The Influence of ChatGPT on Student Learning and Academic Performance

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Abstract* — This study delves into the integration of ChatGPT, an artificial intelligence-driven language model, within undergraduate education. The research scrutinizes the potential advantages, obstacles, and ethical dimensions linked to including ChatGPT in educational practices. It assesses how ChatGPT may impact student engagement, critical thinking, problem-solving abilities, writing proficiency, and the delivery of personalized learning experiences. A survey administered to university faculty members captures their perspectives on ChatGPT usage, encompassing its influence on learning outcomes and academic performance. An internal inquiry at the British University in Egypt found high plagiarism rates in various faculties, with mass media having the highest at 66%, while political science had the lowest at 28%. A survey has been conducted on teaching staff at the university. 75% of teaching staff believes that ChatGPT should be integrated into teaching. However, they are still undecided about whether ChatGPT has affected the teaching and learning process. The study underscores the significance of responsible implementation, faculty training, and continuous assessment to optimize ChatGPT's benefits while adhering to ethical standards in education. In conclusion, this paper illuminates ChatGPT's potential as a valuable tool in undergraduate education, underscoring the imperative of preserving critical thinking skills and human interaction in the learning journey.

Keywords—ChatGPT, AI, Education, Plagiarism, Assessment

I.INTRODUCTION

We find ourselves in a novel global epoch dominated by the rapid evolution of artificial intelligence (AI), presenting itself at an accelerated and, for some, alarming pace. Even the architects of this technology, collectively calling for a momentary truce, recognize the necessity to comprehend and digest its implications. In the contemporary landscape, Chatbots have become ubiquitous—these are computer programs leveraging AI and natural language processing (NLP) to comprehend human queries and autonomously generate responses, adapting to users based on the data they accumulate. Among them, ChatGPT stands out prominently.

ChatGPT serves diverse purposes, including functioning as chatbots and virtual assistants and engaging in human-like conversations. Unlike conventional search engines like Google, ChatGPT is primarily a language generation model focused on producing text, such as conversational responses or detailed descriptions in natural language.

Within the education community, opinions about ChatGPT are varied. Some educators express concern as students exploit cutting-edge technology to cheat on essays, exams, and assignments. On the other hand, a more liberal perspective sees the potential for ChatGPT to revolutionize education by assisting students in honing their writing, thinking, and learning skills. The purpose of this research is to establish an understanding of large language models – particularly ChatGPT – and their role in higher education. Also, we aim to highlight its current deficiencies and shortcomings. Also, we share our results based on a survey we conducted on the subject and how ChatGPT will affect teaching and learning in the future.

II.WHAT IS CHTGPT

Chat GPT, an abbreviation for Generative Pre-trained Transformer, is a groundbreaking AI technology unveiled in November 2022. This tool engages in conversational interactions, responding to inquiries naturally. As a component of the broader big language model, developed by Open AI, ChatGPT can generate a spectrum of content, from outlines and poetry to letters, advice, resumes, and blog posts for websites. Drawing from extensive text data during its training, ChatGPT is adept at delivering coherent and logical responses across a diverse array of queries and prompts, thus enhancing efficiency in research and learning. Accessible through a web browser, ChatGPT engages with users by responding to posted questions or prompts.

Chat Generative Pre-Trained Transformer (ChatGPT) stands as a formidable natural language processing model, boasting 175 billion parameters. Specializing in generating conversation-style responses to user input, ChatGPT utilizes a variant of the widely adopted Transformer network. Trained on extensive text data, it comprehends the intricate patterns of human language, enabling the production of convincingly human-like text.

It is crucial to distinguish ChatGPT from conventional search engines such as Google or Bing. Unlike these search tools, ChatGPT functions primarily as a language generation model, adept at producing text, be it in the form of conversational responses or descriptive passages about images, all in natural language. This is a departure from search engines, which enable users to explore the internet by accessing and querying a database of websites.

A notable distinction lies in the training of ChatGPT compared to other NLP models. While ChatGPT is specifically designed for generating human-like text responses, other NLP models might undergo training on diverse data or for different objectives, like sentiment analysis or language translation. Additionally, variations in network

architectures, such as RNNs or CNNs, can influence how these models process and generate text.

ChatGPT's standout feature lies in its high degree of customizability, allowing users to fine-tune their responses and behavior. This sets it apart from other NLP models that may have limited customization or rigid behavior and output. With its flexibility, ChatGPT proves to be an invaluable tool for applications demanding realistic text generation and conversational interactions.

III.ADVATAGES OF CHATGPT

- Advanced language comprehension: NLP models contribute to language learning and proficiency enhancement, offering students in-depth analyses and constructive feedback on grammar, syntax, and vocabulary use for both new and existing languages.
- Elevated writing proficiency: NLP models play a role in refining students' writing abilities by offering recommendations and feedback on the substance, organization, and style of their written assignments [10].
- Augmented inclusivity: NLP models enhance educational accessibility for students with disabilities through features like text-to-speech and speech-to-text, enabling them to engage with educational content in formats that cater to their specific needs.

IV.DISADVANTAGES OF CHATGPT

- Chatbots lack human-like problem-solving and decision-making abilities, relying on pre-programmed responses, which limits their effectiveness in handling complex or ambiguous situations.
- Chatbots cannot understand or empathize with human emotions and experiences since they operate based on algorithms and data, lacking the subjective emotions that humans have. [11].
- Empathy is an aspect that chatbots, operating on algorithms and data, cannot emulate in their interactions with users.
- Chatbots tend to provide automated responses without reaching satisfactory resolutions.
- Customization is a challenge for chatbots, as they deliver standardized solutions without accounting for the unique needs of individual users [10].
- Understanding human emotions and experiences is beyond the capabilities of chatbots. Despite their ability to mimic human language and provide functional answers, they cannot empathize with users in the way humans can [11].

V.AI IN AIDING EDUCATORS AND STUDENTS

AI, exemplified by ChatGPT, offers substantial benefits in education, enabling personalized lesson plans, identifying, and aiding struggling students, and mitigating resource disparities [12]. Nevertheless, it's essential to acknowledge that AI isn't a cure-all for educational challenges, as it cannot replace the vital human aspects of interaction, teamwork, problem-solving, and critical thinking [13]. Instead of fearing AI's impact, we should maximize its potential to enhance various aspects of life, including writing and research, while recognizing that it complements, rather than replaces, human creativity and insights [14]. As AI becomes an enduring part of our future, our responsibility lies in integrating it thoughtfully and with integrity [16].

VI.AI IN ACADEMIC WRITING

Chatbots possess the capability to revolutionize education by providing immediate support to students, addressing their queries, and enhancing their overall learning experience. The emergence of various technologies has rendered previous tools obsolete, and ChatGPT, with its versatility, can generate a wide array of content. However, ethical concerns arise as some argue that replicating artificial intelligence-created content in cover letters, blog posts, or essays constitutes dishonesty and AI plagiarism. Academic institutions must adapt their evaluation methods to assess students' learning gaps and future potential [17]. This necessitates a shift in the approach to teaching writing, critical thinking, and research skills, with artificial authoring tools like ChatGPT accelerating this transformation, demonstrating swift, effortless, and efficient capabilities [18].

In the realm of academic writing, ChatGPT is steering attention away from teaching techniques for personal stories and toward genres such as argumentative, narrative, and informational writing. This shift opens avenues to utilize diverse media formats, including websites, interactive presentations, videos, infographics, podcasts, blog entries, digital art, and other evolving mediums to impart critical thinking, revision, research, discussion, and creative organizational skills. However, it remains crucial to acknowledge that human oversight is essential for reviewing and correcting AI-generated texts, as the editing process is often intricate and requires genuine subject knowledge [19].

Conversely, ChatGPT can assume the role of a writing coach or personal tutor for students. This technology enables students to receive feedback within seconds, bypassing the wait time for teacher comments [20]. Leveraging ChatGPT for feedback presents numerous potential benefits, allowing students to request the AI to perform specific tasks like reviewing and correcting their papers. Implementing ChatGPT in on-demand writing assignments before a writing unit begins empowers students to navigate the entire writing process independently within a single class hour, without assistance from teachers or AI technologies.

VII.WRITING ASSESSMENT

Educators and school administrators should explore the potential of utilizing this AI technology as a writing coach, providing students with prompt feedback that could lead to accelerated learning and improved writing skills. The significant advantage of ChatGPT lies in its ability to offer a succinct overview of a written piece and even provide grading. Moreover, ChatGPT can leverage data such as a student's learning history and preferences to tailor its responses and recommendations, enhancing its effectiveness [21].

This tool proves exceptionally valuable when a teacher seeks a second opinion on a student's writing to fine-tune the evaluation process. Instructors may encourage students to seek input from the AI and make edits based on that feedback before submitting their papers, fostering mutual benefits for both students and teachers [22]. The immediate feedback offered by ChatGPT allows for the analysis of student responses in real-time, aiding in pinpointing strengths and

weaknesses. Utilizing ChatGPT for feedback enables students to learn from their mistakes and enhance their writing abilities by making adjustments and improvements [23].

When employed as a co-teaching tool rather than a plagiarism checker, ChatGPT can assist students in revising their work. Students can initiate the revision process with a written piece in front of them, modifying their work as they collaborate with ChatGPT. This shift places emphasis on revision and editing, potentially accelerating students' experience with these crucial aspects of writing [24][25].

While some students openly acknowledge using technology to refine their academic language, caution is warranted. While ChatGPT can be seen as a form of free ghostwriting, instances have arisen where the comments provided by the tool were demonstrably false. It remains imperative for educators to guide students in discerning and using technology ethically in the writing process.

VIII.CRITICAL THINKING & ENGAGEMENT

Overreliance on technologies like ChatGPT does not cultivate the critical thinking and problem-solving skills essential for success in both academic settings and real-life situations. The capacity for creative and independent thinking in students may diminish as they become overly dependent on such tools. Excessive reliance on ChatGPT could lead to a decreased interest in independent learning, ultimately resulting in a decline in the human intellect. Striking a balance between technology use and traditional teaching methods is crucial. Furthermore, not all answers provided by ChatGPT can be deemed reliable [26]. Depending on potentially inaccurate information can lead students to make judgments based on erroneous results, negatively impacting their education and future careers.

Chatbots, exemplified by ChatGPT, have the potential to ignite student interest in learning by providing dynamic and captivating educational experiences. Leveraging multimedia tools such as films and photos, chatbots can infuse excitement into the learning process. To enhance engagement, ChatGPT may incorporate gamification strategies like tests and challenges, transforming learning into an entertaining experience [27]. Furthermore, ChatGPT can furnish students with immediate feedback on their progress and achievements, fostering motivation for continuous learning and development [30].

IX.PRIVACY CONCERNS AND DATA LEAKS

Privacy is a major concern in the integration of chatbots into educational settings. These conversational agents amass extensive user data, encompassing personal details and learning histories. A ChatGPT bug once allowed certain users to view the titles of others' conversations, heightening apprehensions about privacy within the network.

Despite a bug that disclosed conversation titles, numerous individuals remain uneasy about their privacy within the platform. Since its launch in November of the preceding year, millions have utilized ChatGPT for composing messages, creating music, and coding. Every interaction is stored in the user's chat history, accessible at any time.

The bug raised concerns about potential access by OpenAI to user communications. According to the company's privacy policies, user data, including prompts and responses, may be employed for further model training. However, this usage occurs only after the removal of personally identifiable information. Safeguarding and ethical utilization of this data are paramount [35].

In the realm of artificial intelligence, Google and Microsoft, both major investors in OpenAI, compete for supremacy. The swift pace of product upgrades and releases prompts worries that errors like the aforementioned bug could be detrimental or lead to unforeseen consequences.

X.DATA COLLECTION METHODOLOGY & STATISTICS ON PLAGIARISM

An internal inquiry at the British University in Egypt has utilized the "Turnitin" tool to scrutinize submissions from undergraduate students. The investigation covered all nine faculties, each of which subjected at least one module to examination using this plagiarism and AI detection tool.

Analysis of Figure 1 reveals that the faculty of mass media exhibited the highest average plagiarism across all faculties, reaching 66 percent. Following closely, the faculties of environmental engineering, nursing, informatics and computer science recorded similar scores, averaging 64, 61, and 60 percent, respectively. In contrast, the faculty of political science had the lowest plagiarism percentage at 28 percent. The second-lowest percentages were reported by the faculties of engineering and law, both achieving an average of 42 percent.

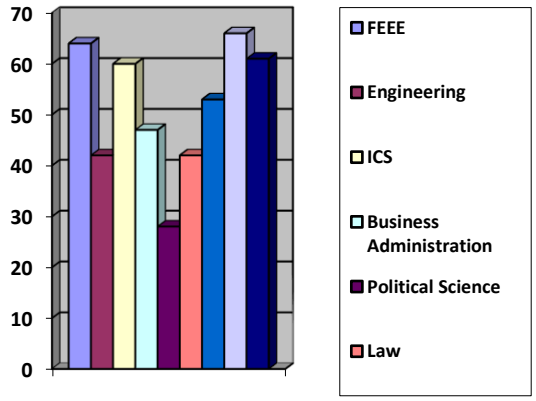

Fig. 1. plagiarism percentage

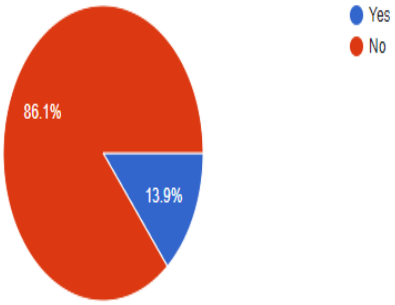

Fig. 2. Have you used ChatGPT or similar AI-based language models in your undergraduate courses?

The university has implemented stringent measures to address instances of plagiarism among students. Additionally, the institution is committed to preventing the recurrence of such significant incidents. With the increasing accessibility of AI tools, the use of plagiarism-checking tools has become

indispensable, as they play a crucial role in detecting and preventing submissions that would otherwise go unnoticed.

The faculty of informatics and computer science at the British University in Egypt conducted a survey on the utilization of ChatGPT in education. This survey seeks feedback from faculty members regarding the incorporation of AI-based language models, specifically ChatGPT, into undergraduate education. Various aspects are covered in the survey, including potential benefits, challenges, and ethical considerations associated with the integration of ChatGPT in educational settings.

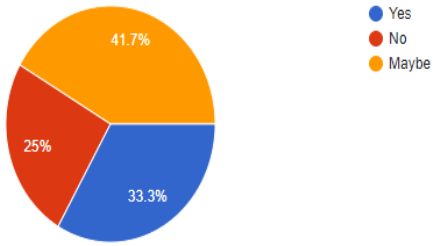

Fig. 3. Have you observed any notable changes in students' learning outcomes or performance as a result of using ChatGPT?

According to the survey conducted among faculty members, a majority have acknowledged incorporating ChatGPT into their undergraduate and graduate courses in various capacities, as depicted in Figure 1. Figure 2 indicates that academic staff remains undecided about whether ChatGPT has impacted students' learning outcomes and performance. Contrary to potential negative effects on the teaching and learning process, Figure 4 below reveals that most academic staff members still endorse the use of such tools in education. This implies a positive inclination toward the integration of large language models like ChatGPT into educational practices.

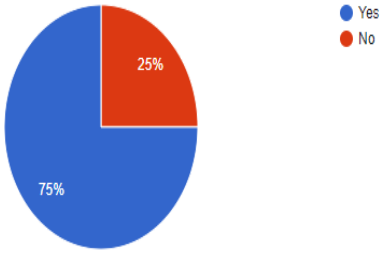

Fig. 4. Based on your experience and observations, would you recommend the use of ChatGPT in undergraduate education?

XI.CONCLUSION

The British University in Egypt identified varying plagiarism rates across different faculties, with mass media exhibiting the highest at 66% and political science the lowest at 28%. The institution is actively addressing plagiarism through AI tools. A survey of faculty members regarding ChatGPT's use in education revealed diverse opinions on its impact, but a prevailing consensus in favor of integrating it due to the potential benefits it offers, alongside concerns related to accuracy and ethical considerations.

Research indicates that AI can indeed be a valuable tool in the classroom, dispelling concerns that it might produce technology-dependent students. This is contingent upon teachers maintaining a focus on fostering critical thinking and interpersonal connections. With such priorities in place, AI, including tools like ChatGPT, has the potential to enhance and improve the educational experiences of all students.

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