AI-Assisted Learning in Higher Education: Exploring the Pedagogical Potential of ChatGPT

Hamis Juma[1] & G. S. Patel[2]

[1]PhD Scholar, University School of Psychology, Education & Philosophy, Gujarat University, Ahmedabad, Gujarat

Email: Hamisj10@gmail.com

ORCID: 0000-0003-0946-463X

[2]Assistant Professor, A.G. Teachers College, Ahmedabad, Gujarat

ORCID: 0000-0002-3321-1010

Abstract

Chat-GPT witnessed exponential growth by attracting 1 million users within five days and over 100 million users in 2 months since its launch in November 2022. ChatGPT responds to user-generated prompts in real time using the provided prompts or questions. The entry of ChatGPT and how it functions by creating a body of text from responses raises concerns about the pedagogical implication on language teaching and learning, ethical issues, and new research avenues for educational specialists to explore. This article examines what ChatGPT can do and its capabilities from recent literature, opportunities that are brought by ChatGPT, such as the creation of sound human-like content, and the limitations, including concerns around bias and the creation of false or misleading information. Further, the pedagogical implication of the ChatGPT is discussed with an analysis of institutional reactions and uptake of the ChatGPT so far. Additionally, the paper suggests what can be done in policy and adoption of the practice of using ChatGPT by emphasizing the need for careful integration into educational practice. By leveraging the capabilities of Chat-GPT and mitigating its limitations, the technology can be a valuable resource for enriching the teaching and learning of language and research.

Keywords: chat-GPT, Generative AI, AI in Education, Higher Education, Innovative Teaching, Pedagogical Tool.

Introduction

The integration of Artificial Intelligence (AI) in education has gained significant attention in recent years. AI technologies offer innovative solutions to enhance teaching and learning experiences, providing personalized and adaptive learning pathways for students (Anjum et al., 2020). Artificial Intelligence (AI) is one of the growing fields of technology that has impacted education by promoting better learning outcomes by improving learning opportunities for students, such as collaborative learning, real-time feedback and an increase in learners' engagement (UNESCO, 2019). Generative AI is AI technology that can generate content from the given dataset that it has been trained to (Gozalo-Brizuela & Garrido-Merchan, 2023); for instance, the generative AI can generate image and convert it to text or text to image or video or text to text. ChatGPT is one of the technological tools under the generative AI that is based on a text-to-text model. (Technical University Munich, 2023) asserted that ChatGPT is

one of the tools that can benefit mostly academic institutions regardless of their curriculum or the types of learners the institution has.

ChatGPT is a tool that use uses natural language processing (NLP) techniques to respond to the responses provided by the users. In simple words, a user inputs the question, a prompt, or a statement into ChatGPT, and ChatGPT will generate the response using NLP from the available data set it has been trained to which currently is up to the year 2021 (Torrey Trust, 2023). Golumbia (2022) defined the ChatGPT as a machine which generates human-English responses from the given prompts. With such capabilities, ChatGPT has gained attention as a potential pedagogical tool in higher education (Schatten, 2022). Its functionalities encompass a wide range of academic tasks, such as generating code languages, social media posts, essays, CVs, and even poems, which can be particularly valuable for both educators and students (Gleason, 2022). Additionally, ChatGPT has been used to assist in content creation, summarization, and error detection in academic papers (Morning Edition, 2022).

ChatGPT is a language model developed by OpenAI, designed to understand and generate human-like text based on the input it receives. It is part of the GPT (Generative Pre-trained Transformer) family of models and has been trained on an extensive dataset to achieve its language processing capabilities OpenAI (2022),. Training process and dataset used The training process of ChatGPT involves exposing it to a vast amount of data from diverse sources, such as books, articles, websites, and other textual content available on the internet. This massive dataset provides ChatGPT with a wide range of language patterns and structures, enabling it to generate contextually appropriate responses.

According to OpenAI (2022), ChatGPT was trained using reinforcement learning from human feedback. The initial model was trained using supervised fine-tuning. Later the human AI trainers played a key role in responding both as a user and the ChatGPT in which ChatGPT learned the dialogue format from given data. The following figures, figure 1 and figure 2 display some sample responses provided by ChatGPT.

Figure-1: Screenshot of response from chat-GPT after given prompt of "what are you?" (https://chat.openai.com/chat)
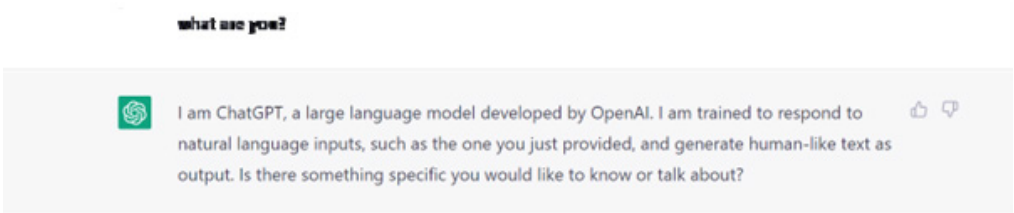
The ChatGPT was provided with the prompt as indicated in figure 1, ChatGPT was questioned "What are you?" ChatGPT responded by providing a clear explanation of what ChatGPT is and a sample example of how it works, further, it provided a dialogue continuation if the answer is not understood or more explanation is needed.

Figure-2: A screenshot of the response from chat-GPT after being given the prompt of "How do you work?" (https://chat.openai.com/chat)
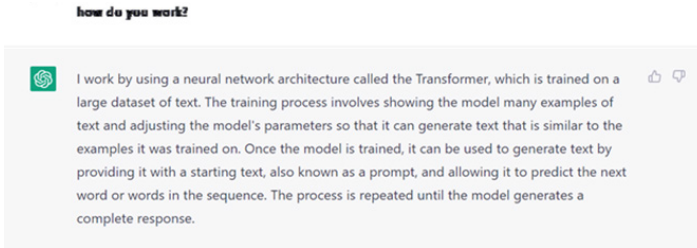
In figure 2, the ChatGPT was questioned "How do you work?" ChatGPT responded by providing a clear explanation of how it works using the dataset it was trained on. It explained the process of reinforcement learning as a repeated process until the model generates the complete response. Further, ChatGPT explained how it works by indicating it works on the dataset given and using the examples that were provided during the training.

When provided with an input prompt, ChatGPT employs its transformer-based architecture to analyze the context and patterns within the text. It uses this analysis to generate a response that is relevant and contextually appropriate to the given prompt. The model's ability to understand the relationships between words and sentences allows it to create coherent and human-like responses, making it a versatile and useful language generation tool. (Brown et al., 2020).

Methodology

The study involved an innovative literature survey from online sources and tool exploration. Literature sources were obtained from online sources such as open journal repositories, news, public talks and discussions, books and reports published on ChatGPT.

Moreover, a ChatGPT account was opened (one needs an account to be able to use ChatGPT) using an active email address to see how it works. ChatGPT started being used after the confirmation of the mobile number (an active mobile number is needed for confirmation). Then, various responses related to the education setting were entered to see how ChatGPT responds and the alternative answers it could provide.

Figure-3: Homepage view of the ChatGPT tool after the sign-on process indicating instructions to the user on how it collects the data and privacy (https://chat.openai.com/chat)
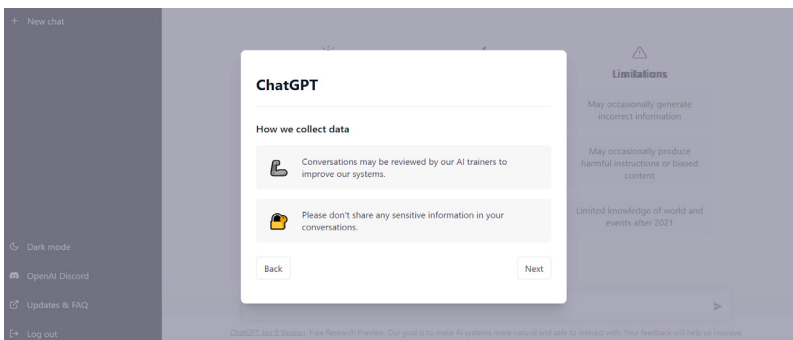
Discussion

The discussion section delves into the pedagogical implications and practical considerations of integrating ChatGPT in higher education. This section

explores the potential benefits of ChatGPT in simplifying academic tasks by providing human-like responses to tailored prompts (Schatten, 2022; Gleason, 2022). Additionally, it adds to the limitations of ChatGPT, including issues of trustworthiness, dataset limitations, biases, and its inability to comprehend complex human language (Torrey Trust, 2023; Golumbia, 2022; Bogost, 2022). Furthermore, this discussion addresses the evolving landscape of academic integrity and plagiarism concerns in the context of AI-generated content (Hippel, 2023; Hern, 2022). Finally, it explores how institutions can adapt to this AI revolution, outlining policy considerations and recommendations for effective implementation (Mills, 2022; Montclair State University, 2023).

## Benefits of ChatGPT as a Pedagogical Tool

ChatGPT provided opportunities to simplify various academic works by providing dedicated responses that sound human-like. According to Schatten (2022), when you input the prompt in ChatGPT, you get a specifically tailored response according to your prompt, and it has a user-friendly interface.

Gleason (2022) added that ChatGPT can generate structured content such as code languages, social media posts, and essays, create a CV from given info, create poems following specific poets' styles, design outlines for courses and lesson plans, design content for teaching and quizzes.

Further, Morning Edition (2022) debated how ChatGPT is used to create content as one can paste an entire academic paper, and ChatGPT can work on it or summarize it, ChatGPT can find errors in codes and make corrections. Gravett (2023) added that with ChatGPT, we can get the response to prompts as when we ask the learners to demonstrate what they have learned, and ChatGPT will answer accordingly, the only difference now is the response will be human-like, and no human is directly involved in providing the response.

According to (Herman, 2022), ChatGPT has proved how it can change how people do writing, and its integration into teaching might end writing assignments. The figure below indicates an example of an essay generated by the ChatGPT tool using the prompt to write about India Republic Day, which it did and provided the response.

Figure-4: A screenshot of the response from chat-GPT after being given the prompt to write about India Republic day (https://chat.openai.com/chat)
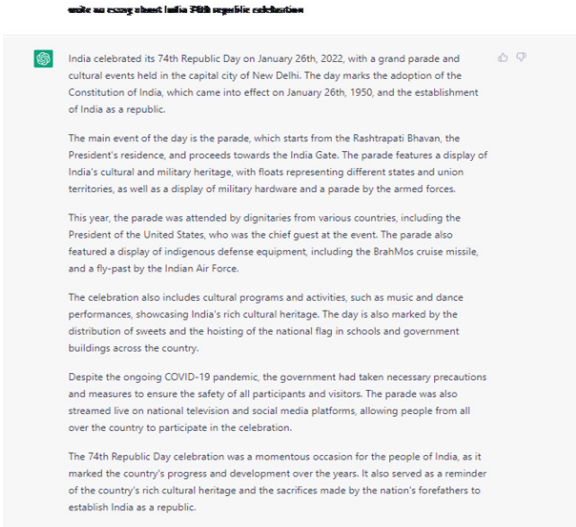
Limitations and Challenges of ChatGPT

With the affordances ChatGPT is offering by generating content from prompts, it still has some limitations on how it works, such as trustworthiness. ChatGPT is not always trustworthy and cannot provide accurate responses when asked to. Torrey Trust (2023) affirmed that the massive dataset ChatGPT was trained on is up to 2021. Hence, the recent events and information cannot easily be available, and ChatGPT cannot by itself access the internet (Mills, 2022) to search for the available information.

Further, as OpenAI (2022) explained how ChatGPT was trained, some trustworthy issues arise as ChatGPT was trained by humans and to some extent, will respond as trainers trained it to and reinforced. On the same, Golumbia (2022) mentioned that biases such as racial preferences might emerge from the dataset used for training ChatGPT. ChatGPT has been trained on the massive dataset; however, it does not mean that it has all the available data when given a prompt as such Torrey Trust (2023) found out that when missing the data, ChatGPT makes up guesses when they lack data to pull information from instead of indicating it cannot respond to the prompt.

Further, Bogost (2022) claimed that ChatGPT does not truly understand how human language is complex but only provides responses on given input and cannot comprehend the meaning behind the words, which makes it easier for it to make up data, the same was found by Thompson (2023) when ChatGPT provided the wrong response with supporting evidence from Hobbes' work which could easily be spotted by a human. Additionally, Gravett (2023) observed that most of the time ChatGPT will provide incorrect and non-existing citations in its responses. OpenAI (2022) explained this scenario by indicating that at times, ChatGPT will generate plausible-sounding but incorrect or nonsensical answers as it misses data that was not trained on; some answers were wrongly trained depending on what the model knows and do not reflect human knowledge.

Pedagogical Implications of ChatGPT

ChatGPT forces institutions to rethink pedagogical practices and assessments of learners. Integrating AI writers into learning and teaching can be done in higher education. With AI writers such as ChatGPT, Gleason (2022) suggested the change of assessment from assessing the product to focusing on the whole learning and assessing process by integrating AI technologies like ChatGPT into learning and teaching.

Nevertheless, Mills (2022) stressed how institutions can adapt to these new changes by regulating academic policies by giving a way to include AI-created content, such as using the ChatGPT to create a question on a selected topic, which also Technical University Munich (2023) explained could be a strategy tool for learners to use prepare themselves for examinations.

Moreover, Hippel (2023) discussed how universities are grappling with the challenge of incorporating ChatGPT and other generative AI tools into their curriculum. Faculty members need to invest time in improving their digital literacy and understanding the technology's affordances and limitations. This understanding will enable faculty to effectively integrate generative AI, like ChatGPT, into their classes and assess its impact on learning outcomes.

Policy and Adoption Considerations

The ethical implications of using ChatGPT have sparked discussions on what is considered acceptable and what

is not in academia (Morning Edition, 2022). Plagiarism, in particular, is a major concern when it comes to integrating ChatGPT into instructional activities (Hippel, 2023). Hern (2022) indicated that institution admins have concerns over plagiarism caused by ChatGPT and how they can function to detect it. Bowers-Abbott (2023) revealed how plagiarism can occur when ChatGPT provides related content to students with similar prompts, potentially allowing some to go unnoticed while others unwittingly produce similar work.

To address the issue, recent developments by OpenAI include working on a watermarking solution to highlight work produced by ChatGPT and GPTZero, aiding in spotting potential plagiarism (Kim, 2022). However, Peritz (2022) argues that using ChatGPT might not be considered traditional plagiarism, as the student initiates the process by exploring multiple prompts, and no previous work exists for the student to copy. Still, Hippel (2023) raises concerns about ChatGPT's ability to respond to mathematical prompts and complex concepts, as it can provide incorrect answers to some calculations.

In response to these concerns, organizations are creating policies to prohibit the submission of AI-created work as one's own in order to uphold academic integrity (Hern, 2022). For instance, platforms like Stack Overflow, designed for programmers to solve coding problems, have implemented policies limiting users from using code generated by ChatGPT and presenting it as their original work. This ensures a fair academic environment and prevents potential issues related to plagiarism.

In navigating the ethical landscape, institutions are striving to find a balance between leveraging AI technology for educational purposes and maintaining academic honesty (Morning Edition, 2022). Some argue that if responses from ChatGPT can

be modified and improved upon by students, this process could be seen as a legitimate way to use generative AI tools. However, this has prompted the need for clear guidelines and codes of conduct to prevent potential misuse of AI-generated content. As institutions move forward, it becomes crucial to establish comprehensive policies and adoption considerations to ensure the responsible and ethical use of ChatGPT and similar AI technologies in the academic setting.

Future Directions and Recommendations

To maximize the benefits of ChatGPT and overcome its limitations, several future directions and recommendations can be explored. In the context of Indian higher education, specific strategies can be adopted to effectively utilize ChatGPT as a pedagogical tool. Firstly, integrate ChatGPT in Language Learning: Given India's linguistic diversity, ChatGPT can play a vital role in language learning. By providing responses in various regional languages, ChatGPT can aid learners in improving their language proficiency and understanding.

Another consideration is how to raise awareness and training for faculty members and students of higher education. Faculty members and students need to be adequately informed and trained on the proper use of ChatGPT. Workshops, training sessions, and educational materials can help users leverage the tool effectively and ethically. Moreover, Indian higher education can develop Policies and Guidelines: Institutions should establish clear policies and guidelines for using generative AI tools, including ChatGPT, to prevent academic misconduct and ensure responsible usage. The government and ministries can work in the provision of fund studies to explore ChatGPT for Personalized Learning: By understanding individual students'

learning preferences and abilities, ChatGPT can be utilized to provide personalized educational content and support, enhancing the overall learning experience. Also, research can be directed into measuring learning outcomes and evaluating the impact of ChatGPT on learning outcomes. This data-driven approach can inform further improvements and enhance the effectiveness of the tool in educational settings.

ChatGPT, as an AI-powered generative tool, offers promising opportunities to simplify academic tasks and enhance pedagogical practices in higher education. Its ability to provide human-like responses to tailored prompts, generate structured content, and aid in various academic processes has been widely acknowledged (Schatten, 2022; Gleason, 2022; Morning Edition, 2022; Gravett, 2023). However, alongside these benefits, several limitations and challenges have been identified. Trustworthiness remains a key concern, as ChatGPT's training data has temporal limitations and potential biases, impacting the accuracy and reliability of its responses (Torrey Trust, 2023; Golumbia, 2022). Additionally, the tool's lack of access to current information and limited understanding of complex human language raises further questions about its usability in certain scenarios (Bogost, 2022; Thompson, 2023).

Conclusion

The education sector is not outside the realm of technological change that is happening in the world, and we need to adopt technological tools to enrich our teaching and learning experiences. With the ChatGPT's capabilities to generate a body of text from given prompts, we can use it in various settings from creating letters to the provision of exemplary essays in our classes. However, with the development of generative AI technologies such as ChatGPT, academic institutions can focus more on how to regulate its usage and adoption, as suggested by Hern and Mills (2022) instead of blocking them. Also, institutions should find a way to equip their faculty with digital literacy skills to be able to work in a changing technology that is dominating the world of work. To effectively harness the benefits of ChatGPT, academic institutions need to foster digital literacy among faculty, develop clear policies, and raise awareness of responsible AI use (Gleason, 2022; Center for Integrated Professional Development, 2022; The New York Times, 2022; Montclair State University, 2023).

ChatGPT and other AI technologies do not exist to replace work that is done by a human. Rather than simplifying it, human intervention is needed to create meaning behind the words generated Bogost (2022) suggested that ChatGPT doesn't understand the meaning. Rather, it works on the dataset as it was reinforced. ChatGPT is a powerful tool. However, human intervention is needed to understand more its full potential capabilities and limitations when used to teach and learn, understand what it can do and what it cannot do and how to integrate it into the school curriculum.

Upon graduation, students will interact with ChatGPT and other AI tools in their work line, and they need to start interacting with them early. Higher education institutions have a chance to adopt the tools and develop innovative assessment practices that can integrate the usage of the tools that students can meet in the workplace as Gravett (2023) advocated to use of ChatGPT to teach digital literacy to learners and explore the capabilities of generative AI in terms of output and efficiency in work settings. While the journey towards integrating AI in higher education may present obstacles, the rewards in terms of improved teaching, learning, and

assessment practices make the effort worthwhile. As we continue to explore the possibilities offered by ChatGPT and similar AI technologies, it is crucial to maintain a balance between embracing innovation and addressing ethical and pedagogical considerations. By doing so, we can ensure a future where AI becomes a valuable tool, enhancing the educational landscape while preserving academic integrity and promoting equitable learning experiences for all.

References

Anjum, A., Islam, R., & Karim, A. (2020). Artificial Intelligence in Education: A Review on Potential, Challenges, and Future Directions. *International Journal of Emerging Technologies in Learning*, 15(23), 4-19.

Bogost, I. (2022). *ChatGPT Is Dumber Than You Think - The Atlantic*. https://www.theatlantic.com/technology/archive/2022/12/chatgpt-openai-artificial-intelligence-writing-ethics/672386/

Bowers-Abbott, M. (2023). *What are We Doing About AI Essays?* | Faculty Focus. https://www.facultyfocus.com/articles/teaching-with-technology-articles/what-are-we-doing-about-ai-essays/

Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., ... & Amodei, D. (2020). Language models are few-shot learners. arXiv preprint arXiv:2005.14165.

Center for Integrated Professional Development. (2022). AI-Generated Content: Considerations for Course Design . https://prodev.illinoisstate.edu/pedagogy/ai/index.php#spotting

Elsen-Rooney, M. (2023, January 4*). NYC bans access to ChatGPT on school computers, networks - Chalkbeat* New York. https://ny.chalkbeat.org/2023/1/3/23537987/nyc-schools-ban-chatgpt-writing-artificial-intelligence

Gleason, N. (2022). *ChatGPT and AI text generators: how HE can respond* | THE Campus Learn, Share, Connect. https://www.timeshighereducation.com/campus/chatgpt-and-rise-ai-writers-how-should-higher-education-respond

Golumbia, D. (2022). *ChatGPT Should Not Exist. It Isn't Just Bias and Threats to...* | by David Golumbia | Dec, 2022 | Medium. https://davidgolumbia.medium.com/chatgpt-should-not-exist-aab0867abace

Gozalo-Brizuela, R., & Garrido-Merchan, E. C. (2023). *ChatGPT is not all you need. A State of the Art Review of large Generative AI models*. http://arxiv.org/abs/2301.04655

Gravett, E. O. (2023). ChatGPT.

Herman, D. (2022). *ChatGPT Will End High-School English - The Atlantic*. https://www.theatlantic.com/technology/archive/2022/12/openai-chatgpt-writing-high-school-english-essay/672412/?utm_source=copy-link&utm_medium=social&utm_campaign=share

Hern, A. (2022). AI-assisted plagiarism? ChatGPT bot says it has an answer for that | *Chatbots* | The Guardian. https://www.theguardian.com/technology/2022/dec/31/ai-assisted-plagiarism-chatgpt-bot-says-it-has-an-answer-for-that

Hippel, P. T. von. (2023, January). *ChatGPT Is Not Ready to Teach Geometry (Yet) - Education Next*. Education Next. https://www.educationnext.org/chatgpt-is-not-ready-to-teach-geometry-yet/

Kim, S. (2022). *How to Detect OpenAI's ChatGPT Output* | by Sung Kim | Geek Culture | Dec, 2022 | Medium. https://medium.com/geekculture/how-to-detect-if-an-essay-was-generated-by-openais-chatgpt-58bb8adc8461

Mills, A. (2022). *AI Text Generators and Teaching Writing: Starting Points for Inquiry - The WAC Clearinghouse*. https://wac.colostate.edu/repository/collections/ai-text-generators-and-teaching-writing-starting-points-for-inquiry/

Montclair State University. (2023). *Practical Responses To ChatGPT. Office For Faculty Excellence* . https://www.montclair.edu/faculty-excellence/practical-responses-to-chat-gpt/?fbclid=IwA R0bQI2bjw52g8XpZwusCT4_MeqUP9GTQZK9_l7gMhnYYP66XhJdRl1X4Vo

Morning Edition. (2022, December 16). *Has AI reached the point where a software program can do better work than you? :* NPR. https://www.npr.org/2022/12/16/1143330582/has-ai-reached-the-point-where-a-software-program-can-do-better-work-than-you

OpenAI. (2022). *ChatGPT: Optimizing Language Models for Dialogue*. https://openai.com/blog/chatgpt/

Peritz, A. (2022). *AI is making it easier than ever for students to cheat*. https://slate.com/technology/2022/09/ai-students-writing-cheating-sudowrite.html

Schatten, J. (2022). *Will Artificial Intelligence Kill College Writing?* https://www.chronicle.com/article/will-artificial-intelligence-kill-college-writing

Technical University Munich. (2023). *Position paper on ChatGPT Outlines Opportunities for Schools and Universities*.

The New York Times. (2022). *Don't Ban ChatGPT in Schools. Teach With It. - The New York Times*. https://www.nytimes.com/2023/01/12/technology/chatgpt-schools-teachers.html

Thompson, B. (2023). *AI Homework*. https://stratechery.com/2022/ai-homework/?fbclid=IwA R3oPxbh504C0LMJEO1z5bcM7T_-2SH4E27_ignd2VBiGg5fhFIE62uz-IU&mibextid=Zxz2cZ

Torrey Trust. (2023). *ChatGPT & Education*. https://docs.google.com/presentation/d/1Vo9w4ftPx-rizdWyaYoB-pQ3DzK1n325OgDgXsnt0X0/edit#slide=id.g1c66bf93982_1_24

UNESCO. (2019). *Challenges and Opportunities for Sustainable Development Education Sector United Nations Educational, Scientific and Cultural Organization*. https://en.unesco.org/themes/education-policy-