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The Implementation of ChatGPT-based Learning for Higher Education in Indonesia: Systematic Literature Review

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ABSTRACT

This research investigates the implementation of ChatGPT-based learning in higher education in Indonesia, emphasizing the analysis of its technical aspects and their contribution to educational practices. Through a systematic literature review, this study examines the positive impacts and challenges of integrating ChatGPT in university settings, drawing on recent analyses and diverse scholarly sources. The data were obtained from a variety of academic databases, including reputable web-blogs, Google Scholar, the Indonesian National Library's database, Education Resources Education Center (ERIC) Database, and E-Resources Perpusnas. The findings reveal that ChatGPT significantly enhances student engagement and writing skills, particularly in English as a Foreign Language (EFL) contexts. Key features such as custom GPTs, prompt engineering, and personalized settings play a crucial role in maximizing the tool's educational benefits. This research underscores the potential of ChatGPT to transform learning experiences by fostering interactive, personalized, and efficient educational environments. The implications of these findings contribute to a deeper understanding of AI's role in education, highlighting its capacity to enhance learning outcomes and educational engagement in higher education institutions in Indonesia.

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AI in Education, GPT-3.5 and GPT-4o; ChatGPT in Higher Education; ChatGPT; Prompt Engineering.

1. Introduction

In today's era, Artificial Intelligence (AI) tools, like the Generative Pre-trained Transformer (ChatGPT), have attained significant recognition in the field of education, particularly in higher education environments. ChatGPT, an artificial intelligence utilizing Natural Language Processing (NLP) models (currently versions GPT-3.5, GPT-4.0, and GPT-4.0) developed by OpenAI, is designed to generate text that mimics human writing. It allows users to adjust and direct a conversation to achieve the preferred length, format, style, level of detail, and language. ChatGPT has undergone several important updates over the years, making it more refined and powerful, thus diversifying its adoption. The most recent model, GPT-4.0, excels at understanding and summarizing information, presenting it in a clear and conversational way (Atlas, 2023; Pavlik, 2023).

The enthusiasm for ChatGPT has captured the attention of researchers. Studies on ChatGPT have predominantly focused on areas such as tourism (Erul & Işin, 2023), law (Biswas, 2023), economy (Huang & Zhu, 2023), information technology and engineering (Ekin, 2023; Hopkins, 2024), and education (Mhlanga, 2023; Canedo et al., 2024). While these studies offer valuable insights and best practices, implementing ChatGPT in education presents challenges. The ongoing debate on whether ChatGPT tools are beneficial for students adds to the complexity. Additionally, there have been instances where students use ChatGPT to write parts of their assignments (Črček & Patekar, 2023), which could potentially lead to cheating and plagiarism (Rahma & Fithriani, 2024). This practice can make it difficult for educators to accurately assess students' abilities in higher education. Therefore, this article aims to provide a comprehensive guide on using ChatGPT-based learning in higher education, specifically focusing on best practices and strategies for maximizing its benefits in the classroom, while also addressing the technical aspects that have contributed to positive attitudes from both educators and students (Yaumi et al., 2024; Rahman, 2024).

Research on the use of AI tools in higher education has been conducted, with a recent focus on ChatGPT's implementation in assisting students' writing skills, particularly among EFL students (Fitria, 2023; Wahyuddin et al., 2023; Marzuki et al., 2023; Yaumi et al., 2023). These studies indicate that both educators and students have a positive

attitude towards using ChatGPT in the classroom. Furthermore, not only has this tool received positive feedback, but students' writing skills have also improved compared to their performance before using ChatGPT (Wahyuddin et al., 2023). However, research on writing skills has solely focused on students' and educators' perceptions and performance in using ChatGPT, leaving out the technical aspects of ChatGPT that make the tool useful for both students and lecturers. This study aims to address this gap by thoroughly exploring the implementation of ChatGPT in higher education, focusing on the technical aspects that have led to positive attitudes from both educators and students.

2. Methodology

This research employed a literature review approach to analyze existing scientific studies conducted by various scholars, as it provided valuable insights for addressing the research questions (Fink, 2019). The literature was presented in a descriptive format, following the structure proposed by Fink (2019), which included key elements such as the review's purpose, methods, results, conclusions, and limitations.

In terms of research methodology, a descriptive qualitative approach was used. This approach involved collecting rich data related to the key terms of this research, which included AI in education, ChatGPT in higher education, AI-based learning tools, educational technology in Indonesia, student engagement and AI, and AI prompts. The data was analyzed inductively, moving from specific observations to broader generalizations, drawing from a range of previous ChatGPT research.

Regarding data collection techniques, this research primarily relied on a document study approach. Various documents related to ChatGPT research and the key terms were gathered and assessed based on their relevance to the current study. To source these documents, this research explored journal articles and research materials available on platforms such as reputable web-blogs, Google Scholar, the Indonesian National Library's database, Education Resources Education Center (ERIC) Database, and E-Resources Perpusnas. Also, to delve deeper into the features of ChatGPT, this research will directly access the interface of the AI tool directly from https://chatgpt.com/.

In the search process, two approaches were used with general descriptors such as "AI in education," "ChatGPT in higher education," "AI-based learning tools," "educational technology in Indonesia," "student engagement and AI," and "AI prompt." Additionally, subtopics under these descriptors, including "ChatGPT" and "implementation," were combined to yield a variety of relevant resources. The data was then classified based on sub-descriptors such as definitions, developmental history, and characteristics, following the classification method developed by Fink (2019).

By focusing on these aspects, this research aimed to explore the usefulness of ChatGPT, particularly emphasizing the technical elements of the tool that contribute to the positive attitudes of both students and educators—an area often overlooked in other studies.

3. Results and Discussion

3.1. Usages of ChatGPT in Higher Education

Research on the usage of ChatGPT by students and educators in their learning process has been limited, particularly in exploring and introducing its features for classroom use. While existing studies have primarily focused on showcasing best practices, such as effective prompts for generating tailored responses, there has been insufficient attention given to understanding the full range of tools available.

a. Supporting Research and Writing

In assisting students' study in higher education institutions, there are some features of ChatGPT that are crucial. Atlas (2023) points out that ChatGPT offers a range of functionalities applicable to various academic and professional contexts. The literature indicates that ChatGPT supports a range of academic activities for both students and educators. For instance, ChatGPT is frequently used by students for summarizing texts and generating creative prompts, which aids in the research and writing process (Atlas, 2023). Educators benefit from using ChatGPT to develop interactive quizzes and educational materials, thus enhancing student engagement and learning outcomes (Atlas, 2023). This synthesis of studies suggests that ChatGPT's versatility makes it a valuable tool in diverse educational contexts, although the effectiveness of these applications varies based on the specificity and complexity of the tasks.

b. Personalized learning support

The literature indicates that ChatGPT enhances personalized learning by providing instant answers and feedback, which is particularly beneficial for students seeking quick clarifications or additional materials outside of regular study

hours. Li (2023a) emphasizes that ChatGPT's ability to offer personalized learning experiences is a key advantage. The model tracks student interactions, identifies learning needs, and delivers customized resources to enhance learning outcomes. This targeted support helps address individual weaknesses and strengthens understanding in specific subject areas, ultimately improving academic performance.

c. Improvement in Student Productivity

Research shows that ChatGPT significantly boosts student productivity by serving as a versatile tool for various educational tasks. Fauzi et al. (2023) note that ChatGPT provides useful information and resources, saving students time that would otherwise be spent searching for answers. Additionally, the model enhances language skills by offering real-time corrections and suggestions, which helps students improve their writing and comprehension. ChatGPT also facilitates collaboration in group projects by acting as a mediator, ensuring clear and efficient communication. By providing quick solutions to problems, ChatGPT allows students to focus on more complex aspects of their studies, thereby increasing overall time efficiency and effectiveness.

d. Support in Teaching and Administrative

The literature highlights significant support provided by ChatGPT in teaching and administrative tasks. Li (2023) discusses how ChatGPT helps organize instructional activities by offering ready-made teaching resources and lesson plans, thus reducing teachers' preparation time. The model also assists in evaluating assignments by providing quick and consistent feedback on student submissions, helping educators manage their workload more effectively and ensuring timely feedback for students. Additionally, ChatGPT aids university administrators in decision-making processes by analyzing data and offering predictive insights, which are useful for course planning, resource allocation, and identifying at-risk students who may need additional support.

e. Support in Academic Writing and Research

ChatGPT supports academic writing by providing several key functions that assist students. Neumann et al. (2023) explain that ChatGPT can summarize literature, helping students quickly grasp the main points of extensive research papers. This is especially useful during the initial stages of research when students need to review a large number of sources. ChatGPT can also paraphrase text, making complex material easier to understand and integrate into student work. Additionally, the model offers direct writing support by suggesting improvements in structure, style, and grammar, which is particularly beneficial for students with language barriers or those who find academic writing challenging. This enables students to produce higher-quality work.

Atlas (2023) further highlights that ChatGPT assists with brainstorming and writing processes by analyzing student work and offering suggestions for improvement in clarity and overall flow. However, it is important to acknowledge the model's limitations. ChatGPT's effectiveness is influenced by the data used for its training, which can lead to challenges in understanding or responding to specific types of prompts and potentially generating biased or inaccurate outputs. Additionally, the text generation is based on learned patterns, which can result in repetitive or unoriginal responses. Despite these drawbacks, recent updates on GPT-3.5 and GPT-4 have shown significant improvements in reducing biases and enhancing user feedback.

f. Efficient Study Assistance with ChatGPT

Using ChatGPT in study routines can make study sessions more efficient for students by providing quick access to information and simplifying complex data. The literature highlights several key benefits of using ChatGPT.

Firstly, rapid information retrieval is a significant advantage of ChatGPT. According to Hultgren et al. (2023), ChatGPT allows students to get answers to their questions almost instantly. This saves valuable time that would otherwise be spent searching through textbooks or various online sources. By streamlining the research process, ChatGPT helps students focus more on understanding and using the information rather than on finding it. This quick access to relevant information makes study sessions more effective.

Secondly, ChatGPT excels at summarizing large volumes of data, making it very useful for students dealing with extensive research articles or lengthy study materials. Surapaneni et al. (2023) note that ChatGPT can condense complex information into concise summaries, allowing students to quickly grasp the main points without getting overwhelmed by details. This feature is especially helpful during exam preparation when managing time and understanding key concepts are critical. By providing clear and concise summaries, ChatGPT helps students retain essential information more effectively.

In addition to summarizing data, ChatGPT plays a crucial role in assisting with literature reviews. Kavadella et al. (2023) state that ChatGPT can give a comprehensive overview of existing research on specific topics, highlight key findings, and suggest relevant articles. This function helps organize and simplify the review process, making it easier for students to identify important trends, gaps, and contributions in the literature. The ability to quickly gather and synthesize relevant research helps with the initial stages of academic writing and research projects.

Moreover, ChatGPT enhances students' understanding of complex subjects by breaking down difficult concepts into simpler terms. Hasanein and Sobaih (2023) explain that ChatGPT offers detailed explanations, examples, and even step-by-step solutions to problems, which enhances comprehension and retention. This feature is particularly beneficial for students tackling challenging subjects or concepts that require extra clarification and support. By simplifying complex information, ChatGPT helps students build a stronger foundational understanding, which is crucial for advanced learning.

Lastly, ChatGPT facilitates collaborative learning by supporting group study sessions. Ali et al. (2023) discuss how ChatGPT can be used to verify facts, resolve disputes over information, and ensure that all group members are aligned in their understanding. This function promotes a more cohesive and productive learning environment, as it allows students to collaboratively explore and verify information efficiently. The use of ChatGPT in group settings ensures that discussions remain focused and productive, enhancing the overall learning experience.

3.2. ChatGPT's Features in Assisting Learning Activity for Higher Education

Studies on analyzing ChatGPT in Higher Education classrooms as mentioned before focused majorly on testing its adaptability, feasibility, and its acceptance for students and educators in Indonesia. However, little attention was given towards the features that makes it powerful in assisting students and educators teaching-learning activity. Several important features are introduced by OpenAI in its new flagship tool, GPT-4o and also its predecessor, GPT-3.5. These features are as follows:

a. Explore GPT's

In the recent version of GPT, which is GPT-4o, there are options to explore custom versions of ChatGPT. These custom GPTs are made by users and it is approved by OpenAI. Custom GPTs differ from standard models in two key ways. First, they are user-created, allowing for customization through the inclusion of additional, hidden instructions. These instructions can take the form of an extended introductory message, in this case prompt, providing context that shapes the GPT's responses. Second, some Custom GPTs are linked to external services. This integration allows them to interact with information beyond their initial training data, potentially enhancing their capabilities. In this current version, there are six featured custom versions that are available for GPT-4 users. The downsides are that these features have usage caps, which are only available for a few amounts of Prompts for free to users. If users need more prompts, they need to subscribe.

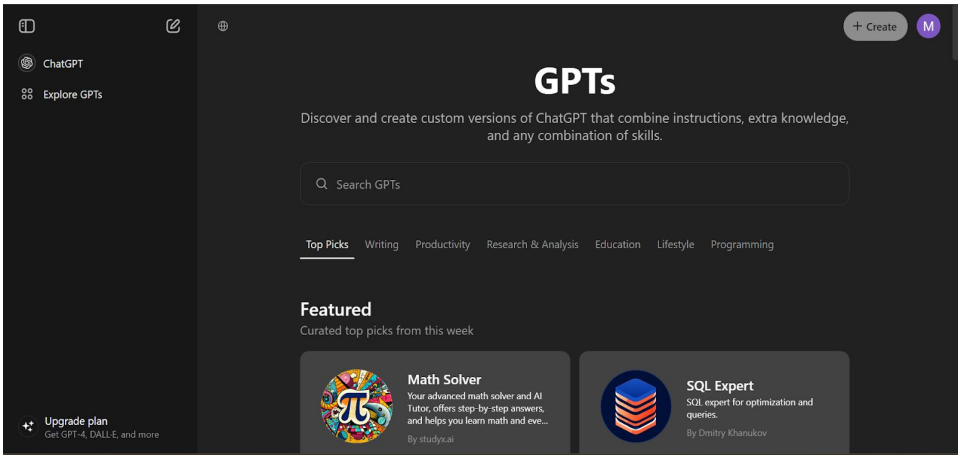

Figure 1. Screenshot of GPT-4o features when clicking Explore GPT's

Sources: Taken from https://chatgpt.com/

b. Prompt

When engaging in a conversation with ChatGPT or similar applications, users typically ask questions through a dedicated chat bar, located at the bottom of the interface (Figure 2). This chat bar allows users to input their questions or messages, known as prompts, to ChatGPT. For example, if a user wants to learn about semiotics, they can simply type, "What is semiotics?" into the chat bar. Therefore, a prompt is the text input, such as a question or instruction, that users enter to receive a response from ChatGPT.

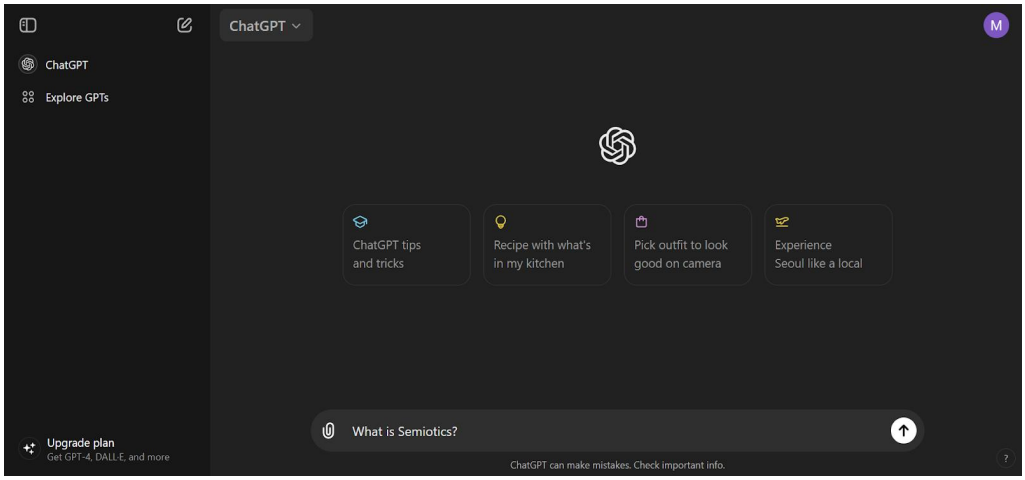

Figure 2. Screenshot of interface of a ChatGPT, showing example of writing a prompt

Sources: Taken from https://chatgpt.com/

The AI's ability to generate a relevant response relies on these inputs, and more specific and carefully worded prompts tend to produce better results (Giray, 2023). This emphasizes the interactive nature of prompts, showing how they facilitate a dialogue between the user and the AI. According to Polverini and Gregorcic (2024), a ChatGPT prompt is a critical input consisting of specific instructions, questions, or phrases that direct the AI to generate appropriate and meaningful responses. The quality of these prompts, in terms of clarity and specificity, significantly influences the AI's conversational output.

The nature of prompts, which is critical to producing high-quality responses to users' questions, has been widely tested by researchers to find the most effective ways of using ChatGPT. Kocoń et al. (2023) studied ChatGPT's performance on 25 different Natural Language Processing (NLP) tasks, a field of artificial intelligence focused on enabling computers to understand, interpret, and generate human language, examining how various prompts affect the quality of its answers. They found that well-crafted prompts greatly improve the AI's accuracy and relevance, although ChatGPT shows an average quality loss of about 25% compared to top solutions in zero-shot and few-shot evaluations. Similarly, Mungoli (2023) investigated how combining prompt engineering with reinforcement learning enhances ChatGPT's control and responsiveness. This research showed significant improvements in performance across different areas, underlining the importance of prompt design in making AI models more effective for real-world uses like customer support, virtual assistants, and education.

As AI grows more capable and powerful in producing information, image, and other related content, the research on how to make effective prompts also grew more diverse. The stems of this research area can be traced back to the development of Artificial Intelligence in the process of training AI. It also can be traced back from the rise of AI image generators (Ambrosio, 2019), such as OpenAI's Dall-E and Midjourney (Hanna, 2023), resulting in the rise of the field Prompt engineering. This field involves the design and formulation of prompts to optimize the performance of AI, specifically includes the design, testing, and refinement of prompts to improve the AI's performance. (Genkina, 2024; Kratzke & Drews, 2024) It also involves understanding the underlying mechanisms of how the AI interprets and responds to different types of prompts (Korzynski et al., 2023; Kocoń et al., 2023). From this field, the researches suggest that to get powerful and more meaningful answers, prompt needs to have specific criteria, such as:

Tasks. Researchers agree that creating a clear task is the most important part of a good ChatGPT prompt. Users should aim to be specific and to the point in their instructions. (Meskó, 2023) Additionally, studies have shown that

starting a prompt with a strong action verb is very helpful. These verbs, like generate, write, analyze, or explain, tell ChatGPT exactly what you want it to do (Atlas, 2023).

Describe the Setting and Provide the Context or Details Around the Question (Meskó, 2023; Team, 2023)

Intonation. It is the desired tone that the user wants ChatGPT to answer. For instance, academic tone, formal tone, casual tone, and etc. Persona, it can be understood as roles that users want to make ChatGPT to be. The tool will generate answers according to the desired persona that the user wants. (Atlas, 2023)

c. Customize ChatGPT

ChatGPT allows users to provide additional information, called custom instructions, that it should consider when responding. These instructions will be automatically included in future conversations with ChatGPT. (Figure 3)

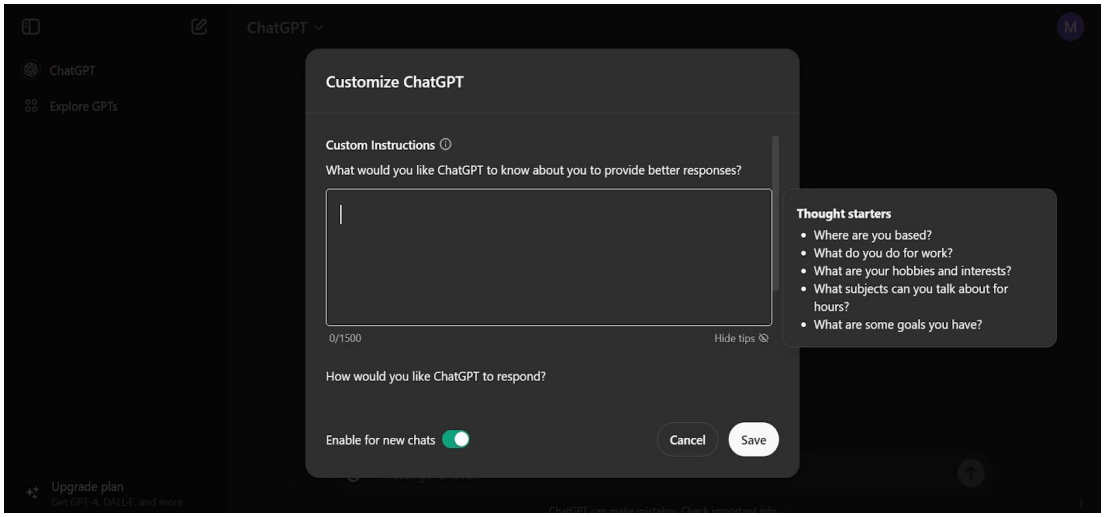

Figure 3. Screenshot of the "Customize ChatGPT" interface, which allows users to provide custom instructions to the tool

Sources: Taken from https://chatgpt.com/

The custom instruction feature in ChatGPT allows users to specify what they want the ChatGPT to know about them in order to generate better responses in future conversations. This feature enables users to tailor the model's responses to their specific needs or preferences. Users can input information under the heading “What would you like ChatGPT to know about you to provide better responses?” There are thought starter prompts listed such as:

Where are you based?

What do you do for work?

What are your hobbies and interests?

What subjects can you talk about for hours?

This could include information about the user's location, occupation, hobbies, interests, or any other relevant details. The text box below the prompt allows the user to enter their custom instructions, with a character limit of 1500 displayed. This gives users the flexibility to provide detailed information about themselves to help ChatGPT understand their context and respond more appropriately. The "Thought starters" section on the right-hand side of the interface offers a list of suggested prompts to help users consider what information they might want to share, such as their location, work, hobbies, and goals. The "How would you like ChatGPT to respond?" section allows users to toggle a setting to "Enable for new chats," which will apply the custom instructions to future conversations with ChatGPT. The "Cancel" and "Save" buttons at the bottom of the interface allow users to either discard their custom instructions or save them for use in subsequent conversations with the language model.

There is also a space for users to input their own goals for using ChatGPT. By providing this information, users are essentially giving ChatGPT a background or context about themselves, which can be used to tailor its responses to be more relevant and interesting in future interactions.

4. Conclusion

This study, through a literature review approach, investigates the applications and implications of ChatGPT in higher education, focusing on its role in supporting students and educators. The literature indicates that ChatGPT enhances personalized learning by offering instant responses and tailored feedback, addressing individual learning needs and improving academic performance. It assists students in summarizing texts, generating creative prompts, and providing quick access to information, which aids in research and writing. ChatGPT also enhances study sessions and literature reviews, simplifying complex subjects. For educators, ChatGPT organizes instructional activities, develops interactive quizzes, and provides consistent feedback on assignments, reducing preparation time and workload. Additionally, it supports university administrators by analyzing data for course planning and resource allocation. Despite limitations related to its training data, which can impact response quality, recent updates have improved its performance and reduced biases. Overall, the literature review suggests that ChatGPT significantly benefits higher education by improving learning and productivity for students and educators. Future research should focus on optimizing ChatGPT's features and addressing its limitations to further enhance its effectiveness in educational settings.

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