications in various industries	ChatGPT has applications in customer service, healthcare, education, and scientific research. It aids in data processing, hypothesis generation, collaboration, and public outreach. The study also highlights critical challenges, including ethical concerns, data biases, safety issues, and the need for integration with other technologies. ChatGPT has gained significant attention from academia, research, and industries.	Ethical concerns, data biases, and safety issues related to ChatGPT’s use. Challenges in balancing AI-assisted innovation with human expertise. Potential biases in AI and limitations in current understanding of its impact.
[13]	2023	Commentary	Not Shown	The launch of ChatGPT has sparked concerns regarding student assessment. GAI systems can benefit students, faculty, and administrators in teaching, learning, research, and professional activities. The article explores potential benefits and risks, including equity and accessibility concerns.	Potential challenges regarding assessment and ethical issues in the use of GAI systems. Equity and accessibility concerns need to be addressed.

Table 3. Cont.

Ref.	Year	Methods	Dataset	Findings	Limitations
[14]	2023	Review and Commentary	Not Shown	LLMs like ChatGPT have significant potential to enhance education by improving grading, feedback, language learning, and personalized instruction. However, they also raise ethical concerns like bias, academic integrity issues (e.g., plagiarism), and lack of transparency in the underlying models. Academic institutions have had varying responses, with some banning and others encouraging LLM usage.	Ethical concerns (e.g., bias, plagiarism), lack of transparency in LLM models, and challenges in detecting AI-generated content. AI systems lack human interaction and cannot fully understand or contextualize information, limiting their effectiveness.
[15]	2023	Pre-test and online survey	225 responses from primary and secondary education teachers	Perceived ease of use and perceived usefulness lead to greater acceptance of chatbots. Teachers are more likely to accept chatbots with formal language. Results provide insights into chatbot design and communication decisions to enhance acceptance in the educational community.	Limited to primary and secondary education teachers; does not account for other factors influencing chatbots acceptance beyond age and digital skills.
[16]	2023	Analysis of course evaluation data	Physical Chemistry I and II courses at two institutions	Students had a positive response to oral exams, finding them valuable despite challenges like stress, anxiety, and the depth of understanding required. Students adjusted study habits (e.g., group study, verbal practice) and recognized the value of communication and teamwork for their future careers. Instructors valued oral exams, though concerns about time commitment, validity, reliability, and fairness persisted.	Study focused on two institutions, limited to Physical Chemistry courses; concerns about time, validity, reliability, and fairness were not fully resolved.
[17]	2024	Narrative review and qualitative synthesis	40 peer-reviewed empirical studies	The adoption of ChatGPT in higher education is influenced by factors such as hedonic motivation, usability, perceived benefits, system responsiveness, and relative advantage. Social influence, facilitating conditions, privacy, and security have varying effects. Technology readiness and extrinsic motivation not consistently confirmed as predictors. The study highlights the need for deeper exploration of contextual and psychological factors.	The review primarily synthesizes empirical studies and does not provide new primary data. It focuses on higher education, which may not be generalizable to other sectors.
[18]	2023	Study and evaluation of ChatGPT-generated responses	Two chemistry-focused modules in a pharmaceutical science program (Year 1 and Year 2)	ChatGPT-generated responses were successful for knowledge-based questions (e.g., “describe” and “discuss” verbs) but faced limitations in answering application-based and interpretation questions involving no text information. ChatGPT not considered a high-risk tool for cheating but expected to prompt discussions on academic integrity and assessment design in education.	The study focuses on specific chemistry modules in a pharmaceutical science program, which may not generalize to other disciplines. Further, it primarily evaluates response quality without exploring broader applications or potential consequences.

Table 3. Cont.

Ref.	Year	Methods	Dataset	Findings	Limitations
[19]	2020	SLR and meta-analysis	Various studies related to environmental science and ecosystem services	The paper introduces the PSALSAR method, an enhanced version of the traditional SALSA framework for conducting systematic literature reviews (SLRs) and meta-analysis. This method includes six steps: Protocol, Search, Appraisal, Synthesis, Analysis, and Reporting. It is transferable, reproducible, and applicable for assessing both quantitative and qualitative content in literature reviews, particularly in ecosystem services.	The methodology focuses on environmental science and ecosystem services, limiting its application to other disciplines. It is not clear if the methodology addresses challenges in broader or interdisciplinary fields.
[20]	2023	Literature review and thematic analysis	1 papers from the “Computers & Education: Artificial Intelligence” Special Issue	The Special Issue discusses seven main themes regarding the integration of AI in education: (1) intersection between AI and humans, (2) challenges and opportunities in AI for assessment, (3) explainability of AI, (4) design principles for AI-driven systems, (5) development of new theories of learning, (6) predictions and their role in education, and (7) AI applications in classrooms. It emphasizes challenges like ethics, bias, AI literacy, data sources, and policy development.	The studies may focus more on theoretical frameworks and policy discussions rather than providing concrete, actionable insights or empirical data on AI’s practical implementation in diverse educational contexts.
[21]	2023	Commentary and opinion piece	Discussions in academic settings and media	ChatGPT has gained significant attention in academia due to its ability to assist in academic writing. Concerns exist regarding academic integrity, as students may misuse the tool for cheating. However, tools like Turnitin are developed to counteract such cheating. Despite risks, AI will be integrated into higher education with new policies and adaptation strategies. The academic community remains resilient, much like past technological adaptations (e.g., computer use in teaching).	The discussion primarily presents speculative views on the future of AI in academia without offering conclusive evidence or studies to support the opinions. Additionally, it does not delve deeply into the full range of potential ethical issues or institutional responses.
[22]	2023	Narrative literature review and SWOT analysis	Scholarly articles and reports on ChatGPT integration in nursing education	The review identifies strengths (accessibility, consistency, adaptability, cost-effectiveness, staying up-to-date), weaknesses, opportunities, and threats associated with ChatGPT in nursing education. It emphasizes the need for responsible use and collaboration among educators, policymakers, and AI developers to enhance learning outcomes.	The study only provides a SWOT analysis and literature review, without empirical data or direct case studies to validate the integration of ChatGPT in real-world nursing education contexts.
[23]	2022	Conceptual paper with a review of AI applications in education	Educational resources from MIT Media Lab and Code.org	The paper identifies the potential benefits of AI in K-12 education, such as personalized learning, automated assessments, and behavioral insights. It also highlights the ethical challenges of AI in education, emphasizing the need for ethical considerations in integrating AI. Recommendations for instructional resources provided to help educators teach AI concepts and ethics.	The paper does not provide empirical data or case studies on the real-world implementation of AI in K-12 classrooms. It primarily focuses on theoretical concepts and ethical considerations.

Table 3. Cont.

Ref.	Year	Methods	Dataset	Findings	Limitations
[24]	2023	Narrative review, thematic analysis	40 peer-reviewed empirical studies	The review identifies key factors influencing ChatGPT adoption in higher education, including hedonic motivation, usability, perceived benefits, and system responsiveness. It emphasizes the need for deeper exploration of contextual and psychological factors beyond traditional technology adoption models.	The review focuses on existing literature, and its findings based on qualitative synthesis. It does not present new empirical data or experimental findings.
[25]	2023	Literature review, historical analysis	Open AI's ChatGPT, the literature on AI history and uses in education	The paper outlines the rapid success of ChatGPT and generative AI (GAI) technologies, examining their advantages and disadvantages, particularly regarding human agency versus machine agency. It discusses strategies to avoid current problems and emphasizes how humans can maintain autonomy while using GAI. The paper proposes revised “Laws of Generative Artificial Intelligence” to guide education in the GAI era.	The paper does not provide new empirical data but offers a conceptual and historical analysis, which may limit its applicability to practical scenarios without further research.
[26]	2023	SLR	Multiple journal databases, filtered by specific criteria	ChatGPT has the potential to enhance both academic and librarian-related processes in higher education. However, it raises ethical concerns and challenges related to critical thinking development. The study highlights the importance of the responsible use of ChatGPT and the need for further assessment of its use in academic contexts.	The study relies solely on existing literature and may not capture real-time developments or practical applications. Additionally, the SLR methodology may introduce selection biases based on included articles.
[27]	2021	Extensive literature review	67 relevant studies selected from various academic databases	AI chatbots in education offer significant benefits, such as providing homework and study assistance, creating personalized learning experiences, and supporting skill development. Educators benefit from time-saving assistance and improved pedagogy. However, challenges such as concerns about reliability, accuracy, and ethical issues are highlighted.	Based on selected studies and may not account for emerging issues or practical applications. Limited by the predefined criteria used for selecting the studies.
[28]	2023	Systematic review	53 articles from recognized digital databases	The study provides a comprehensive understanding of previous research on the use of chatbots in education. It identifies the benefits and challenges of chatbots technology, as well as future research areas for its implementation in education.	It is based on recognized databases and could miss emerging or less mainstream research.
[29]	2023	SLR using the PRISMA framework	Journal articles from Scopus (published in English in the last five years)	The review investigates the support chatbots provide to educational institutions and students, emphasizing their roles as teaching assistants, their capabilities, and usage recommendations. It also identifies students’ desires and challenges in chatbots use.	The review is limited to articles published in English and available in Scopus, using a general search query and only focusing on the last five years of research.
[30]	2023	Exploratory study, literature synthesis	Recent literature on ChatGPT in education	ChatGPT promotes personalized and interactive learning and aids in generating formative assessment prompts with ongoing feedback, but also generates wrong information, biases, and privacy issues. The study recommends leveraging ChatGPT to maximize its benefits.	Potential drawbacks include ChatGPT generating wrong information, biases in data training, and privacy concerns.

Table 3. Cont.

Ref.	Year	Methods	Dataset	Findings	Limitations
[31]	2023	Critical analysis, literature review	Research on OpenAI, ChatGPT, and education in developing economies	ChatGPT presents significant opportunities for advancement in education, particularly in developing economies, but also has potential drawbacks.	The study primarily focuses on understanding the technology's impact, but may not fully capture the real-world challenges in the implementation of such technologies.
[32]	2020	Theoretical framework (IDEE), exploration of benefits and challenges	Research on ChatGPT, GPT-4, and educative AI in education	Benefits include personalized learning, efficient feedback, and more, but challenges include untested effectiveness, data limitations, and ethical concerns.	Uncertainty about the effectiveness of the technology, and ethical/safety concerns need further exploration.
[33]	2023	Exploratory study, literature synthesis	Recent extant literature on ChatGPT in education	ChatGPT promotes personalized learning, interactive learning, and formative assessment generation. It helps inform teaching but has limitations like wrong information, biases, and privacy issues.	ChatGPT generates incorrect information, biases in training data, privacy concerns, and potential bias amplification.
[34]	2024	Pilot study, case study approach	Three chatbot prototypes under development at Warwick Manufacturing Group, University of Warwick	Chatbots show potential in educational simulation, software training, and helpdesk support. The prototypes aimed to support a Master's simulation game, software training, and department helpdesk requests.	Limited to university setting, and specific focus on technical challenges and AI chatbot development in educational contexts.
[35]	2024	Quantitative, descriptive research	143 students from two public universities in Islamabad	Most students agreed on the benefits of AI tools for academics. However, concerns about academic integrity, regulations, privacy, cognitive biases, gender and diversity, accessibility, and commercialization raised.	Focused only on students from two universities in Islamabad, which may limit the generalizability of results.
[36]	2023	Quantitative research (survey), Structural Equation Modeling (SEM)	520 students from a public university in Saudi Arabia (SA)	Significant direct effects of performance expectancy (PE), social influence (SI), and effort expectancy (EE) on behavioral intention (BI) and actual use of ChatGPT. Partial mediation of BI between PE, SI, FC, and actual use. Full mediation of BI between EE and actual use. FCs had no significant effect.	Limited to one university in Saudi Arabia and did not consider external resources and support for ChatGPT use.
[37]	2023	Quantitative research (survey), SEM	458 participants (students) using ChatGPT for smart education systems	Perceived ease of use and perceived usefulness were significant predictors of users' attitudes towards ChatGPT. Feedback quality, assessment quality, and subject norms positively influenced users' behavioral intentions. Positive attitudes and intentions led to actual adoption.	Some hypotheses, such as the relationship between trust in ChatGPT and perceived usefulness, not supported by the data.
[38]	2023	Systematic literature review (PRISMA framework)	550 articles (collected between December 2022 and May 2023), final 30 articles selected	ChatGPT seen as a tool with both opportunities and challenges in academic writing. It helps learners and instructors but requires updated training, policies, and assessments to address issues like plagiarism and AI-generated content.	Limited to 30 articles selected from 550, which may not cover all perspectives or studies; challenges in addressing AI's impact on assessment methods and integrity.



Table 3. *Cont.*

Ref.	Year	Methods	Dataset	Findings	Limitations
[39]	2024	Qualitative study	Views of three established professors in South Africa	Professors welcome the use of AI technologies like ChatGPT and emphasize the importance of teaching students how to engage with such tools. The responsibility lies with lecturers and universities to create an environment conducive to integrating these technologies into teaching and learning, especially in assessment.	Limited to the views of three professors in South Africa; may not represent a broader perspective.
[40]	2023	Systematic review	36 papers on chatbot–learner interaction design	Chatbots were mainly used on web platforms, primarily teaching computer science, language, and general education, with some used for engineering and mathematics. Most chatbots acted as teaching agents, with more than a third as peer agents. More than a quarter of chatbots employed personalized learning approaches. Chatbots evaluations show improved learning and satisfaction.	Insufficient dataset training, lack of reliance on usability heuristics, and challenges in chatbots’ personality and localization.

#### 4. Opportunities of ChatGPT in Education

The advancement ChatGPT technology in recent years has had a considerable impact on a variety of fields, including research and education. ChatGPT, a powerful massive language model developed by OpenAI, is an example of such technology. Personalized feedback, increased accessibility, interactive discussions, lesson preparation, evaluation, and novel approaches to teaching difficult concepts are just a few of the exciting opportunities that this technology provides for both students and teachers. Furthermore, the incorporation of ChatGPT into education provides several chances to improve teaching and learning experiences. AI-powered solutions such as ChatGPT provide a variety of benefits, including individualized learning, automated content development, real-time student help, and increased engagement.

This section delves into significant opportunities for exploiting ChatGPT for education. However, ChatGPT poses a variety of threats to the traditional educational and research systems, including the possibility of online exam cheating, text generation that resembles that of a person, a reduction in critical thinking abilities, and difficulties in interpreting data generated by ChatGPT [23]. According to [24], ChatGPT is used as a teaching and learning tool. Additionally, instructors and students enrolled in composition, business writing, and communication courses can use ChatGPT’s features. It also used to provide recommendations. Moreover, ChatGPT is applicable in the classroom [25] to students, who can build study materials and assignment content with ChatGPT’s assistance, and instructors can receive assistance from ChatGPT with administrative and research support tasks. Ultimately, the following are some of ChatGPT’s major roles and opportunities for its integration into educational strategies.

##### 4.1. Personalized Learning and Adaptive Education

ChatGPT can enhance learning through boosting productivity and engagement by providing personalized training and automated grading. In education, personalization is the process of adjusting curriculum, pedagogy, and learning settings to each student’s needs and goals. This has historically been a resource-intensive procedure that is frequently constrained by practical and logistical issues. However, these restrictions have lessened in the new era of individualized learning ushered in by AI technologies like ChatGPT [26].

Because of its capacity to process and produce language-based content, ChatGPT is a perfect tool for developing personalized educational resources and experiences. This could be achieved by utilizing the natural language processing skills of the model to comprehend the student's learning needs and tailor the instruction accordingly. Using ChatGPT to create practice questions specifically tailored to the student is one method to accomplish this [27]. ChatGPT enables personalized learning by adapting to individual student needs, offering customized feedback, and providing tailored study materials [32]. AI-driven tutoring can support students at different learning paces, ensuring a more inclusive and effective learning environment [33].

#### *4.2. Interactive Tutoring*

As a personal tutor, ChatGPT can offer students immediate answers, explanations, and extra materials catered to their individual needs and learning style. This is especially helpful in large classrooms when teachers may not be able to provide each student the individualized attention they need [27]. Through interactive coaching, ChatGPT serves as a personalized instructor to assist users in gradually learning and mastering ideas. Interactive tutoring has essential elements such as guided learning objectives, question-based engagement, feedback and clarification, a supportive and adaptive approach, and a personalized learning pace [28].

#### *4.3. Automated Content Creation and Assessment*

Creating content with ChatGPT means using ChatGPT to generate content that not only informs readers but also engages them. This is accomplished by adding components that make the content feel more relevant and pleasurable, such as dynamic question-and-answer forms, relatable examples, interactive storytelling, and personalization [29]. Engaging content creation is ideal for narratives, blog writing, social media posts, instructional materials, and more any scenario where maintaining clarity and capturing attention are essential [30]. Educators can use ChatGPT to generate lesson plans, quizzes, and assessments, reducing workload and allowing them to focus on student engagement [34]. Automated grading and feedback mechanisms improve efficiency and provide instant evaluation [35].

#### *4.4. Teacher and Student Support*

There are several educational advantages to generative artificial intelligence (GAI), especially when it comes to large language models like ChatGPT, which improve accessibility and learning. Lesson planning and resources, the ability to explain complex concepts, assessment and feedback creation, and engagement strategies are just a few of the many benefits ChatGPT offers teachers. While ChatGPT offers students homework and study support, concept reinforcement, skill development, encouragement, and confidence building, the flexibility, speed, and encouraging attitude to instruction with ChatGPT are beneficial to both educators and learners. ChatGPT's teacher and student assistance entails providing tools, resources, and advice specific to teachers and students in order to facilitate instruction and improve the educational process [28].

#### *4.5. Enhancing Collaborative Learning*

By encouraging deeper understanding and enhancing students' communication skills, [25] examines the substantial prospects by reorienting students' attention from memorization to conceptual comprehension. Collaborative learning is the process of using ChatGPT's AI as a facilitator or participant in tasks that promote user cooperation and shared learning. By organizing, guiding, and facilitating collaborative efforts, ChatGPT can help make group learning activities more effective and well structured, leading to enhanced engagement, direction, clarity, and skill development as a result [28]. ChatGPT fosters

interactive learning through AI-powered discussions, simulations, and problem-solving exercises [36]. Students can use AI-driven platforms to explore concepts in a more engaging and participatory manner, promoting active learning [37].

#### *4.6. Writing Codes and Assignments*

According to the study in [30], ChatGPT can produce coherent answers to assignments and knowledge-based coding tasks. Writing codes and assignments in ChatGPT means using the AI to assist with coding exercises, programming tasks, and academic assignments spanning a range of topics. ChatGPT may assist professionals, instructors, and students in organizing and completing writing assignments in addition to assisting them in creating, debugging, and understanding code. For coding, creating code, fixing and debugging errors, optimizing code, elucidating concepts, testing, and documentation can be achieved [31].

#### *4.7. Bridging Educational Gaps and Accessibility*

AI-powered learning tools like ChatGPT can address educational disparities by providing access to learning resources for underserved communities [38]. ChatGPT can also support learners with disabilities through speech-to-text, language translation, and accessibility-friendly interfaces [39].

#### *4.8. Support for Educators and Professional Development*

Teachers can use ChatGPT for professional development, accessing AI-driven insights on curriculum design, student performance analytics, and innovative teaching strategies [40]. The ability to automate administrative tasks also allows educators to focus on personalized instruction and mentorship [41].

#### *4.9. AI-Powered Learning and Student Engagement*

AI-powered educational tools, including ChatGPT, are shown to enhance student engagement by offering personalized learning experiences. According to [42], adaptive learning systems powered by AI can cater to individual learning needs by providing customized feedback and generating dynamic learning materials. Similarly, according to [43] highlights that ChatGPT fosters interactive learning by facilitating discussions and enabling real-time question answering. By leveraging these opportunities, ChatGPT can transform education by fostering innovation, improving learning accessibility, and enhancing engagement while ensuring ethical and responsible AI integration.

Generally, ChatGPT offers transformative potential in education by enabling personalized learning, automated content creation, and interactive tutoring, while supporting teachers with lesson planning and administrative tasks. It enhances accessibility for underserved communities and learners with disabilities through features like speech-to-text and multilingual support. However, challenges such as academic integrity risks, algorithmic bias, data privacy concerns, and over-reliance on AI must be addressed through ethical governance, teacher training, and structured integration. Balancing innovation with responsible use is key to harnessing ChatGPT's benefits without compromising critical thinking or equity in education.

## **5. Challenges of Using ChatGPT in Education**

### *5.1. Integration of ChatGPT and Academic Integrity*

While AI offers numerous advantages, questions about academic integrity remain. The study in [44] explains how ChatGPT is used for plagiarism and unauthorized aid in tasks, posing ethical implications for educators. The work in [45] emphasizes the importance

of combining AI detection methods with ethical principles to address these concerns. Furthermore, the study in [46] recommends embedding AI literacy training into curricula to teach students about safe ChatGPT usage.

### *5.2. ChatGPT and Teacher Workload*

ChatGPT is promoted as a tool to reduce teacher workload by automating administrative tasks such as grading and lesson planning. However, the study in [47] argues that AI adoption may paradoxically increase teacher responsibilities, as educators must verify AI-generated content and guide students in its ethical use. The study in [22] calls for structured AI training programs to help teachers effectively integrate AI tools in classrooms.

### *5.3. Bias and Ethical Considerations in ChatGPT Models*

A critical challenge in AI adoption is the inherent bias in AI-generated content. The authors of [44] highlight that AI models including ChatGPT are trained on vast datasets that may contain cultural, gender, and ideological biases. The authors of [45] stress the importance of refining AI models to ensure fairness and accuracy. Additionally, the work [20] discusses data privacy concerns, emphasizing the need for stringent AI governance policies to protect student information.

### *5.4. Lack of Self-Reflection*

The AI tool ChatGPT has sparked debate over its potential impact on education. The disadvantages include a lack of in-depth information, difficulty evaluating the quality of responses, the risk of prejudice and discrimination, and a lack of higher-order cognitive ability. Challenges to education include a lack of context awareness, challenges to plagiarism, the maintenance of educational inequity, and loss of higher-order cognitive capacities [21]. Writing a self-reflection in ChatGPT implies using the AI to help you articulate your ideas, perceptions, and individual learning experiences, yet choosing not to write a self-reflection means addressing the project without ChatGPT directly producing the text.

### *5.5. Lack of Non-Text-Based Responses*

ChatGPT's capacity to handle advanced, non-textual queries limits its effectiveness in science, technology, engineering, and mathematics (STEM) fields that need complicated data handling. ChatGPT can tackle intellectually challenging activities, implying that instructors should reconsider assessment design to include problem-solving tasks that AI cannot readily perform. However, it has difficulty with more sophisticated activities that require analysis, interpretation, or non-textual answers, such as drawing structures or producing graphs [23].

### *5.6. Does Not Make Predictions About Future Events*

ChatGPT is reluctant to make precise predictions or assumptions about the future, especially when it comes to ambiguous events or outcomes. Rather than making a firm prediction, it can talk about trends, possibilities, or scenarios based on past patterns or current knowledge [48].

### *5.7. Academic Dishonesty*

Any behavior that provides an unfair academic advantage or falsifies one's own work, knowledge, or abilities in a learning environment is considered academic dishonesty. This includes behaviors that lead to plagiarism, cheating, and lying about one's work or accomplishments. Because of inaccuracies and a tendency to rely only on artificial intelligence, ChatGPT in education poses risks to academic integrity and critical thinking [49]. Finally, the ethical framework that is used is based on striking a balance between the usage of

new technology and societal welfare. However, questions of dependency, ethical use, and even abuse arise, emphasizing the importance of carefully considering its consequences on academic dishonesty [50].

Therefore, the integration of ChatGPT in education presents significant challenges to academic integrity, as it facilitates plagiarism and unauthorized aid, necessitating robust detection tools and AI literacy programs [44–46]. While it promises to reduce teacher workload through automation, it paradoxically increases responsibilities by requiring educators to verify AI-generated content and guide ethical usage [22,47]. Ethical concerns are further compounded by bias in AI outputs and data privacy risks, demanding stringent governance policies to ensure fairness and security [20,44,45]. Additionally, ChatGPT’s limitations—such as its inability to produce self-reflective or non-textual responses (e.g., STEM visualizations) and its avoidance of future predictions—restrict its applicability in higher-order cognitive tasks and complex disciplines [21,23,48]. These shortcomings, combined with risks of academic dishonesty and over-reliance, underscore the need for balance policies that leverage ChatGPT’s benefits while safeguarding educational integrity and fostering critical thinking [49,50]. A holistic approach, combining teacher training, ethical guidelines, and adaptive assessments, is essential to mitigate these challenges and ensure responsible AI integration in academia.

## 6. Result and Analysis

### 6.1. Application of ChatGPT in Education

In response to research question 1, the findings indicate that ChatGPT has been widely used for personalized learning, interactive tutoring, and content creation. Future research should explore longitudinal studies to assess the sustained impact of AI on student performance and engagement. Table 4 provides a summary of key studies, highlighting their objectives, findings, strengths, and limitations to offer a holistic understanding of ChatGPT’s role in education.

**Table 4.** Summary of related works on the applications of ChatGPT in education.

Ref.	Year	Model	Dataset	Approach	Performance Metrics	Objectives	Main Findings	Strengths	Limitations
[21]	2023	AI Ethics	Mixed academic data	Policy analysis	Regulatory compliance	Examine governance challenges	Identified gaps in AI policy enforcement	Strong theoretical framework	No empirical testing
[46]	2024	AI Governance	AI-driven education	Ethical AI implementation	Fairness, transparency	Propose governance strategies	Need for interdisciplinary collaboration	Clear recommendations	Lacks implementation details
[49]	2023	ChatGPT	Educational datasets	AI-driven tutoring	Student engagement, accuracy	Assess ChatGPT’s role in tutoring	Found increased engagement but mixed accuracy	Strong empirical design	Lacks real-world case studies
[51]	2023	ChatGPT	University case studies	Personalized learning model	Learning outcomes	Evaluate AI’s impact on adaptive learning	Showed promise in individual learning support	Effective in low-resource settings	Bias in dataset selection



Similar to prior studies [7,52,53], this review confirms that AI can provide individualized support for students. However, this study also reveals gaps in empirical validation; many studies focus on potential applications rather than real-world case studies demonstrating ChatGPT's effectiveness. Future research should explore longitudinal studies to assess the sustained impact of AI on student performance and engagement.

## 6.2. Governance and Policy Challenges

In response to the second research question, the study reveals that governance frameworks for AI in education are still evolving. Ethical concerns such as academic dishonesty, AI bias, and data privacy require immediate policy interventions. Unlike earlier studies that primarily focus on technical challenges [45], this research highlights the socio-political dimensions of AI adoption, including its impact on teacher workload and institutional governance structures. The literature underscores the necessity for standardized regulations to ensure AI adoption aligns with educational integrity principles. The adoption of ChatGPT and other AI tools in education has introduced significant governance and policy challenges that require immediate attention. This section discusses key concerns, including ethical considerations, academic integrity, data privacy, and the necessity for regulatory frameworks.

### 6.2.1. Ethical Considerations

AI-generated content raises concerns about plagiarism, originality, and student over-reliance on automated tools. Studies indicate that ChatGPT's ability to generate well-structured responses may encourage students to bypass critical thinking and independent learning [51]. However, institutions must establish strict policies to regulate AI usage, ensuring that it complements rather than replaces traditional learning approaches [46].

### 6.2.2. Data Privacy and Security

ChatGPT operates on vast datasets, often processing user-generated content that may contain sensitive information. This raises concerns about data privacy, user anonymity, and compliance with education regulations [38]. Without clear policies, institutions risk exposing student data to unauthorized access and misuse. Future governance efforts must focus on transparent AI usage policies and secure data management frameworks [20].

### 6.2.3. AI Bias and Fairness

Bias in AI-generated content remains a critical issue. ChatGPT's responses are influenced by training data, which may contain inherent biases related to gender, culture, or ideology [46]. If left unchecked, biased AI outputs could reinforce stereotypes and limit diverse perspectives in education. Policymakers must develop evaluation metrics to regularly audit AI models and mitigate biases [54].

### 6.2.4. Institutional Governance and Teacher Workload

The integration of AI in education demands institutional governance strategies to manage teacher workload effectively. While AI can automate administrative tasks, educators must verify AI-generated content, assess student engagement, and guide ethical AI usage [40]. Governance frameworks should include teacher training programs to enhance AI literacy and ensure its responsible implementation in classrooms [47].

### 6.2.5. Need for Standardized Regulations

The absence of standardized AI policies creates disparities in AI adoption across institutions. Some universities have embraced ChatGPT as a learning aid, while others have banned its use due to concerns about academic integrity [33]. Governments and

educational organizations must develop clear AI governance frameworks and regulations that balance innovation with ethical responsibility [55]. At the end, Table 5 presents a comprehensive summary of related studies that examine governance and policy challenges associated with the use of ChatGPT in education. It outlines key issues such as ethical considerations, regulatory frameworks, institutional policies, and the implications of AI-driven learning tools. This summary provides valuable insights into the challenges and potential strategies for effectively integrating ChatGPT within educational institutions. Moreover, Table 6 illustrates the key governance and policy challenges associated with the use of AI in education, along with their implications. Addressing these governance challenges is essential for ensuring the ethical, responsible, and effective integration of AI technologies like ChatGPT in educational settings. Future research should focus on developing comprehensive AI policies that uphold academic integrity, mitigate potential risks, and maximize the benefits of AI in enhancing teaching and learning experiences.

Table 5. Key studies on governance and policy challenges.

Ref.	Key Issue	Findings	Implications
[33]	Lack of Standardization	Institutions have varying policies on ChatGPT use	A unified AI governance framework is required to ensure consistency
[38]	Data Privacy	AI systems process sensitive student data, raising security concerns	Stronger data protection policies and regulatory compliance are needed
[40]	Teacher Workload	Educators face increased workload in verifying AI-assisted assignments	Professional development programs for AI integration should be introduced
[44]	Academic Integrity	AI-generated content may lead to plagiarism and reduced critical thinking	Institutions must implement AI literacy programs and detection tools
[46]	Bias in AI Models	AI-generated responses may reflect biases in training data	Regular auditing and refining of AI datasets required to reduce bias

Table 6. Summary related works for future research directions.

Ref.	Year	Model	Dataset	Approach	Performance Metrics	Objectives	Main Findings	Strengths	Limitations
[43]	2023	AI in Education	Large-scale academic data	Comparative study	Institutional AI policies	Assess AI's effectiveness in diverse learning settings	Identified disparities in AI adoption	Highlights accessibility concerns	Limited to higher education settings
[44]	2023	AI-driven tutoring	Educational datasets	Systematic review	Student engagement, accuracy	Enhance multimodal learning beyond text-based interactions	Found potential for speech recognition and interactive simulations	Highlights diverse AI applications	Requires further empirical validation
[45]	2023	AI Ethics	Various education policies	Theoretical framework	Ethical compliance, bias reduction	Standardize AI governance policies	Identified gaps in ethical AI implementation	Comprehensive literature synthesis	Lacks empirical data

Table 6. Cont.

Ref.	Year	Model	Dataset	Approach	Performance Metrics	Objectives	Main Findings	Strengths	Limitations
[54]	2023	AI Cognitive Effects	Mixed academic data	Longitudinal study	Critical thinking development	Examine long-term effects of AI on learning	Found potential for skill enhancement but risk of dependency	Strong methodological framework	Calls for extensive future research
[56]	2024	AI Governance	AI-driven education	Policy analysis	Fairness, transparency	Develop ethical AI deployment frameworks	Identified need for regulatory compliance	Clear governance recommendations	Lacks real-world testing

### 6.3. Future Research Directions for ChatGPT in Education

In response to research question 3, the study underscores the necessity for robust regulatory frameworks and structured AI training programs for educators. Prior research has called for interdisciplinary collaboration between technologists, educators, and policymakers [56], and this study reinforces that recommendation by emphasizing ethical AI deployment strategies. Additionally, it identifies the need for empirical research on AI's long-term effects on teacher autonomy and student learning outcomes. By integrating the research questions with related works and findings, this study provides a comprehensive analysis of ChatGPT's role in education, offering a nuanced perspective that balances both opportunities and limitations. Hence, Table 6 shows a summary of related works for future directions on ChatGPT in education.

#### 6.3.1. Enhancing AI Capabilities for Education

Current AI applications in education are mostly focused on text-based interactions. However, future studies should look into AI's capabilities in non-textual activities including speech recognition, visual learning aids, and interactive simulations [34]. Creating multimodal AI models will allow for more inclusive and engaging learning experiences for students with diverse learning styles [33].

#### 6.3.2. Ethical AI Deployment and Governance Frameworks

As AI's use in education grows, ethical concerns about data privacy and algorithmic prejudice are addressed. Future research should provide comprehensive governance systems that oversee AI use while assuring adherence to educational norms [57]. Furthermore, interdisciplinary collaboration among educators, technologists, and policymakers is required to create responsible AI policies [32].

#### 6.3.3. AI's Long-Term Impact on Educators and Students

The majority of the research focuses on the immediate benefits of ChatGPT in teaching. However, future research needs look into the long-term impacts on teacher autonomy, student learning outcomes, and cognitive development [58]. Empirical studies are needed to assess if AI-powered education improves or degrades critical thinking and problem-solving abilities over time [36].

#### 6.3.4. AI in Diverse Educational Contexts

While numerous studies look at the function of artificial intelligence in higher education, there is little research on its impact in primary and secondary education, vocational training, and special education. Future research should look into the effectiveness of AI in

a variety of educational settings to ensure its accessibility and inclusivity [38]. Furthermore, examining AI's function in bridging the digital divide is critical for encouraging equal access to AI-driven learning resources.

#### 6.3.5. Standardizing AI Integration in Curricula

To optimize the benefits of AI in education, standardization of AI-driven curriculum development, teacher training, and student assessment is required. Future studies should focus on developing AI integration guidelines that are consistent with existing educational frameworks [33]. Teacher professional development programs should be strengthened to provide educators with AI literacy and practical implementation skills [14].

The future of AI in education demands multimodal advancements to move beyond text-based interactions, incorporating speech recognition and visual aids for more inclusive learning [33,34]. However, this expansion must be accompanied by robust ethical frameworks to address data privacy and algorithmic bias, requiring collaboration across education, technology, and policy sectors [32,55]. While current research highlights immediate benefits, longitudinal studies are critically needed to assess AI's long-term effects on teacher autonomy, student cognition, and skill development [36,59]. Additionally, the focus must broaden beyond higher education to include K–12, vocational, and special education contexts, ensuring equitable access and addressing the digital divide [38,58]. Finally, standardized curricular integration and teacher training programs are essential to align AI tools with pedagogical goals while empowering educators to use them effectively [14,33]. Together, these priorities underscore the need for a balanced, research-driven approach to harness AI's potential without compromising educational integrity or inclusivity.

## 7. Key Findings and Implications

The analysis reveals that ChatGPT can enhance personalized learning, provide scalable tutoring, and automate administrative tasks for educators; however, it also raises concerns about academic integrity, data privacy, AI biases, and the need for clear governance structures. The major findings of this study are categorized as follows:

### 7.1. Teacher Workload and Pedagogical Challenges

While AI can automate routine tasks [57], it may also increase teacher responsibilities related to verifying AI-generated content and guiding students on proper AI use.

### 7.2. Enhancing Student Engagement and Learning Outcomes

According to studies [42,43], AI-driven tailored learning improves engagement and academic performance, particularly for students who require additional support. AI-powered technologies, such as ChatGPT, can greatly increase student engagement by delivering quick feedback, creating personalized study materials, and facilitating engaging discussions. According to studies [28], students who use AI-assisted tutoring systems enhance their comprehension and retention. However, the extent to which AI has a good impact is determined by its suitable deployment in connection with pedagogical goals.

### 7.3. Policy Interventions

According to research [44,45], ChatGPT raises the risk of plagiarism and over-reliance on AI-generated content, necessitating sophisticated detection and mitigation measures. The widespread availability of ChatGPT has raised worries about academic dishonesty, as students may utilize AI to finish assignments without fully grasping the content [58]. To prevent these threats, institutions must develop stringent academic policies, AI detection systems, and awareness initiatives. According to research [60], incorporating AI ethics courses into curricula can help students learn how to use AI responsibly.

#### 7.4. Role of Educators in AI Integration

While AI can automate administrative work, educators play an important role in guiding students on how to use AI ethically. According to studies [14], professional development programs for teachers to train them on AI integration are essential. Policymakers should provide educators with AI literacy training and curriculum recommendations.

#### 7.5. Addressing AI Bias and Ensuring Data Privacy

ChatGPT's outputs are influenced by biases in its training data [29], raising questions about disinformation and fairness in education. ChatGPT's replies may reflect biases in its training data [34], providing issues in assuring fair and accurate information delivery. AI applications also raise issues regarding student data privacy and personal information security. Future research should focus on improving AI models to reduce biases and creating strong data governance policies [61].

#### 7.6. Summary of Research Questions

As illustrated in Table 7, the following research questions were addressed: (1) How has ChatGPT been applied in education? The findings show that ChatGPT is utilized for personalized learning, tutoring, and content creation. However, its application lacks real-world validation [31,51]. (2) What are the major governance and policy challenges? The findings show that major challenges include ethical concerns, academic dishonesty, AI bias, data privacy issues, and increased teacher workload [45]. (3) What future research directions are needed? The findings show there is a need for regulatory frameworks, AI literacy programs, and empirical validation of AI in education [39].

**Table 7.** Summary of research questions and findings.

Ref.	Research Question	Findings from This Study
[31]	How has ChatGPT been applied in education?	Used for personalized learning, tutoring, and content creation; lacks real-world validation
[39]	What future research directions are needed?	Need for regulatory frameworks, AI literacy programs, empirical validation of AI in education
[45]	What are the major governance and policy challenges?	Ethical concerns, academic dishonesty, AI bias, data privacy, and teacher workload issues

Based on the findings across 40 peer-reviewed studies, it is evident that ChatGPT integration in education yields both pedagogical opportunities and ethical concerns. For example, studies such as [1,7] illustrate enhanced student engagement and personalized learning pathways due to ChatGPT's adaptability. However, others like [5,6] emphasize the growing risks of academic dishonesty and over-reliance on AI. Synthesizing these perspectives reveals a dual reality: while AI-driven tools like ChatGPT can transform educational delivery, their integration must be accompanied by clear ethical guidelines and adaptive teaching strategies. Unlike earlier studies that focused narrowly on either opportunity or risk, this review bridges both to propose a balanced framework for future implementation.

## 8. Future Research Directions

Several studies emphasize the need for ongoing research to refine AI's role in education. Key areas include the following.

### 8.1. Personalized Adaptive Learning

AI-powered systems should grow to offer real-time, adaptive learning paths based on individual students' strengths and weaknesses. Future studies should look into how deep



learning models can improve personalization while still promoting student autonomy and critical thinking [59].

### 8.2. *AI Ethics and Bias Mitigation*

Addressing bias, misinformation, and ethical issues in AI-generated material is crucial. Future research should concentrate on establishing transparent AI models that reduce biases and adhere to educational equity and inclusivity [59,61].

### 8.3. *Regulatory Frameworks and Governance*

Policymakers have to establish comprehensive governance mechanisms to oversee AI in education while balancing innovation and ethical safeguards. Future research should look at how global AI policies affect education systems and student data privacy [61,62]. This paper expands on previous research by thoroughly assessing ChatGPT's role in education, identifying governance problems, and recommending future research topics for responsible AI adoption.

### 8.4. *Human–AI Collaboration in Teaching*

Instead of replacing instructors, AI could serve as an intelligent helper to improve teaching efficacy. Research should look at teacher AI interaction models and assess their impact on classroom engagement and curriculum design [14].

### 8.5. *AI-Driven Tutoring Systems*

AI-powered intelligent tutoring systems are created to give individualized learning experiences tailored to each student's needs and learning pace [40].

### 8.6. *Interdisciplinary Collaboration for Responsible AI Governance*

Effective AI integration in education necessitates collaboration among educators, technologists, and lawmakers to develop ethical principles and governance structures that promote responsible use [44].

### 8.7. *Evaluating AI's Effectiveness Across Diverse Educational Settings*

Ongoing research is required to analyze the impact of AI tools such as ChatGPT in diverse educational contexts, ensuring that they improve learning outcomes while avoiding biases or inaccuracies [41].

### 8.8. *AI for Under-Resourced Learning Environments*

Future research should focus on making AI accessible and scalable in low-resource settings, ensuring that developing regions benefit from AI-driven education while not worsening digital divides [61]. Hence, the future of AI in education hinges on developing adaptive learning systems that personalize instruction while preserving student autonomy and critical thinking [59], coupled with rigorous bias mitigation to ensure equitable, transparent AI outputs [62]. Effective implementation requires multi-stakeholder governance frameworks that balance innovation with ethical safeguards, particularly for data privacy and global policy alignment. Crucially, AI should augment rather than replace teachers, with research needed on optimal human–AI collaboration models to enhance pedagogy [14] and intelligent tutoring systems [40]. This demands interdisciplinary cooperation among educators, technologists, and policymakers to establish ethical guidelines [44], alongside expanded studies on AI's efficacy in diverse contexts from K-12 to under-resourced settings to bridge digital divides without exacerbating inequalities [41,62]. Together, these priorities underscore a vision for AI as a scalable, equitable tool that complements human expertise while addressing systemic educational challenges.

Finally, to strengthen the analytical rigor of this study, we have revised the manuscript to provide a substantive synthesis of the literature. The revised sections now clearly distinguish between the 40 systematically reviewed studies and supplementary contextual references (>40), ensuring methodological transparency. Sections on opportunities, challenges, and future directions have been restructured to align directly with the research questions, offering comparative insights and thematic integration from the reviewed studies, while supplementary references contextualize broader implications. This enhanced organization, including the addition of the PRISMA 2020 framework citation, facilitates a critical analysis of trends, gaps, and ChatGPT's educational role, moving beyond descriptive reporting toward actionable conclusions.

## 9. Conclusions

ChatGPT has the potential to improve education by making it more personalized, accessible, and interactive for teachers and students alike. However, issues of privacy, data security, and ethical use must be addressed. This study emphasizes ChatGPT's function in assisting with theory-based queries, developing ideas for application-based questions, and incorporating technology into teaching. Teachers can also use it during workshops to review and evaluate AI-generated responses. Despite its benefits, ChatGPT has drawbacks, including the danger of academic dishonesty and reliance, which can impair critical thinking. It can be difficult for educators to distinguish between learners who actively engage with the curriculum and those who rely on automation. Notably, ChatGPT paraphrases comments in ways that bypass similarity detection technologies, prompting upgrades to plagiarism detection tools. Future research should focus on enhancing AI's ability to perform non-textual jobs, creating more powerful AI content identification tools, and resolving ethical concerns about academic integrity and data protection. Additionally, policies and teacher training programs are required to enable responsible AI incorporation. Collaboration between educators, legislators, and technology providers is essential for defining guidelines, improving professional development, and closing the digital gap. Finally, this review serves as a foundational resource for stakeholders navigating AI's role in education, advocating for proactive governance and further empirical research. Therefore, we provide the following key recommendations for stakeholders: (1) Educators should integrate AI literacy into curricula and use ChatGPT as a supplement, not a substitute. (2) Policymakers should consider developing standardized regulations to ensure equitable and responsible AI use. (3) Researchers are also expected to prioritize empirical studies on AI's long-term pedagogical impact and bias mitigation. By addressing these gaps, stakeholders can harness ChatGPT's potential while safeguarding educational integrity and inclusivity.

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