

## RECOGNIZING CHATGPT'S ABILITY TO ENHANCE THE TEACHING AND LEARNING PROCESS

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Chapter ID: NSP/ICAAR-2023/A-28

### ABSTRACT

On November 30, 2022, ChatGPT made its first appearance in the public domain and within a week had more than a million subscribers. The world was taken aback by the advanced ability of the generative AI tool ChatGPT to do impressively challenging jobs. Teaching staff have varied sentiments regarding ChatGPT's amazing potential to conduct complete challenging activities in the realm of education because this development in AI appears to alter modern education pedagogies. In this study we offer some distinct advantages of ChatGPT in enhancing teaching and learning by synthesizing current existing studies. The promotion of individualized and interactive learning, formative evaluation procedures, and other advantages are only a few of ChatGPT's advantages. The research also identifies numerous fundamental flaws in the ChatGPT, such as incorrect information generation, biases in data training that may exaggerate preexisting prejudices, privacy concerns, etc. The research makes suggestions for utilizing ChatGPT to enhance instruction and learning. In order to improve education and promote students' learning, policy experts, academics, educators, and technology experts might collaborate and start discussions on how these growing generative AI technologies may be utilized securely and constructively.

**Keywords:** ChatGPT, GPT-3, Generative Pre-Trained Transformer, AI, Academia, Libraries

### INTRODUCTION

Because of technological advancements (such artificial intelligence), the educational environment in the 21st century has changed quickly (Petersen, 2021). Machine learning has recently made strides in its development, and as a result, new revolutionary technologies like generative artificial intelligence (AI) have emerged (Hu, 2022). An unsupervised or partially supervised machine learning framework called generative modelling artificial intelligence (GAI) creates artefacts of humankind by using probability, statistics, and other mathematical concepts (Hu, 2022; Jovanovi, 2022). By analyzing training samples and understanding their patterns and distribution, generative AI may build artificial artefacts from existing digital information, including but not limited to video, images/graphics, text, audio, and video (Abukmeil et al., 2021; Hu, 2022; Jovanovi, 2022; Gui, et al., 2021). The Generative Adversarial Network (GAN) and the Generative Pre-trained Transformer (GPT) are two of the most significant generative AI systems (Abukmeil et al., 2021; Brown et al., 2020; Hu, 2022; Jovanovi, 2022; Gui, et al., 2021). Nowadays, the most widely used GAI method is GAN. Using two neural networks, GAN (i.e., generator and discriminator networks). The discriminator network assesses the authenticity of the material to determine if it is legitimate or false after the generator network creates synthetic data (such as a facial image) (e.g., whether the image of the human is real or fake). When the discriminator network is unable to distinguish between the synthetic and genuine material, the synthetic content is accepted as

real (Hu, 2022; Jovanovi, 2022). CAN is mostly utilized for the creation of voice, graphics, and video (Hu, 2022).

The Generative Pre-Trained Transformer (GPT) model, on the other hand, reads and produces human-like text in a variety of languages using a large amount of publicly available digital content data (natural language processing [NLP]). It also demonstrates creativity in writing from a paragraph to a full research article convincingly (or nearly convincingly) on almost any topic.

### What is chatGPT?

ChatGPT stands for chat generative pre-trained transformer. It is an AI chatbot developed by openAI. It is launched in November 2022. It is built on top of open AI's GPT-3 family of large language models and has been tuned (an approach to transfer learning). It uses two types of learning i.e., supervised learning and reinforcement learning. In supervised learning, model was provided with conversations in which trainers played both sides i.e., user and AI assistant. In reinforcement learning, human trainers first ranked responses that the model had created in previous conversation. These ranking were used to create reward models that the model was further fine-tuned on using several iterations of proximal policy optimization (PPO). This algorithm presents cost-effective benefits to trust region policy optimization algorithm.

### How chatGPT works?

The transformer architecture, a kind of neural network that has proven to be particularly successful for applications involving natural language processing, is the foundation of ChatGPT. It learns to produce content that is comparable to the material it was trained on after being exposed to a big dataset of text, including novels and articles. The model analyses the input and produces a response in response to a prompt or context. The model predicts the subsequent word based on the input and the words it has already created. The answer is generated one word at a time. The model makes use of attention processes to concentrate on the input's most important elements and produce a response that is logical and pertinent to the situation. By giving the model task-specific examples and refining the model on this data, the model may be fine-tuned on a specific task such as question answering or conversation production after the training. By adjusting the model using the multilingual dataset or by giving the model the language code, it may also produce text in many languages. On January 23, 2023, ChatGPT works in 2 phases. Let's discuss in detail about it

1. **Pre-training:** Pre-training refers to the phase of data collection. It uses two types of learning i.e., supervised learning and unsupervised learning. Let's have a look on these techniques in detail:
  - A. **Supervised learning:** A model is trained on a labelled dataset using supervised pre-training, where each input is linked to a relevant output. A mapping function that properly maps inputs to outputs is taught to the whole model through training. Classification, regression, and sequence labelling are supervised learning problems that frequently employ this method.
  - B. **Non supervised learning:** When a model is pre-trained on data without any specified outputs linked to each input, this is known as non-supervised pre-training. Instead, the model is trained without any particular objective in mind to discover the underlying structure and patterns in the incoming data. Unsupervised learning tasks including clustering, anomaly detection, and dimensionality reduction frequently employ this method. To train a model to comprehend the syntax and semantics of natural language in the context of language modelling, non-supervised pre-training can be utilized. This will enable the model to produce coherent and comprehensible text in a conversational environment.
2. **Transformer architecture:** Natural language data is processed using neural networks using the transformer architecture. A neural network processes information through layers of linked nodes to mimic how the human brain functions. A neural network may be compared to a hockey team in that each player has a distinct duty, yet they all work together to score goals by passing the puck back and forth among one another.

- **Self-attention:** The "self-attention" technique used by the transformer architecture to analyze word sequences allows it to forecast outcomes by evaluating the relative weights of the various words in a sequence. Self-attention is comparable to how a reader may review a prior phrase or paragraph in a book to find the context necessary to grasp a new term. To comprehend context and the links between words, the transformer examines each word in turn. A phrase or other input data is sent to the transformer during training, and it is then asked to predict something based on that data. Depending on how well the model's forecast fits the actual result, it is modified. The transformer gains an understanding of the context and connections between words in a sequence as a result of this process, making it an effective tool for natural language processing tasks like language translation and text production.

## **MERITS OF CHATGPT AND OTHER GENERATIVE AI FOR TEACHING AND LEARNING**

OpenAI's ChatGPT, a huge language model, has the ability to serve as a successful tool for teaching. These are some examples of how ChatGPT may be used to improve learning, along with references to back them up:

1. **Personalized Tutoring:** ChatGPT may be utilized to provide students feedback and individualized instruction based on their unique learning requirements and development. According to a study by Chen and colleagues (2020), a conversational agent based on a generative model (ChatGPT) may offer students individualized math's coaching, leading to better learning results. The study demonstrated that the conversational agent was capable of tailoring its explanations to students' assumptions and adapting to their level of comprehension.
2. **Automated Essay Grading:** Essay grading may be assigned to ChatGPT, freeing up instructors' time to concentrate on other facets of instruction. According to research by Kim and colleagues (2019), a generative model (ChatGPT) trained on a dataset of human-graded essays was able to properly score high school student writings with a correlation to human grades of 0.86. The research demonstrated that the model could recognize crucial elements of some well essays and could offer feedback that was comparable to that of human graders.
3. **Language Translation:** To make educational resources more accessible to a larger audience, ChatGPT may be used to translate them into several languages. A generative model (ChatGPT) trained on a dataset of bilingual sentence pairings was shown to be capable of correctly translate across languages in research by Johnson and colleagues (2016), obtaining state-of-the-art performance on a number of translation benchmarks. The study demonstrated that the model was capable of accurately translating statements in one language while comprehending their meaning in another.
4. **Interactive Learning:** Students can engage in verbal interaction with a virtual teacher using ChatGPT to design interactive learning experiences. A conversational agent built on generative models may effectively help students learning English as a second language, leading to increased language competency, according to research by Peng and colleagues (2019). The study demonstrated that the agent could comprehend students' inquiries and offer pertinent and acceptable answers.

In general, COVID-19 has sped up the use of technology and digital pedagogy in education, but it has also brought attention to the importance of fairness and accessibility in the provision of education. In these difficult times, the educational system will need to continue to adjust and develop in order to satisfy the demands of students, instructors, and parents. 23 January 2023 (By ChatGPT).

## **POSSIBLE LIMITATIONS OF USING CHATGPT AND RELATED GENERATIVE AI IN EDUCATION**

Using ChatGPT and other generative AI models in education has many potential advantages, but there are some disadvantages as well. Research findings back up these negatives:

1. **Lack of Human Interaction:** The degree of human contact that a genuine instructor or tutor can provide is not something that ChatGPT and other generative models can match. For students who might gain more from a close relationship with a teacher, this lack of interpersonal interaction can be a drawback. According to 2014 research by D'Mello and colleagues, students who engaged with a virtual tutor who exhibited emotional behavior similar to that of humans learned more than those who connected with a tutor who lacked this behavior.
2. **Limited Understanding:** Generic models are not truly cognizant of the ideas they are assisting students in learning because they are based on statistical patterns in the data they are trained on. When it comes to giving explanations or feedback that are specific to a student's requirements and misconceptions, this might be a drawback.
3. **Bias in training data:** The quality of generative models depends on the data they are trained on, and if the training data has biases, so will the model. A model may not be able to properly assess essays submitted by students from various demographics, for instance, if it was trained on a dataset of essays that were largely authored by students from one particular population.
4. **Lack of Creativity:** The creativity and originality of the responses may be constrained by the fact that generative models can only produce answers based on the patterns in the data they have observed during training. A generative model-based music composition system had a restricted capacity to develop unique and varied tunes, according to research by Ziegler and colleagues published in 2019.
5. **Dependency on Data:** The quantity and quality of the data used to train generative models play a significant role in the model's performance. The model won't function as well if the data is insufficient or irrelevant. A generative model-based question-answering system lagged when the training data was unrelated to the task at hand, according to a study by Kocaguneli and colleagues (2019).
6. **Lack of Contextual Understanding:** Inadequate or irrelevant replies may result from generative models' incapacity to comprehend situation and context. According to research by Gao and colleagues (2019), generative model-based dialogue systems have a limited capacity to comprehend conversations and produce contextually relevant replies.
7. **Limited ability to personalize instruction:** ChatGPT and other generative AI models can offer advice and general knowledge, but they might not be capable of customizing lessons to each student's unique needs. 2020 (Ribeiro and Vala)

Eventually, ChatGPT and other generative AI models may be effective tools for boosting teaching and learning, but it's vital to be aware of their limits and pair them with other teaching strategies that place an emphasis on human interaction and comprehension.

## CONCLUSION AND SCOPE

Although its fundamental drawbacks, ChatGPT and some other forms of generative AI have established themselves and will proceed to revolutionize the way that teaching and learning is now conducted. While some have begun creating tools to identify AI-generated messages, others have urged for ChatGPT to be banned from classrooms. Several other people have offered advice that professors can use to discourage students from using ChatGPT for doing essays and other types of schoolwork. For instance, Elsen-Rooney (2023) claimed that ChatGPT was no longer accessible to students and instructors due to the New York City Education Department (NYC) blocking ChatGPT on school computers and networks. Even if these different approaches could be effective for a while, they might not hold up in the face of even more advanced generative AI, like GTP-4, which is projected to appear in the not-too-distant future. Existing research has demonstrated that AI generated-text detectors do not work well with modern advanced natural processing language models (Williams, 2023; Tate, 2023). We could not ignore that students may change the produced text to make it undetected and have access to these detectors as well. Therefore, it is imperative that we start to acknowledge the fast-evolving state of educational practices and incorporate these changes into our ongoing educational strategy. Students' assessment is one subject that has attracted more attention and grown more current.

With the rise of AI in organizations as well, including generative AI tools in the classroom and instructing students on how to use it responsibly and productively will also equip them to succeed in an AI-dominated workplace after graduation. As a result, teachers might use ChatGPT and other generative AI model tools to help students' learning. Certain inquiries require prompt solutions, such as how we may use ChatGPT to help students' learning. Do we need to provide instructors and students with training on how to use generative AI technologies available today to enhance teaching and learning? How can we successfully train faculty members or which was before teachers to use AI tools in their classrooms by integrating generative AI technologies into teacher education programmers? Would these generative AI tools narrow or widen the current digital gap, and what should we do next? Together, policymakers, academics, educators, and technology specialists initiate discussions on how these developing generative AI technologies may be utilised responsibly and effectively to enhance education and promote students' learning.

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