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Understanding the Role of Generative Pre-Trained Transformer (GPT) In Improving Learning Quality and Practices

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Abstract

Generative Pre-trained Transformers (GPTs) are an artificial intelligence model gaining popularity in educational technology development. GPTs are models that are massively trained on diverse texts and can generate texts with structure and meaning. The utilization of GPT in education offers great potential to improve the quality of learning, both inside and outside the classroom. This study aims to understand the role of GPT in improving the quality and practice of learning. This research uses a qualitative research method with a case study method. Data collection techniques in this research include literature study, interviews, and observation. Thematic analysis will be used as the main data analysis technique. The results show that GPT has the potential to be a supportive and interactive tool to increase student motivation in the learning process. The participants perceived GPT as a convenient and efficient means to access information, complete assignments, and receive personalized content tailored to their interests and learning styles.

Keywords Generative Pre-Trained Transformer; Learning Quality; Leraning Practice

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1. INTRODUCTION

This study aims to understand the role of GPT in improving learning quality and practices. Artificial Intelligence (AI) in education is becoming increasingly common in modern times, as it provides a way to enhance learning and teaching practices (Haluza & Jungwirth, 2023). During these changes, the use of artificial intelligence (AI) technology has become a topic increasingly attracting attention in education (Mambu et al., 2023). Advances in artificial intelligence in the field have opened up new possibilities and challenges in learning (Popenici & Kerr, 2017).

The new generation of artificial intelligence represented by Chat GPT (Generative Pretrained Transformer) is driving the innovative development of intelligent technology into a new historical stage. This technology not only profoundly influences and shapes the production, life, and communication modes of the entire society but also fundamentally reshapes society and humanity itself (Hill-Yardin et al., 2023). Since the emergence of Eliza, chatbots based on artificial intelligence generated content (AIGC) technology have been continuously developing and innovating. In particular, a Generative Pre-trained Transformer (GPT) is a type of AI developed to facilitate natural language processing and understanding (Khawar Hussain et al., 2023).

This innovative technology has the potential to revolutionize the way we learn and teach by providing new tools for improving learning quality and practices (Luckin & Holmes, 2016). GPT is a type of AI that uses deep learning techniques to analyze and generate text. It has been used for various applications, including language translation, text summarization, and question answering (Rudolph et al., 2023). It is based on the transformer architecture, a neural network designed to capture long-term dependencies in text. It can analyze large amounts of data, such as student performance data, and identify patterns and trends. And GPT information can then inform instructional decisions and improve teaching practices (Dağdeler & Demiröz, 2022).

The advancement of GPT has the potential to fundamentally transform students' approaches to academics and the educational landscape. Existing literature underscores the positive impact of AI technology on learning, as demonstrated by studies such as those conducted by Patil & Abraham (2010) and Pham & Sampson (2022). As highlighted by Srinivasa, Kurni, & Saritha (2022), AI-based tutoring programs can significantly enhance students' performance and motivation within learning environments. In particular, through tailored and interactive assistance, AI technologies like chatbots can elevate the learning experience and increase student engagement in online courses. Through the delivery of personalized and interactive support, Chat GPT holds the potential to foster the autonomy and independent study habits of self-directed learners.

Therefore, GPT can generate text, answer questions, and produce natural-sounding conversations. It is trained using large amounts of text data and can be fine-tuned to perform specific tasks. GPT can provide intelligent support to students, such as answering questions, providing feedback, and even predicting student performance. This can help to create a more personalized and engaging learning experience for students (Chen, 2022). One of the main advantages of GPT is that it can be used to improve learning quality and practices. For example, it can generate personalized learning materials for students.

This helps to create individualized learning plans for each student, tailored to their needs and interests. GPT can also generate personalized feedback for students, helping them better understand concepts and develop their skills. GPT can be used to create interactive learning experiences for students (Sultan et al., 2022). It can generate virtual tutoring sessions, allowing for on-demand assistance with course material. This can help improve student-teacher interactions and engagement quality, leading to better learning outcomes. GPT can also be used to generate automated assessments of student work (Hutson, 2022). This can help to reduce the workload of teachers while providing feedback to students promptly. GPT, in particular, can be used to create customized learning materials based on individual student needs, leading to improved learning outcomes (Kikalishvili, 2023). This can also help improve the quality of learning and teaching practices and increase student engagement.

Furthermore, by understanding the role of GPT in improving learning quality and practices, students and educators can leverage its capabilities to enhance teaching methods, personalize learning experiences, and engage students more effectively (Baidoo-Anu & Ansah, 2023). This research seeks to investigate how GPT contributes to improving learning experiences, its impact on teaching practices and instructional strategies, and potential barriers that may arise during its implementation. Moreover, there are several studies related to this research. The first study by Chen et al. (2020) looked into how GPT (Generative Pre-trained Transformer) affects writing skills in second language learning. They did a trial with 60 participants and discovered that GPT significantly improved writing skills, especially in accuracy, fluency, and complexity. The second research, by Dağdeler & Demiröz (2022), focused on teachers' views and experiences using GPT in teaching English as a foreign language. They interviewed 20 teachers and found that GPT positively impacted students' language learning, particularly in terms of engagement.

The last study by Smith et al. (2020) assessed how GPT influenced student learning outcomes in a high school history class. They did a study with 80 participants and found that using GPT significantly

improved students' content knowledge compared to traditional teaching methods. Students also reported higher engagement and interest in the topic. While these studies focused on specific areas like writing skills, English teaching, and history learning, there's a need for a broader investigation into how GPT could impact learning across various subjects and situations. Additionally, understanding the mechanisms through which GPT improves outcomes, such as engagement, motivation, critical thinking, and personalized learning, is crucial for future research. By shedding light on these aspects, educators, students, and researchers can gain valuable insights into the transformative potential of GPT and devise strategies to maximize its effectiveness in enhancing learning quality and practices.

2. METHODS

This study will use a qualitative research approach with a case study method. Power collection techniques in this research include literature review, interviews, and observations. Thematic analysis will be used as the main data analysis technique. The sampling technique used in this research is purposive sampling. The researcher selected 15 participants based on their experience using GPT for learning and teaching purposes. The participants are from Yogyakarta State University.

The saturation principle will determine the number of samples, which means that data collection will continue until no new information is obtained. Data for this study will be collected through semi-structured interviews. Furthermore, for this study, thematic analysis will be used to analyze the data. Thematic analysis is a method that identifies and analyzes patterns or themes within the data.

The study received full ethical clearance from all participants involved. Written consent was obtained from each participant after they were provided with comprehensive information about the study. Participants were assured of their freedom to withdraw from the study at any point if they chose to do so.

Participants agreed to have their interviews recorded, which were later anonymized and transcribed. To ensure data security, all interviews were stored on a password-protected and encrypted computer system, which housed all the research data.

Depending on the availability and preferences of the participants, the interviews will be conducted in person or online. The location of the interview process was in State University of Yogyakarta. The interview questions will be carefully developed to elicit information about the participants' direct experiences with GPT, its impact on their learning quality and methods, and their perspectives on its benefits and downsides. The interviews will be recorded in audio format with the participants' permission.

This study used thematic analysis, as Braun and Clarke (2006) defined. The approach began with transcribing the interview tapes and progressed through the coding stages. The researchers read and reread the transcripts to discover relevant themes, which they then shared with the primary author.

The first and last authors analyzed these initial codes in the second phase of analysis, carefully examining how to preserve the diversity of the initial codes while developing overarching themes and higher-level sub-themes.

3. FINDINGS AND DISCUSSIONS

The analysis produced five themes.

Writing Boost: Supportive & Interactive Tool for Student Motivation

Almost all participants reported that they received the potential of GPT as a supportive tool in learning to enhance student motivation. Illustrative examples appear below.

One participant stated:

"I think it (GPT) will help them in the learning process, I heard that it can give information for its user in an easy way. I think it will motivate students more as they have tools that can help them learn easily." (Student 1)

Another participant also stated:

"In looking for the information, GPT is quickly found it, also it help the students to easier for create and finishing the assignment. so it makes the students being motivated in learning process." (Student 3)

Participants recognize that GPT can generate personalized and interactive content tailored to students' interests and learning styles.

"I believe that GPT can generate personalized content that is tailored to the student's interests and learning style, which can help increase interactive learning experiences, which can help them stay motivated and on track with their learning goals" (Student 12)

The accessibility and speed of GPT also can enhance motivation and engagement in the learning process.

"It is very helpful for students, because the GPT is very quick and easy to use it also provides a lot of good information, this can engage student to be more motivate in learning because sometimes the answers to the information provided by the GPT are in accordance with the expected answers." (Student 15)

The perspectives shared by the participants shed light on the potential positive impact of GPT on the learning process. The sentiments expressed by students, such as those articulated by Student 1 and Student 3, underscore the belief that GPT can enhance motivation by providing information in an accessible and user-friendly manner, ultimately facilitating a more streamlined approach to learning. Moreover, participants, exemplified by the viewpoint of Student 12, recognize the transformative potential of GPT in generating personalized and interactive content. This acknowledgment suggests that GPT can cater to individual interests and learning styles, thereby fostering more engaging and tailored learning experiences. However, GPT in education still needs an adjustment, as stated by Stephens (2023). To ensure that students adhere to academic integrity when using these new technologies. Schools need to make appropriate adjustments to teaching methods and examination standards. The emphasis on interactive learning experiences is particularly noteworthy, as it aligns to maintain student motivation and help them stay on track with their learning goals.

Furthermore, the participants, as highlighted by the perspective of Student 15, emphasize the significance of GPT's accessibility and speed. The quick and easy accessibility, coupled with the provision of high-quality information, is perceived as a valuable resource that not only aids in the efficient completion of assignments but also serves as a motivational factor for students. This underscores the idea that GPT, with its swift and reliable capabilities, has the potential to influence motivation and engagement in the learning process positively. In essence, while the participants recognize the potential benefits of GPT in enhancing learning experiences, it is crucial to acknowledge the nuanced nature of these perspectives. As technological tools like GPT continue to evolve, it becomes imperative to balance leveraging their advantages and ensuring that they complement, rather than replace, the critical thinking and analytical skills integral to the learning process.

Igniting: A Catalyst for Personalized Learning Experiences

Research has shown that personalized learning can improve academic achievement, engagement, and self-efficacy (Wu, 2017). Participants in the study have acknowledged the pivotal role played by GPT as a catalyst in addressing students' individual needs, interests, and preferences, thereby facilitating the generation of personalized learning content. This noteworthy customization spans

various facets of the learning journey, encompassing practice exercises, targeted feedback on pronunciation and grammar, and the provision of resources tailored to each student's unique language level and specific goals.

The participants in the study have keenly observed and highlighted that GPT's functionality offers a seamless avenue for quick and efficient access to information. This accessibility significantly contributes to the creation of personalized learning experiences. Notably, students often grapple with motivation when independently searching for information. However, the swift and effective retrieval capabilities of GPT have emerged as a game-changer in this regard. By streamlining the information retrieval process, GPT empowers students to personalize their learning journeys effortlessly, enabling them to find relevant information with greater ease and efficiency. The recognition of GPT as a tool that enhances both motivation and accessibility underscores its substantial impact on fostering personalized and engaging learning experiences for students.

Handcuff Creativity: Diminishing the Need to Think Critically

Most participants expressed concerns that GPT may hinder critical thinking skills or make individuals dependent on it for information. They highlight the importance of personal thinking, motivation, beliefs, and experiences in developing critical thinking skills, which they believe cannot be replaced by GPT.

Two participants stated :

> *"No. I said no because I believe that critical thinking skills affected from inner thinking of a person. It related to people motivation, what they believe, and what they like, which is, affected from their experience. GPT, even though it gives information in fast and easy way, will not be same as experience which is you got from long process of learning in many ways and surroundings."* (Student 6)

> *"I think otherwise. GPT can make students less critical since it can provide everything including critiques towards something, it makes student be less creativity."* (Student 4)

Some participants also stated that GPT does not provide clear resources and often gives them fake references that do not even exist on the internet.

> *"According to my experience in using GPT, the information presented in GPT does not contain clear sources it often lead me to fake references, so in my opinion it is less effective in its use so that it will have an effect on decreasing our critical thinking skills."* (Student 7)

The results reflect a prevailing sentiment among participants expressing apprehensions regarding the potential impact of GPT on critical thinking skills. The participants, as exemplified by the insights shared by Student 6 and Student 4, stress the intrinsic connection between critical thinking and individual introspection, motivation, beliefs, and personal experiences. They argue that the multifaceted nature of critical thinking, rooted in personal development and learning experiences, cannot be wholly replaced by the practicality of information retrieval offered by GPT. Student 6, in particular, emphasizes the nuanced interplay between motivation, beliefs, and experiences, asserting that critical thinking is intricately tied to these internal factors. This perspective suggests that the depth and richness of knowledge gained through a more prolonged and varied learning process are irreplaceable, even by the efficiency of tools like GPT.

Moreover, concerns raised by Student 4 highlight the potential downside of GPT, with the belief that overreliance on the system might diminish creativity and critical thought. The sentiment expressed suggests that while GPT offers a quick and comprehensive array of information, it may inadvertently stifle the development of independent and creative thinking skills. Additionally, criticisms regarding the lack of clear sources and the potential inclusion of fake references, as voiced by Student 7, underscore challenges related to the reliability of information provided by GPT. Even though the use of GPT has benefits for time efficiency, it is not helping students at all. As stated by Villasenor (2023), it is essential

to teach students how to use these technologies correctly and effectively to ensure that their learning process is meaningful and efficient rather than to make them work fast. This perception, if widespread, could contribute to a decrease in trust and reliance on the tool, particularly when accuracy and clear sourcing are integral to fostering critical thinking.

In conclusion, the participants' concerns collectively highlight the need for a balanced approach to integrating GPT in educational contexts. While recognizing its efficiency, there is a prevailing sentiment that GPT should not replace but rather complement the intricate and multifaceted process of developing critical thinking skills through personal introspection and varied learning experiences. The nuanced perspectives shared by participants underscore the ongoing dialogue surrounding the role of technology in education and the importance of preserving the depth and diversity inherent in the cultivation of critical thinking abilities.

Addictive: The Dependency of GPT

A prevalent sentiment among most participants is the concern that GPT might have the unintended consequence of diminishing critical thinking skills, potentially fostering an overreliance on the AI system. One participant, in particular, articulated the apprehension that exclusively depending on GPT for task completion could impede individuals from engaging in critical thought processes regarding how they approach and execute those tasks. This participant emphasized the significance of personal engagement, analysis, and critical evaluation of information that, according to their perspective, might be compromised when utilizing GPT.

The expressed worry centers around the idea that the convenience and efficiency offered by GPT might inadvertently discourage individuals from actively and critically engaging with the content they encounter. There is a collective recognition among participants that, while GPT undoubtedly streamlines processes and provides quick solutions, it may inadvertently erode the habit of approaching tasks with a critical mindset.

In essence, the concern voiced by participants underscores the delicate balance between leveraging AI capabilities for efficiency and ensuring that individuals retain their capacity for independent thought and analysis. This nuanced perspective highlights the importance of nurturing an awareness of when and how to use AI tools like GPT, emphasizing the need for a thoughtful and measured approach to ensure the preservation and enhancement of critical thinking skills in tandem with technological advancements.

Unlocking the Potential of GPT in Future Education

As artificial intelligence technology advances swiftly, the level of automation in diverse industries is rising, presenting unprecedented challenges to traditional education and instructional methods. The constant evolution of technology leads to the continual replacement of existing knowledge and skills. Consequently, the education sector must continually innovate to keep pace with the rapid technological advancements. In response, the education industry has introduced numerous new technologies and knowledge to cater to the ever-changing demands of learning.

In the era characterized by artificial intelligence akin to GPT, the future of education has shifted from merely imparting knowledge, fostering skills, and facilitating employment opportunities to a focus on adaptive learning (Gao et al., 2022). In light of this paradigm shift, the education industry should prioritize the development of students' critical thinking, analyzing problems, and cultivating effective solution-seeking abilities. This emphasizes the need for education to evolve in tandem with the changing landscape, emphasizing skills that are adaptable and applicable in an environment shaped by continual technological advancements.

Furthermore, students should acquire the skills to harness technology for societal improvement, become proficient in utilizing data and analytical techniques for streamlined decision-making, and

develop the capacity to discern and assess artificial intelligence effectively. Attaining these objectives necessitates educational institutions to concentrate on enhancing students' learning capabilities, empowering them to proactively delve into knowledge and participate in digital learning most efficiently. In education, school-based learning assumes an indispensable role, with school education being integral. Regarding the curriculum, teachers are responsible for nurturing students' critical thinking and practical skills, encompassing proficiency in artificial intelligence technologies such as Chat GPT (Zhai, 2022).

Students should undergo training to foster strong self-control abilities, particularly in managing time, energy, and emotions. The emphasis in education and teaching should be on nurturing a new generation of individuals with a global outlook and adept digital skills. Moreover, schools should actively develop students' artistic aptitude and design skills, fostering an appreciation for aesthetics. Crucially, students need to acquire the capacity to identify and resolve problems, especially complex ones. This skill set is vital for preparing them to navigate diverse challenges in their future careers, positioning them to emerge as leaders and advocates in the era of artificial intelligence.

Furthermore, participants highlighted several key factors that can contribute to the future improvement of GPT in educational settings. Participants expressed the need for expanding the scope of GPT's application in education. This includes integrating GPT with other learning technologies and existing tools and platforms, allowing for seamless integration and leveraging the strengths of different resources to enhance learning outcomes.

Discussion

The study results indicate that participants generally perceive GPT as a supportive and interactive tool for enhancing student motivation in the learning process. The ability of GPT to provide information easily and quickly was highlighted by participants, leading to increased motivation among students. The convenience of finding information and completing assignments efficiently contributed to a positive learning experience. This result is in line with (Lameras & Arnab 2021), who stated that the research had contributed to developing a better understanding of how artificial intelligence can enhance the teacher's role as a catalyst in designing, creating a visualization, and managing teaching and learning. In addition, the results can also amplify AI systems that make representations based on meaningful data-based conclusions from pedagogical, domain, and learner models (Holstein et al., 2018).

Participants recognized that GPT has the potential to generate personalized and interactive content tailored to student's interests and learning styles. This customization extends beyond basic information retrieval and includes practice exercises, feedback on pronunciation and grammar, and resources tailored to individual language levels and goals. By catering to the unique needs of students, GPT can enhance interactive learning experiences and help students stay motivated in achieving their learning goals. The same statement is in line with (Hwang & Tu, 2021), who stated that using artificial intelligence can enhance cognitive load, collaboration, and communication competencies, and learning anxiety.

The accessibility and speed of GPT were also identified as factors contributing to motivation and engagement in the learning process. Participants expressed that GPT's quick and easy access to information, which often aligns with expected answers, can engage students and increase their motivation to learn (Muñoz et al., 2023). The efficient retrieval of relevant information through GPT alleviates the demotivation often associated with searching for information manually. Participants also expressed concerns regarding the potential negative impact of GPT on critical thinking skills.

They emphasized the importance of personal thinking, motivation, beliefs, and experiences in developing critical thinking skills, which they believed could not be fully replaced by GPT. Some participants were apprehensive that GPT's ability to provide comprehensive information, including critiques, might hinder students' critical thinking abilities and creativity. Additionally, the lack of clear

sources and the occasional presentation of fake references by GPT raised doubts about its effectiveness in promoting critical thinking. The study also revealed that participants perceived a risk of dependency on GPT, which could lead to a decrease in critical thinking skills.

Many participants expressed concerns that relying too heavily on GPT for completing tasks might hinder individuals from thinking critically about their approach and execution. The ease of finding information through GPT could lead to a mindset where all tasks are seen as solvable solely through GPT, diminishing the inclination to think critically about the task at hand. This is also in line with the results of Schmidt's research regarding the process of learning foreign languages using artificial intelligence. In this research, the desire is that with AI, all tasks are considered easy, and there is no need to bother thinking critically anymore. This is one of the weaknesses produced by artificial intelligence (Schmidt & Strasser, 2022).

To unlock the full potential of GPT in future education, participants suggested several areas for improvement. These included integrating GPT with other learning technologies and existing tools and platforms, incorporating more multimodal features, customizing learning pathways, and incorporating real-time assessment and feedback. Participants emphasized the need for collaboration between GPT and human educators, as well as the importance of user feedback, expanding the scope of the application, and ensuring data privacy and security. By addressing these areas, GPT could be optimized and enhanced to improve learning quality and practices. While participants acknowledged the potential of GPT as a supportive and interactive tool for student motivation, concerns were raised regarding its impact on critical thinking skills and the risk of dependency. To fully utilize GPT in education, it is essential to balance leveraging its benefits for personalized learning experiences and focusing on personal engagement, analysis, and critical evaluation.

With these considerations in mind and incorporating feedback from users, the GPT can be further developed to improve learning outcomes and facilitate effective educational practices. Future research could conduct experimental studies to evaluate the impact of using GPT in teaching. This could include the development and implementation of a curriculum that utilizes GPT as well as the measurement of student learning outcomes. In addition, future research could examine how to design more effective instruction or learning materials by utilizing GPT. Focus on aspects such as content organization, interactivity, and personalization.

4. CONCLUSION

The results of the study suggest that GPT has the potential to be a supportive and interactive tool for enhancing student motivation in the learning process. Participants perceived GPT as a convenient and efficient means of accessing information, completing assignments, and receiving personalized content tailored to their interests and learning styles. The accessibility and speed of GPT were identified as factors contributing to motivation and engagement in learning. However, concerns were raised regarding the potential negative impact of GPT on critical thinking skills. Participants emphasized the importance of personal thinking, motivation, and experiences in developing these skills, suggesting that GPT cannot fully replace them.

There was also a perceived risk of dependency on GPT, which could diminish the inclination to think critically and independently. To maximize the benefits of GPT in education, participants recommended integrating it with other learning technologies and platforms, incorporating multimodal features, customizing learning pathways, and incorporating real-time assessment and feedback. Collaboration between GPT and human educators, user feedback, expanding the scope of application, and ensuring data privacy and security were also highlighted as important considerations. Furthermore, while GPT shows promise as a tool for enhancing student motivation, it is essential to strike a balance between leveraging its benefits for personalized learning experiences and maintaining

a focus on personal engagement, analysis, and critical evaluation.

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