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IMPACT OF CHAT GPT IN PHARMACEUTICAL EDUCATION

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ABSTRACT: Introduction: This paper will provide an overview of the uses, advantages and disadvantages of using ChatGPT in the pharmacy. A new era of personalised and interactive learning is beginning in pharmaceutical education because of ChatGPT (Generative Pre-trained Transformer). Through the use of AI technology, ChatGPT provides adaptive tutoring that enables students to advance at their own speed and receive individualised guidance. Their understanding is improved, and it also encourages a more intense level of engagement. **Methods:** This study discuss how ChatGPT is very important in enhancing inclusion and accessibility in pharmaceutical education. It explore the incorporation of virtual simulations and practical training fills the gap between academic understanding and real-world application by giving students practical experience before they reach the workforce. It also addresses the importance of considering ethical issues, such as data privacy, bias correction, and finding the right balance between human engagement and technology when using AI in education. **Results:** The abstract highlights various studies that demonstrate the effective inclusion of ChatGPT in pharmaceutical education. Numerous studies show how ChatGPT has been effectively included into education. These real-world examples demonstrate its efficacy in online tutoring, interactive lessons on medication development, and group research. While ChatGPT has many benefits, there are some drawbacks as well. **Conclusions:** To fully utilise it, technical and educational challenges must be overcome. Future developments in ChatGPT technology have the potential to further alter both the pharmaceutical sector and its educational environment. It encapsulates the advantages it provides in terms of personalised learning, better accessibility, and practical training. While it recognises the technological and instructional hurdles that must be overcome, it is enthusiastic about future improvements in ChatGPT technology and its sustained good impact on pharmaceutical education.

INTRODUCTION: The development of ChatGPT has greatly increased interest in Large Language Models (LLMs), such as Generated Pre-trained Transformers (GPT). The language model ChatGPT, created by OpenAI, has the potential to contribute to public health⁸. The world of education and learning is made easier as a result of

technology advancements. Virtual mentors, creative material, smart classrooms, automatic assessments, and personalised learning are just a few examples of the many AI-based solutions that are frequently utilised in education.

ChatGPT can assist with a number of pharmacy-related functions. According to chatGPT, it can offer details on drug products, side effects, and dosage guidelines, respond to customer inquiries about medication use, drug interactions, and contraindications, produce summaries of academic articles and research papers on drugs and their development, support clinical trial management by generating reports and summaries, and provide

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information on drug discovery by offering insights on molecular properties and drug interactions. However, it's crucial to remember that before being utilised for decision-making, information generated by ChatGPT should be examined and verified by a skilled professional (Commentary / Viewpoint, n.d.). The field of pharmacy is continuously changing and looking for new methods to improve patient care and expedite procedures. The employment of chatbots, like ChatGPT, is growing in popularity as a tool to help several elements of the pharmacy as a result of technological improvements. Despite the fact that ChatGPT has numerous advantages, it's necessary to be aware of both its advantages and dangers ⁴.

Known Information: The manner that students obtain educational resources and help is revolutionised by ChatGPT's 24/7 accessibility and availability. Students may readily get help anytime they need it because it can be accessed from anywhere with an internet connection, encouraging continual learning. Personalised education is a key advantage of GPT approaches. By adapting explanations and examples to each student's knowledge level and learning pace based on their interactions, the AI can provide individualised educational experiences.

Furthermore, ChatGPT provides immediate access to extensive pharmacological databases that contain the most recent details on drug interactions, doses, contraindications, and side effects. The learning process is further improved by the AI's capacity to generate case studies and clinical scenarios. Students develop their critical thinking skills and get practical insights into pharmaceutical practise by applying their knowledge to actual situations. Additionally, it is a useful tool for mimicking patient-counselling situations and enables students to hone the communication and empathy skills necessary for successful careers in the pharmaceutical industry.

Unknown Information: It has been demonstrated that ChatGPT encourages interactive learning and engagement, but it is yet unknown how this strategy will ultimately impact students' retention, competency, and learning outcomes in pharmaceutical education. The application of AI in education raises concerns about data privacy and

morality. It is crucial to examine how student data is handled and what security and privacy measures are in place. Even while ChatGPT is a useful tool, there is a chance that it won't always be able to provide accurate and comprehensive information, especially in sectors where things change frequently, like the pharmaceutical industry. It's vital to be aware of these limitations and to encourage youngsters' critical thinking. While ChatGPT improves traditional teaching methods, further research is required to determine it works. The effectiveness of chatGPT's feedback in response to student's queries and comments may require more investigation.

If you want to improve the educational process, you must be aware of how pupils understand and use this input. Investigation is still ongoing into the long-term cost-effectiveness of employing ChatGPT in pharmaceutical education, taking into consideration factors like infrastructure upkeep, training, and AI model upkeep. However, it also necessitates careful evaluation of its effects on long-term learning outcomes, ethical issues, accuracy, conventional teaching techniques, feedback systems, and cost-effectiveness.

ChatGPT integration in pharmaceutical education offers interesting potential. To ensure that students have a balanced and productive learning environment, it is critical to address these issues as AI continues to change the educational landscape.

Method: To investigate the prospects and challenges of ChatGPT in academia, pertinent internet resources (news, reports, *etc.*) and published articles were searched and selected using Google and Google Scholar. The quality of the information sources is carefully considered in this work, which uses a desktop analytic approach. We conducted Google Scholar searches on "GPT-3 and higher education" and "ChatGPT" to find the hundred most relevant academic publications, conference proceedings, and book chapters. Furthermore, we consulted the reference lists of chosen academic articles as well as embedded references in non-academic sources. This broad literature search revealed that there is very little valuable academic material on GPT-2 or GPT-3 with higher education. Surprisingly, a rapidly expanding academic literature on ChatGPT and

higher education exists, with approximately eight preprints and two peer-reviewed articles concentrating on evaluation and other elements of learning and teaching. The selected literature was then studied and analysed using the noticing-collecting-thinking model. This data analysis paradigm is commonly used to divide the complex and rigorous practise of qualitative data analysis into three phases: noticing, collecting, and thinking. During the Noticing phase, the selected literature was painstakingly evaluated to see if there was any concern about the opportunities and challenges of ChatGPT in the context of academics.

During the gathering phase, all observed concerns (opportunities and problems) were gathered and organised in different section. Finally, in the Thinking phase, all of the mentioned concerns were analysed and synthesised in order to highlight the potential and problems, and they were categorised into four topics (research, education, personal skill development, and societal). This procedure was repeated multiple times until the writers reached a degree of agreement on which information (opportunities and challenges) should be regarded final. Table containing answers given by chatGPT itself on various queries

TABLE 1: CHATGPT OUTPUT IN RELATION TO EXPERT PANEL QUERRIES REGARDING PHARMACEUTICAL EDUCATION

Prompt	ChatGPT exact response
1. Scientifically discuss the abilities of ChatGPT to assist pharmaceutical students to understand complex pharmaceutical concepts in their courses in fewer than 50 words.	ChatGPT aids pharmaceutical students by providing detailed explanations, answering questions, and offering personalized learning experiences. Its vast knowledge and natural language processing capabilities simplify intricate pharmaceutical topics, enhancing student comprehension.
2. Scientifically list major potential concerns and challenges that could be associated with ChatGPT incorporation into pharmaceutical education in fewer than 50 words.	<ol style="list-style-type: none"> 1. Data privacy and security risks with sensitive pharmaceutical information. 2. Inaccuracies in AI-generated content may lead to misinformation. 3. Limited practical and hands-on training opportunities for students. 4. Ethical considerations in AI-driven drug development and decision-making. 5. Overreliance on AI may hinder critical thinking and problem-solving skills in students.
3. Scientifically and concisely elaborate on ChatGPT use to improve pharmaceutical students' clinical reasoning and problem-solving skills in fewer than 50 words	ChatGPT aids pharmaceutical students' clinical reasoning by simulating complex drug-related scenarios, analyzing pharmaceutical data, and providing evidence-based solutions, thereby enhancing problem-solving skills.

TABLE 2: KEY QUESTIONS AND CHATGPT RESPONSES IN FEWER THAN 50 WORDS IN PHARMACEUTICAL EDUCATION AND RESEARCH

Key Questions	ChatGPT Responses
What are the key subjects covered in pharmaceutical education?	Pharmaceutical education typically includes subjects such as pharmacology, medicinal chemistry, pharmaceutics, pharmacokinetics, pharmacodynamics, pharmaceutical analysis, pharmacotherapy, clinical pharmacy, and pharmaceutical marketing. These subjects equip students with the knowledge and skills needed to understand drug development, manufacturing, and patient care.
How does pharmaceutical education prepare students for careers in the pharmaceutical industry?	Pharmaceutical education provides students with a strong foundation in drug discovery, development, and regulatory processes. It also focuses on developing critical thinking, research skills, and an understanding of pharmaceutical business practices, enabling students to pursue careers in various roles within the pharmaceutical industry.
What role does research play in pharmaceutical education?	Research is a crucial component of pharmaceutical education as it fosters innovation and advances in drug development. Students engage in research projects that contribute to the understanding of drug mechanisms, pharmacology, and formulation, preparing them for evidence-based practices in the field.
What advancements in pharmaceutical education have been made to address global health challenges?	Pharmaceutical education has adapted to address global health challenges by incorporating modules on infectious diseases, vaccination, and healthcare disparities. Additionally, there is an increased focus on global health ethics, access to essential medicines, and the role of pharmaceuticals in addressing public health issues.
How does pharmaceutical education address ethical considerations in drug research and development?	Pharmaceutical education emphasizes ethical principles and guidelines to ensure responsible conduct in drug research and development. Students learn about informed consent, patient confidentiality, and the ethical implications of clinical trials, ensuring ethical decision-making in their future careers.

How do pharmaceutical researchers identify potential drug targets?	Pharmaceutical researchers identify potential drug targets through a process called target identification. They use various approaches, including genomic studies, proteomic analyses, and disease pathway investigations, to identify specific molecules, proteins, or genetic components that play a critical role in the disease process. These identified targets represent potential points of intervention for drug development to treat the disease effectively.
What role does pharmacognosy play in pharmaceutical research?	Pharmacognosy plays a crucial role in pharmaceutical research by studying natural products from plants, animals, and microorganisms. It identifies bioactive compounds for potential drug development, explores traditional remedies for modern medicine, and contributes to the discovery of new drugs and herbal medicines.
How do pharmaceutical companies collaborate with academic research institutions? write in fewer than 50 words	Pharmaceutical companies collaborate with academic research institutions through joint research programs, funding support, technology transfer, clinical trials, knowledge sharing, and advisory roles, fostering innovation and advancing drug development.
What are the latest trends in pharmaceutical marketing and sales strategies?	The latest trends in pharmaceutical marketing and sales strategies include the adoption of digital marketing, personalized targeting, social media engagement, data analytics for customer insights, and emphasis on patient-centric approaches to enhance brand visibility and sales effectiveness.
What role does pharmaceutical biotechnology play in pharmaceutical research?	Pharmaceutical biotechnology plays a pivotal role in pharmaceutical research by utilizing biological systems and processes to develop innovative drugs and therapies. It involves the use of biotechnological techniques such as genetic engineering, recombinant DNA technology, and monoclonal antibodies to produce biopharmaceuticals, vaccines, and targeted therapies, advancing treatment options and disease management.

RESULT:

How Students, Professors and University Face this Revolutionizing Tool: The educational scene has undergone a quick change as a result of LLMs. As educators utilise it to generate course materials, students are increasingly using it to accomplish their homework and writing tasks. The application of LLMs in developing pharmaceutical models is the focus of this section, which does not dig into their applicability in other fields ².

As an AI language model, ChatGPT can play a significant role in enhancing pharmaceutical education in various ways i.e., it offers students on-demand learning help, enabling them to ask questions and receive clarifications on pharmaceutical concepts, establishing an interactive learning environment that supports conventional classroom training. Through ChatGPT, which provides specialised recommendations for study materials and learning aids based on specific student needs, personalised learning experiences are made possible, ultimately increasing engagement and boosting learning results. The AI can also help with research and literature reviews, making it easier for academics and students to identify scholarly papers and pertinent resources, promoting the use of evidence in decision-making, and speeding up the research process. ChatGPT is helpful in educating students, pharmacists, and healthcare professionals on

important pharmacological information, dose recommendations, and safety precautions. This helps to prevent pharmaceutical errors and improves patient safety. Students can practise problem-solving in various pharmaceutical settings by using virtual simulations and case studies using ChatGPT. This develops their critical thinking abilities and gets them ready for difficulties in the real world. Students have access to up-to-date and pertinent information thanks to ChatGPT's ongoing upgrades and improvements, which ensure that it stays abreast of the most recent developments in medicine and scientific research. With ChatGPT's multilingual support, students from different linguistic backgrounds can now access and participate in pharmaceutical education. Furthermore, this can help pharmaceutical researchers and scientists with drug design, dose optimisation, and comprehension of interactions between medicinal components. It acts as a virtual teacher or mentor, offering suggestions, encouragement, and insights to improve learning and give pupils useful direction.

Some Examples ChatGPT used for Collaborative Research:

- ❖ It can be used to connect researchers with the right skills and expertise.

- ❖ It can be used to coordinate and manage research projects.
- ❖ It can be used to share research findings.
- ❖ It can be used to track the progress of research projects.
- ❖ It can be used to improve the reproducibility and impact of research.

Using ChatGPT in Teaching and Learning: As a starting point for developing course syllabi, teaching materials, and assessment activities, ChatGPT might be a useful tool for educators. But there are issues that need to be resolved about the generated content's accuracy. A potential fix would be to build training materials for course-specific chatbots using ChatGPT. For instance, Topsakal and Topsakal used ChatGPT to create conversations to help students learn English. After confirming the materials' authenticity, teachers can ask ChatGPT to transform them into a format compatible with AI-based chatbots, like Google Dialogue flow, to give students an engaging and customised learning experience ¹⁴.

Additionally, ChatGPT can improve active learning strategies. For instance, Rudolph *et al.* recommended employing flipped learning, in which students are obliged to read pre-class materials before sessions. This method of instruction can allow for more participatory learning activities, including group discussions, during class time. However, in traditional flipped classes, students might struggle with pre-class learning. Additionally, class participation needs to be increased. This problem was made clear during the COVID-19 epidemic, when entirely online flipped learning caused low in-class participation and peer sharing disengagement ³. As a virtual tutor, ChatGPT may help students with their online independent study by responding to their inquiries and improve group dynamics by recommending a structure for the conversation and giving immediate feedback ¹⁰.

ChatGPT use in Pharmaceutical Research and Publishing: ChatGPT quickly compiles and synthesises a large number of research papers, assisting academics in identifying gaps in the literature and staying current with the most recent

discoveries, making literature reviews more effective. When it comes to handling huge amounts of clinical trial data for data analysis, ChatGPT is invaluable since it enables researchers to spot patterns and trends that might help with drug development and safety evaluations.

With ChatGPT's aid, writing chores, such as research papers and grant applications, are streamlined, allowing academics to finish their work more quickly and with a greater level of polish. This is useful for peer review processes as well since it makes it easier to see potential mistakes in research articles and gives writers insightful criticism. Additionally, ChatGPT contributes significantly to education by creating materials for students and medical professionals. This encourages a deeper comprehension of intricate scientific concepts and encourages the safe and efficient administration of drugs. Finally, by increasing many areas of the research process and allowing the development of useful educational resources, ChatGPT's integration empowers pharmaceutical researchers and educators and ultimately leads to breakthroughs in the pharmaceutical industry ¹².

DISCUSSION:

Implications for Pharmaceutical Institutions and Educators: The study of pharmaceuticals and their research and production is the focus of the scientific discipline known as pharmaceutical science. This field has made considerable advancements over the years. This expansion has been significantly influenced by improvements in our knowledge of the molecular and genetic causes of diseases. The effectiveness of medication development has significantly increased because to methods like combinatorial chemistry and computer modelling. Pharmacogenomics has facilitated the growth of personalised medicine and allowed scientists to swiftly find drugs with desired qualities through high-throughput screening. Another illustration is the widespread usage of Network Pharmacology, which makes use of a sizable database to investigate conventional drugs in an evidence-based manner ¹. The way in which pharmacy students acquire knowledge and abilities is crucial, thus it's critical to consider the instructional methods employed to improve learning in this profession. Modern technologies

make it possible to visualise fundamental concepts in pharmaceutical research. While there is some literature that discusses the perspectives of visual teaching on the learning of pharmaceutical science, there is a dearth of studies that examine effective teaching techniques for pharmaceutical science education and their widespread use in pharmacy practice and pharmacy curricula⁵.

Research and development for pharmaceuticals will be facilitated by the use of artificial intelligence (AI). For instance, language models are more common in a variety of scientific domains, including pharmaceutical sciences. One such language model is Chat Generative Pre-Trained Transformer (GPT), which released its public beta version in November 2022. Because they enable quick access to a vast quantity of information and facilitate the analysis and interpretation of data, these technologies can be immensely helpful in assisting researchers and practitioners in their work. However, it is crucial to understand their constraints and conceivable biases and make effective use of them⁹. AI language models can be useful in the pharmaceutical sciences in a number of ways. They can help with literature reviews, for instance, by swiftly summarising huge quantities of research and highlighting essential conclusions. They can also offer insights into complex datasets that might be challenging to understand manually, aiding in data analysis, modelling, and interpretation. They can also help identify prospective medication targets and facilitate drug repurposing, maturing the drug discovery and development processes.

However, it is vital to understand that human knowledge and critical thinking cannot be replaced by AI language models. Currently, these tools can only provide information based on the data they have been trained on, and the quality of the data they provide will ultimately determine how useful they are. The input data these models were trained on may also contain inherent biases that cause them to produce conclusions that are unreliable or deceptive. As a result, it's crucial to combine human cognition and experience with AI language models. Researchers and practitioners should actively integrate this knowledge into their published work by carefully evaluating the output of these models, verifying for accuracy and

potential biases. To decrease potential partiality and increase precision and accuracy, efforts should also be undertaken to improve the quality and diversity of the data used to train these models. It is anticipated that the application of AI language models in the pharmaceutical sciences will increase as they develop and get better. However, it's crucial to keep assessing and keeping an eye on how they're being utilised to make sure they're being used successfully and ethically.

Although many journals may not have particular restrictions governing the use of AI language models like ChatGPT in scientific articles, they do have guidelines and policies that demand rigour and openness in research. This tendency is growing. The use of computer programmes and algorithms is included in this. Regulatory agencies may classify some products as medical devices while classifying others as Software of Unknown Provenance (SOUP). Authors must include a thorough explanation of the AI model's application, the data utilised to train it, and the output accuracy. They must also acknowledge the significance of human expertise and critical thinking in the research process and explain any potential biases or limits of the AI model. It is significant to note that best practises and guidelines are being built in the field of AI language models in scientific research, which is an emerging one. To ensure appropriate and open usage of AI models, writers should keep up with recent findings and recommendations and work closely with journal editors and reviewers.

ChatGptA wonderful illustration of how technology is constantly evolving, artificial intelligence (AI) is the culmination of many years of research, development, and improvement. It is a cutting-edge instrument that enables new modes of communication, information access, and information processing. We must also be aware of the existing limitations of machine learning models, which only function within a set of pre-established constraints and are incapable of true thought or reasoning. In the pharmaceutical sciences, AI models and programmes are already helpful and will surely remain crucial instruments. It is crucial to ensure their suitable and efficient application in pharmaceutical research and practise in order to fully realise their potential. Researchers must keep up with the most recent developments

and best practises in order to adapt, thrive, and prosper in the field of pharmaceutical sciences where AI is being used.

Potential Impact on the Pharmaceutical Industry: Chatbots are revolutionising drug discovery, patient support, the distribution of medical information, and many other areas of the pharmaceutical sector. Chatbots quickly collect essential information from large amounts of biomedical and scientific literature, put forth hypotheses, and suggest prospective target molecules for future investigation in the drug discovery and development process. It interact with patients for personalised medicine and patient support. They collect medical histories and make personalised therapy suggestions based on patient health information. This helps to improve treatment plans and encourage drug adherence.

Pharmaceutical companies use chatbots to provide precise and up-to-date medical information, including medication information, dosage suggestions, adverse effects, and drug interactions, to patients and healthcare professionals. Because of this accessibility, prescribing procedures are safer and more knowledgeable.

Chatbots are used to interact with potential participants in clinical trials, providing information about the trial, responding to questions, and verifying eligibility. This streamlines patient recruitment and speeds up the clinical trial process. Additionally, chatbots are essential for pharmacovigilance and adverse event reporting, tracking unfavourable drug reactions and gathering safety data from patients and healthcare professionals to enable quick responses and risk assessment. Chatbots help with coordination and communication within pharmaceutical supply chains in supply chain management, assuring prompt medication delivery and lowering inventory management errors. Its assistance is also useful for regulatory compliance and quality assurance, helping pharmaceutical companies adhere to legal requirements and high performance standards, supporting internal audits, and answering questions about regulatory regulations.

Limitations of Chat GPT in Pharmaceutical Education: Regarding the context of learning,

ChatGPT has shortcomings that, when considered, cannot take the place of people as creatures who can engage verbally and directly. These weaknesses include.

1. Academic success involves models or examples during the learning process as well as direct engagement (emotional connection) from the teacher, which ChatGPT cannot provide;
2. As opposed to ChatGPT, which lacks the creativity that humans possess, learning involves creativity to produce new ideas and inventions that are offered to students to receive feedback;
3. ChatGPT is unable to accurately capture the subtleties and unique learning preferences of individual;
4. Socially, depending too heavily on ChatGPT might make people feel inadequate because they don't know how to engage with others;
5. Psychologically, leaning too heavily on ChatGPT can weaken one's capacity for critical thought, making it challenging for users to come up with solutions to problems that happen in daily life.

Ethical Considerations in Implementing ChatGPT in Education: When adopting ChatGPT in education, there are a number of ethical issues that must be taken into mind. ChatGPT has the potential to be an effective educational tool. However, it's critical to be conscious of the moral issues raised by using it. ChatGPT can be used safely and responsibly by taking the required precautions to reduce these risks⁷. To make sure users are aware that they are engaging with a chatbot and not a real person, transparency is essential. To create realistic user expectations, ChatGPT's identity must be made clear, as well as its capabilities. Any biases existing in the data may be reflected in the output of ChatGPT because it is trained on large text datasets. To ensure fair and impartial interactions, it is crucial to recognise these biases and take steps to actively decrease them. When users give ChatGPT with personal information like names, email addresses, and locations, privacy concerns surface.

In order to preserve user privacy, this information must be protected and user consent must be obtained. The chatbot must regularly update its training data to guarantee that it provides accurate and current information. The use of ChatGPT should be guided by the fundamental value of fairness. The chatbot's interactions must be fair to all users and devoid of bias in order to guarantee that no particular group of people is harmed. Its output is ultimately the responsibility of the teachers. They must keep a careful eye on ChatGPT's interactions with students and respond appropriately if problems are found.

CONCLUSION: The future of ChatGPT in pharmaceutical education is promising and exciting. While we have explored current trends and applications, the field remains dynamic and continues to evolve. By implementing ChatGPT, issues of inclusivity and accessibility have also been addressed, guaranteeing that a wider spectrum of students may access education. But this technical development raises moral questions that call for caution to safeguard data privacy and lessen biases. Despite obstacles, ChatGPT's future is full of potential, with new technologies likely to spur more innovation and have a good effect on the pharmaceutical sector as a whole. The promise for a more dynamic, effective, and inclusive pharmaceutical education ecosystem grows more and clearer as educators and institutions continue to investigate and adjust to this AI-powered transformation. The journey has just begun, and as we forge ahead, we must remain vigilant, adaptable, and committed to harnessing the full potential of ChatGPT for the betterment of pharmaceutical education and beyond.

Emerging Trends and Future Applications: The pharmaceutical sector could be significantly impacted by ChatGPT in a variety of ways like its data analysis skills enable the investigation of huge amounts of academic publications and clinical trial data for drug discovery and development, revealing trends and insights that help in drug development. Additionally, the AI can develop original hypotheses and help with experimental planning, which may result in the development of safer and more effective pharmaceuticals. The ability of this to analyse patient-specific data helps personalised medicine by making it possible to identify the best

treatment regimens for certain patients, leading to more specialised and efficient patient care. Using ChatGPT Patients can gain from having a better grasp of their diseases and learning appropriate management techniques. As ChatGPT automates numerous jobs, including data entry, customer service, and clinical research, the pharmaceutical industry sees a rise in efficiency and production.

Patients looking for a deeper grasp of their diseases and the best management techniques will find ChatGPT's interactive and personalised approach to learning to be beneficial. ChatGPT streamlines routine chores for clinical researchers, such as data input, patient recruiting, and analysis, giving them time to focus on more involved and strategic endeavours. Pharmaceutical companies can rely on ChatGPT to assist them in complying with legal requirements for regulatory compliance, ensuring the efficacy and security of new pharmaceuticals.

Final Thoughts on the Future of Chat GPT in Education: ChatGPT has the potential to revolutionize education, the availability of personalised learning experiences, where each learner can have a special learning journey customised to their specific speed and talents, improving overall learning results, is a huge advantage. ChatGPT makes information more accessible, allowing students to learn things that might be hard to find otherwise. This access helps students comprehend difficult ideas more clearly and broadens their base of knowledge.

Additionally, by automating some operations that are traditionally carried out by human teachers, ChatGPT contributes to lowering educational costs. This cost-cutting measure enables teachers to concentrate on more difficult and complex assignments, thus improving educational quality. As ChatGPT continues to develop, it is likely that we will see even more innovative and effective applications of this technology in education. The potential applications of ChatGPT in education are endless. It is an exciting time to be in education, as we are on the cusp of a new era of learning that is more personalized, accessible, and affordable than ever before.

Statements and Declarations:

Disclosure(s): None.

‘Declaration of Generative AI and AI-assisted Technologies in the writing Processes’: During the preparation of this work the author(s) used ChatGPT, a language model based on generative AI that uses a deep learning architecture to generate human-like text based on the input it receives in order to gain a better understanding of its answer generation capabilities. It was used to ask questions and observe the responses as a reference to comprehend the behavior of the AI model. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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