



www.ijemst.net

Beyond the Bot: ChatGPT's Influence on Student Learning

Ahmed Azmi 
University Malaysia Sabah, Malaysia

Ismail Maakip 
University Malaysia Sabah, Malaysia

Peter Voo 
University Malaysia Sabah, Malaysia

Nurul Hudani Mohd Nawi 
University Malaysia Sabah, Malaysia

Dg Norizah Ag Kiflee @ Dzulkifli 
University Malaysia Sabah, Malaysia

Murnizam Halik 
University Malaysia Sabah, Malaysia

Sanen Marshall 
University Malaysia Sabah, Malaysia

Wei Boon Quah 
Universiti Putra Malaysia, Malaysia

To cite this article:

Azmi, A., Maakip, I., Voo, P., Mohd Nawi, N.H., Kiflee @ Dzulkifli, D.N.A., Halik, M., Marshall, S., & Quah, W.B. (2024). Beyond the bot: ChatGPT's influence on student learning. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 12(6), 1488-1503. <https://doi.org/10.46328/ijemst.4435>

The International Journal of Education in Mathematics, Science, and Technology (IJEMST) is a peer-reviewed scholarly online journal. This article may be used for research, teaching, and private study purposes. Authors alone are responsible for the contents of their articles. The journal owns the copyright of the articles. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of the research material. All authors are requested to disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations regarding the submitted work.



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

Beyond the Bot: ChatGPT's Influence on Student Learning

Ahmed Azmi, Ismail Maakip, Peter Voo, Nurul Hudani Mohd. Nawi, Dg Norizah Ag Kiflee @ Dzulkifli,
Murnizam Halik, Sanen Marshall, Wei Boon Quah

Article Info

Article History

Received:

01 May 2024

Accepted:

01 September 2024

Keywords

ChatGPT

Impacts

Students' perspective

Higher education

Abstract

Given the widespread use of ChatGPT among university students, questions arise about its potential benefits and drawbacks. This study aims to explore the challenges and impacts of ChatGPT on the future of higher education. Using qualitative research methods, data were collected from semi-structured interviews. A thematic analysis approach was employed. Findings revealed that most students learned about ChatGPT primarily through social media, followed by friends and lecturers. While students acknowledged ChatGPT's ability to simplify and filter information, aiding in their understanding of topics, they also expressed concerns about increased dependency, potential laziness, and a decline in writing and critical thinking skills. Furthermore, students felt that ChatGPT could not replace higher education or lecturers due to its lack of emotional understanding. They also emphasized the impracticality of banning its use. Instead, they suggested that universities should explore ways to regulate its use, with specific recommendations discussed in the article. Lastly, students recognized the importance of learning to use ChatGPT, citing potential job requirements and their utility in assisting with assignments and learning.

Introduction

The primary goal of higher education extends beyond just nurturing students' intellectual capacities, such as critical thinking and problem-solving skills; it also prepares them for the demands of the job market. To foster this comprehensive development, universities utilize various assessments, including assignments and exams, which play a crucial role in molding students' intellectual growth and career paths. However, the rise of advanced technologies, particularly the emergence of large language models like ChatGPT, capable of performing diverse tasks ranging from essay writing and brainstorming to conducting literature reviews and coding, has prompted widespread speculation. These speculations revolve around the potential impact of such technologies on existing educational models and the future landscape of higher education.

This article seeks to address these conjectures and contribute to the ongoing discussion. It aims to explore and analyze students' perceptions of ChatGPT's influence on higher education, aiming not only to provide answers to pertinent questions but also to enrich the discourse on this critical issue.

Literature Review

The Evolution of ChatGPT

Chatbot technology, designed to emulate human-like conversations, has been adopted both formally and informally for educational purposes (Adamopoulou & Moussiades, 2020; Karyotaki et al., 2022). However, educational chatbots encounter several challenges, including difficulties in accurately processing student input and their lack of emotional nuance in language (Chen et al., 2023; Smutny & Schreiberova, 2020).

ChatGPT, developed by OpenAI, represents a significant advancement in this field, leveraging a sophisticated language model. The initial iteration, ChatGPT-1, launched in 2018, was built on transformer architecture and equipped with 117 million parameters. Despite its ability to provide cohesive and fluent responses, ChatGPT-1 encountered limitations, notably repeating answers when queries extended beyond its training data. In 2019, OpenAI introduced ChatGPT-2, which included an additional 1.5 billion parameters, enhancing its capability to generate contextually appropriate text. However, it still faced challenges with complex reasoning tasks.

June 2022 marked the launch of a more advanced version, featuring 175 billion parameters, demonstrating remarkable proficiency in generating human-like text. This progression continued with subsequent releases of ChatGPT 3.5 and ChatGPT 4, the latter being the most recent update as of March 14, 2023. ChatGPT 4, incorporating trillions of parameters, has exhibited exponential improvements in text generation, showcasing advanced capabilities in creating high-quality content. Research evaluating ChatGPT's level of critical thinking found that it could produce responses characterized by clarity, precision, relevance, and logical coherence, demonstrating significant depth and breadth (Susnjak, 2022). Another study assessing ChatGPT's performance in a third-year medical exam revealed its ability to meet the threshold for passing, highlighting its potential in complex knowledge assessments (Gilson et al., 2023).

The Impact of ChatGPT on Learning

ChatGPT has sparked a blend of admiration and skepticism within educational spheres. On the positive side, it offers personalized assistance tailored to students' learning paces, potentially enhancing their comprehension of material (Dempere et al., 2023). This study also underscores additional benefits, such as streamlined enrollment processes, improved student services, teaching enhancements, research support, and increased student retention. Moreover, ChatGPT has the potential to relieve pressure on both students and lecturers; students may find it more comfortable seeking help from ChatGPT rather than directly from their tutors, while tutors can save time by not having to address routine queries (Limna et al., 2023). Luan et al. (2023) argue that ChatGPT is pivotal in transitioning to the Learning 3.0 Era, emphasizing the cultivation of critical thinking, creativity, and problem-solving skills, with perceived usefulness and ease of use as key factors driving student adoption.

Scholarly documents suggest that ChatGPT can aid in a range of academic tasks, including reading, writing, information analysis, critical thinking, problem-solving, creating practice problems, and developing research skills. Furthermore, it serves as a valuable tool for lecturers in lesson planning and student assessment (Kasneci

et al., 2023). Lecturers can employ ChatGPT to address routine questions, thereby reducing their workload and enabling them to focus on more complex tasks (Limna et al., 2023).

Conversely, concerns have been raised about ChatGPT's potential role in promoting academic dishonesty and diminishing the authenticity of student work (Kasneci et al., 2023; Khalil & Er, 2023; Perkins, 2023). Studies like Baskara and Mukarto (2023) suggest that ChatGPT may provide biased and inaccurate information due to the data it was trained on. Another significant concern is the risk of overreliance on ChatGPT, which could impair students' critical thinking and hinder the development of higher-order thinking skills. This overreliance may lead to a superficial understanding of topics and diminish peer interaction, as students might depend solely on ChatGPT for information (Bai et al., 2023; Farrokhnia et al., 2023).

The critical question then arises: how should educators and universities address the use of ChatGPT? Farrokhnia et al. (2023) advocate for a balanced approach that harnesses ChatGPT's opportunities while mitigating its threats. They recommend integrating media literacy to foster critical thinking about new technologies and transitioning from traditional summative assessments to formative ones, including self-assessments, reflection reports, portfolios, and peer feedback. This approach underscores the significance of authentic assessment practices that focus on real-life problem-solving tasks beyond ChatGPT's capabilities. Another study proposes fostering criticality towards ChatGPT's responses and promoting group activities to enhance peer interaction, utilizing ChatGPT as an aid. Additionally, it encourages educators to cultivate a comprehensive understanding of tools like ChatGPT as part of their ongoing professional development (Bai et al., 2023).

Students' Perception of ChatGPT

In a study conducted by Shoufan (2023), students generally perceived ChatGPT as useful, particularly for its ability to enhance motivation and provide clear explanations of complex topics. However, concerns were raised about its impact on academic integrity and future job opportunities. Firat (2023) also examined the perceptions of scholars and students, highlighting ChatGPT's benefits in improving student engagement and performance, as well as reducing educator workload. Yet, this study pointed out challenges such as outdated assessment methods, ethical issues, misinformation, and bias.

Ngo (2023) reported that students appreciated ChatGPT for its time-saving capabilities, access to a broad range of information, personalized tutoring, and enhanced learning retention. Despite these benefits, there was skepticism about the accuracy of the information provided. Similarly, Kanabar (2023) found that most students viewed ChatGPT as a valuable support tool but expressed concerns about its impact on their learning and critical thinking skills. Barrett and Pack (2023) focused on student and teacher perceptions of ChatGPT in the writing process. The study observed its utility in idea generation and brainstorming during the initial stages of writing, rather than for completing assignments. A study examining medical students in Saudi Arabia found that ChatGPT, unlike Google, was valued for its ability to synthesize information and provide conversational interactions. However, there was awareness that the information could be misleading, with potential implications for students' critical thinking (Abouammoh et al., 2023).

In a Malaysian context, Abd Rahim et al. (2023) noted ChatGPT's effectiveness in improving students' writing skills through personalized feedback, vocabulary suggestions, and grammatical corrections. A study of Chinese students learning English found that ChatGPT motivated them towards independence and problem-solving skills (Liu, 2023). Imran and Lashari (2023) explored Pakistani students' perceptions of ChatGPT's impact on creative writing, recognizing its potential to enhance fluency and creativity. However, they also feared it might diminish critical thinking and independent thought. Yilmaz and Karaoglan Yilmaz (2023) discussed ChatGPT's application in programming education, noting its helpfulness in answering questions and aiding in debugging, potentially boosting self-confidence. Yet, there was a concern about increasing reliance and potential professional anxiety.

Interestingly, Petricini et al. (2023) found faculty members uncertain about integrating ChatGPT into educational settings, noting a distinction between the unique content provided by ChatGPT and the more straightforward outputs of calculators. Mohamed (2023) also highlighted a variety of opinions among faculty members regarding ChatGPT's utility versus its potential to hinder critical thinking and research skills. In general, as noted by Hadi Mogavi et al. (2024), ChatGPT is often associated with increased productivity and efficiency, aiding in the development of student motivation and self-efficacy. However, it also poses the risk of encouraging superficial learning habits and diminishing critical thinking. This article contributes to the ongoing debate about ChatGPT's impact and its potential effects on the future of higher education, specifically by exploring the perceptions of students at Malaysian universities.

Methodology

This study adopted a qualitative research method, deemed suitable for the research objectives as it facilitates a profound exploration of participants' perceptions regarding the phenomenon under scrutiny (Creswell & Creswell, 2013). The study aims to address three primary questions:

1. How do students perceive ChatGPT's impact on their learning?
2. How do students view ChatGPT's influence on higher education, and how should universities respond?
3. Do students deem it essential to learn how to use ChatGPT, and if so, why?

The subsequent sections of the methodology will cover data collection methods, participant profiles, and the data analysis process.

Data Collection Approach

In this study, researchers utilized a semi-structured interview technique, providing participants with the opportunity to freely express their opinions. While this approach encouraged candid responses, it also directed the conversation towards our specific research topics, as outlined by Doody and Noonan (2013). Regarding participant selection, researchers employed a purposive sampling strategy. This strategy aims to select individuals with comprehensive knowledge of the subject matter, thus maximizing the efficient utilization of limited research resources (Palinkas et al., 2015). Interviewees were selected based on their familiarity with ChatGPT, proficiency in English, undergraduate status, and availability.

Participant Profile

The majority of respondents were from the Faculty of Psychology and Education, likely due to their accessibility and eagerness to participate compared to students from other faculties. Nevertheless, the sample was diverse, including three respondents from the Faculty of Social Sciences and Humanities, two from the Faculty of Art, and one from the Faculty of Medicine and Health Sciences. This study encompassed a total of 14 informants, reaching the saturation point.

Data Analysis Process

The study adopted the thematic analysis approach outlined by Braun and Clarke (2006). This method was chosen for its flexibility and reflexivity, facilitating the retention of depth and richness in the findings. Initially, the data was thoroughly reviewed multiple times to immerse in it. Preliminary codes were then generated and applied across the dataset. Subsequently, primary themes were identified and refined through collaborative discussions among the researchers. Finally, the themes were presented in a way that effectively conveyed the perspectives of participants on the research topic.

Table 1. Participants Information

Informants	Faculty	Sex
Informant 1	Faculty of Psychology and Education	Female
Informant 2	Faculty of Psychology and Education	Male
Informant 3	Faculty of Psychology and Education	Female
Informant 4	Faculty of Psychology and Education	Female
Informant 5	Faculty of Psychology and Education	Female
Informant 6	Faculty of Psychology and Education	Female
Informant 7	Faculty of Social Science and Humanities	Female
Informant 8	Faculty of Social Science and Humanities	Female
Informant 9	Faculty of Social Science and Humanities	Male
Informant 10	Faculty of Psychology and Education	Male
Informant 11	Faculty of Psychology and Education	Female
Informant 12	Faculty of Arts	Male
Informant 13	Faculty of Arts	Female
Informant 14	Faculty of Medicine & Health Sciences	Male

Findings

The findings have been organized into five primary themes.

1. Discovering ChatGPT.
2. Positive impacts of ChatGPT on student learning.
3. Negative impacts of ChatGPT on student learning.

4. ChatGPT's influence on higher education institutions.
5. The importance of learning how to use ChatGPT.

Discovering ChatGPT

Most students learned about ChatGPT through friends or social media, while a smaller number discovered it through their lecturers. For instance, Student 5 shared that her course mate introduced her to ChatGPT when they noticed she was having difficulty with her assignment:

“I found out about it from a friend, specifically a course mate. At that time, I was struggling with my assignments. They suggested, 'Why don't you try ChatGPT?' I was puzzled and asked, 'What is that?' That's when they demonstrated how it works.” (Student 5).

Another student came across ChatGPT on TikTok. Initially, she disregarded it but eventually gave it a try after persistent recommendations from her friends, who highlighted its utility. Meanwhile, some students were introduced to ChatGPT by their lecturers. One student, for example, became aware of ChatGPT after her lecturer mentioned it in a WhatsApp group:

“We learned about it from our lecturer. She shared information about it, saying it helped her with her work.” (Student 3)

Interestingly, another student's first exposure to ChatGPT was a caution from their lecturer about the risks of copying and pasting from the platform:

“I first heard about it from teachers and lecturers. They would often say in class, 'I know some of you might copy-paste from ChatGPT.' As they kept mentioning it, more of us began to wonder about its utility. That piqued my curiosity, and I decided to explore it further. I hadn't been aware of it initially.” (Student 14)

Positive Impacts of ChatGPT on Student Learning

In general, students believe that ChatGPT can be both beneficial and detrimental, with its impact largely depending on the user. When discussing the positive effects of ChatGPT on learning, many students highlight the platform's ease of use and simplicity as primary advantages.

“The advantage is clear: it simplifies our lives and assists in our tasks.” (Student 3)

This simplicity in ChatGPT is frequently attributed to its proficiency in providing rapid, thorough, and pertinent responses that are readily comprehensible. Numerous students also highlight that, in contrast to Google and other search engines, ChatGPT's human-like conversational interface significantly enhances the effectiveness of information exchange.

“It filters out irrelevant content, saving time when searching for information.” (Student 2)

“It can explain a topic comprehensively.” (Student 5)

Many individuals, including students and academics, increasingly recognize the potential of ChatGPT as a valuable tool for enhancing knowledge and understanding. This utility becomes particularly evident in scenarios where learners face difficulties with certain topics in their lecture notes or struggle to locate relevant books and resources. In these instances, ChatGPT emerges as a rapid and straightforward solution, providing clear explanations and bridging knowledge gaps with ease. Additionally, ChatGPT is acclaimed for its role as an excellent starting point in the exploration of new and unfamiliar academic fields, as highlighted by a student who used it to gain initial insights into complex subjects.

“I use ChatGPT when there's a topic missing from my lecture notes or when I need a quick answer. It's a valuable resource for gaining knowledge. If you delve deep into a topic, you can learn a lot from ChatGPT.” (Student 11.)

“If used wisely, ChatGPT can provide a foundational understanding. For instance, if I'm unfamiliar with a topic like psychosis in medical school, I can start with ChatGPT for an overview. It's essential to not solely rely on ChatGPT but to use it as a steppingstone before consulting more authoritative sources.” (Student 14).

Negative Impacts of ChatGPT on Student Learning

Students have also raised concerns about the potential impact of ChatGPT on academic diligence and independence. While acknowledging the numerous benefits of ChatGPT, they caution that its ease of use and immediate access to information could inadvertently foster a tendency towards laziness and over-reliance among learners.

“My opinion is the same. is the same like earlier. because when things. become more easier, you probably will be lazy to give an effort for everything or anything.” (Student 4)

This sentiment is echoed by others who believe that ChatGPT might diminish the inherent challenges of learning. Which consider that one of the main objective of learning process is to adapt students to the struggles of life and learning.

“But the con is that student will not learn Um, the struggle. The struggle of learning. Maybe they just being fed by the ChatGPT directly.” (Student 6)

This over-reliance on tools like ChatGPT could potentially undermine the value of the learning process in two significant ways. Firstly, it may result in a shallower understanding of the material. Secondly, it could impede the development of critical and creative thinking skills. This situation mirrors the 'use it or lose it' principle, where the ease of access to ChatGPT might tempt students to rely more heavily on it for answers. Consequently, this could lead to a diminished need for, and thus a lesser development of, higher brain functions involved in problem-solving and independent thinking.

“Would the bad sides for it is it is not very good for you to own. It is means it is your second brain. and I think that your brain does not even. you know, creating new neurons. I mean because you are not using your brain” (Student 1).

“First one is critical thinking. because they cannot think, you know. They just follow what the AI say and just put in the assignment.” (Student 9)

“Reduces creativity and stunts intellectual growth.” (Student 12)

The growing reliance on AI tools like ChatGPT raises significant concerns regarding the authenticity and integrity of student work. There is a fear that such dependence might undermine the originality and honesty integral to academic writing.

“There is no integrity in their self. because as students we must make our assessment with our writing, not use anyone to help us. So, when we use this application this ChatGPT. so that makes the student, just take granted. something like that. something like that” (Student 7).

ChatGPT's Influence on Higher Education Institutions

While AI, particularly ChatGPT, has made significant strides in information dissemination, most students believe it's unlikely to replace the traditional university lecturer. They argue that AI lacks the emotional depth and experiential knowledge that human educators bring to the table. Additionally, while AI can provide information, it doesn't necessarily teach in the same way a lecturer does.

“Because a lecturer is a person and then a lecturer not, they just not what, how to say? They teach the student not only to use the syllabus, but they also have their, for us, I like psychology. They have their self-closure like that ah, ChatGPT doesn't have that, doesn't have that emotional ah thing happening. Life like life going anywhere.” (Student 6)

However, some students note the advantage of ChatGPT in providing a direct answer to students questions. Instead of following the lecturer who may spend too much time to explain a materials that ChatGPT could explain in a few minutes.

“Like no beating around the bushes or something like that, because I find some lectures, spend too much, too, too long on something that could be taught in just a few minutes. Yeah, like less than what they usually take. So ChatGPT helps, that Is why I love ChatGPT because it simplifies everything. There's no chit-chat, there's no advertisement here. And again, lecture, sometimes the lecturer will, like, go around, and they'll get the experience of something, and then it goes more than the time when it's something you can learn just a shorter time.” (Student 5)

Many students argue against the outright banning of AI tools like ChatGPT. Instead, they suggest that universities should harness its capabilities. For instance, lecturers could use ChatGPT to enhance their teaching materials.

“So, saying that you are just going to stop people from using it. it is just a waste in my opinion. it is modern day already. stopping innovation has not work since forever, they are going a way to get through.” (Student 2)

“Definitely won't be replacing lectures, because we still need what you call this quality, qualitative

lectures, you know, like ChatGPT is just an app, it's just an AI, it doesn't exactly know what you mean. But lectures, they, they've gone through being a student, they know what a student needs. So, we still need lectures, it's just that maybe ChatGPT can help them do a lecture better. maybe they Maybe lecturers could ask ChatGPT to do this lecture., What are the important things that I should highlight.”
(Student 5)

Furthermore, students believe that universities should focus on regulating the use of ChatGPT appropriately. They've proposed various strategies, such as reminding students of the purpose of higher education, instilling values like integrity and honesty, and teaching students how to use AI tools effectively.

“So, maximizing the benefit and minimizing the damage, I guess. the first thing is to educate the student. why are they here? why is it they are studying? You are studying not to just pass the exam. but to learn something. Once they know this. they will automatically be using the tools properly instead of abusing them tools. I think this is probably the first way. and the second way I think would be to regulate the answer that they give.” (Student 14)

“Because as student must take responsibility for our results. with our own decision. We know, we cannot do something like cheating on the exam. or cheating while we are doing our assessment, so we need to be more integrity. be more integrity. responsibility, integrity, and honesty. three types of attitudes must have in students' self.” (Student 7)

Other proposed strategies involve delineating specific sections of assignments where the use of ChatGPT is permissible. For instance, lecturers could advise students that certain components, such as the introduction and literature review, can be completed with the assistance of ChatGPT. However, they would also clarify that other segments, particularly those requiring deeper analysis and original thought like the discussion section, should be the students' own work. This approach ensures that while students leverage the advantages of ChatGPT for certain tasks, they also engage in critical thinking and personal input where it matters most.

Additionally, another method to mitigate over-reliance on digital tools is the implementation of supervised, in-class assignments. In these settings, students would be required to work without the use of any electronic devices. This approach not only fosters a controlled environment for academic honesty but also encourages students to develop and rely on their own cognitive abilities, ensuring a balanced use of technology in their learning process.

“That not supposed to be a thing to do. but then regulation. maybe certain parts, sure ChatGPT can used like a literature review like introduction can. Things that do not require your own opinion. because you still going to be online. you just going to look for whole things and articles, you are going to copy-paste. you are going to cite. It saves time. but then for parts like discussion. parts like the later part. like the conclusion, the abstract, or the result. those things can be regulated. Maybe the lecturer can say like in this part Ai is not allowed, being caught will automatically zero" or something like that.” (Student 2)

“Maybe the lecturer gives the assessment on time. and students must do it on time without any electronic devices. the lecturer makes groups, and they discuss at that time and the assessment will be complete at

that time also. something like a quiz but discussion.” (Student 7)

The Importance of Learning How to Use ChatGPT

A significant majority of students emphasize the importance of familiarizing oneself with ChatGPT. For many, this stems from the need to stay updated and adapt to the modern era. Student 5, for instance, highlights that as the world becomes increasingly reliant on AI, it's crucial to harness its capabilities without becoming overly dependent.

“I think it's important to learn because as we move on forward, right, it's everything is going to be AI. It's important that you learn how to use AI and not let AI use you or control you. And because AI is going to make your life a lot easier in the future, since everything is going to be high-tech. I think it's important. Yes, maybe we can give like short courses or tutorials on YouTube. On how to use ChatGPT.” (Student 5)

Another perspective shared by students is the potential career advantage that proficiency in ChatGPT can offer. Student 2 elaborates on how industries with large-scale production, such as journalism and advertising, are already leveraging AI. In such a landscape, job recruiters prioritize efficiency and cost-effectiveness, making individuals skilled in AI tools like ChatGPT more attractive hires.

“Job recruiters, they do not care if you, all they care about is lessening the cost they must pay for their workers. so, if one worker can do the job of ten people. Because they know how to use an AI program. They are going to choose that one person over the other 10 people so yeah, it depends on the industry. It depends on many factors, but I will say learning how to use ChatGPT is an advantage. because it is viral, but it is not widespread. If you interview with 10, with 100 students they will know about ChatGPT. They will know how to use it, but they are not skilled at it. Because writing the correct prompts for ChatGPT will give you higher-quality things.” (Student 2)

Discussion

This research delves deeply into the multifaceted effects of ChatGPT within the realm of higher education. It comprehensively covers various aspects including the channels through which ChatGPT is discovered, its escalating significance in academia, and its dual-sided potential to affect student learning outcomes both positively and negatively. Moreover, the study explores students' perceptions regarding the wider implications of ChatGPT for educational institutions, its influence on the evolution of future teaching strategies, and the importance of developing proficiency in utilizing this tool.

The findings reveal that students predominantly come across ChatGPT through social media platforms, notably TikTok and Instagram. Considering Dixon's (2023) finding that the average student dedicates roughly 147 minutes daily to social media, the extensive recognition and adoption of ChatGPT through these mediums is not unexpected. This observation underscores the urgency for educational institutions to acknowledge and integrate the influential role of social media in molding academic behaviors and the adoption of new educational tools.

Students recognize the dual nature of ChatGPT's influence on their learning. Positively, ChatGPT aids in their understanding by distilling complex information from the internet into more digestible forms. This tool effectively circumvents the often tedious process of navigating through multiple Google links to find relevant data. This aligns with existing research exploring student perceptions, which indicates that students value ChatGPT for its ability to simplify complex concepts, potentially enhancing their motivation to learn (Kanabar, 2023; Montenegro-Rueda et al., 2023; Shoufan, 2023). A similar sentiment is noted among Saudi Arabian students, who recognize ChatGPT's crucial role in synthesizing online information for easier comprehension (Abouammoh et al., 2023). The facilitation of easy-to-understand explanations by ChatGPT could lead to an increase in student motivation. This concept is supported by the theory of planned behavior, which suggests that an individual's likelihood of engaging in certain behaviors is influenced by their perceived level of control (Kaiser & Gutscher, 2003). By providing accessible information, ChatGPT may enhance students' self-efficacy, thereby positively impacting their motivation to study.

However, there are growing concerns among students about an over-reliance on ChatGPT, which could potentially lead to two significant issues. Firstly, there is a risk of diminished higher-order thinking skills among students. Secondly, students might miss out on the valuable learning experiences that come from grappling with challenging material.

Addressing the first concern, the impact of ChatGPT on students' critical thinking can be explored through the lens of writing's role in enhancing such skills. Research by Quitadamo and Kurtz (2007) demonstrates that writing activities can significantly bolster critical thinking performance. Therefore, the increased dependency on ChatGPT for writing tasks could lead to a decline in students' writing quality and, consequently, their critical thinking abilities. This notion is further supported by the theory of planned behavior proposed by Ajzen (2012). As students become more reliant on ChatGPT for completing their work, their perception of their own capabilities diminishes. This perceived decrease in self-efficacy regarding higher-order skills can, in turn, lead to an actual reduction in these abilities.

The second point of discussion delves into a crucial educational concern: the risk of neglecting the importance of enduring and overcoming challenges in the learning process. In the current digital era, where quick access to information through AI tools like ChatGPT is common, there is a worry that these technologies might encourage a sense of impatience and a preference for superficial learning. Rapid answers provided by such tools can detract from the deeper, more enriching aspects of learning that involve effortful exploration and problem-solving. This aligns with the concerns raised by Bai et al. (2023) and Hadi Mogavi et al. (2024) about ChatGPT potentially leading to more superficial learning experiences. Furthermore, these observations resonate with Carr's (2010) assertions in his book about the internet fostering shallow rather than deep learning. The crux of the problem lies in the tendency to seek information quickly and only skim through it, a habit that ChatGPT might inadvertently promote.

Despite the potential drawbacks associated with ChatGPT, students have made it clear that outright banning the tool in universities is impractical. Given the accessibility of technologies like VPNs, students are likely to find

ways to use ChatGPT regardless of prohibitions. Therefore, universities should focus on how to effectively integrate ChatGPT into their systems. Students themselves have proposed several approaches to achieve this. Firstly, there is a need to shift the academic focus of students. Universities should emphasize the importance of mastering course materials rather than merely striving for high grades. By fostering a deeper commitment to learning, the likelihood of ChatGPT being misused could be mitigated. Another strategy involves setting boundaries for ChatGPT usage. For instance, students could be permitted to use ChatGPT for tasks that don't require higher-order thinking, such as conducting literature reviews. However, its use could be restricted for more complex tasks like discussions or assignments that demand synthesis and critical thinking.

A third approach is the in-class execution of assignments under supervision. This method would encourage students to rely on their own cognitive abilities rather than on ChatGPT, thereby enhancing their independent thinking skills. Finally, it's crucial for lecturers to explore ways to incorporate ChatGPT into their teaching methodologies. This aligns with recent studies by Dempere et al. (2023) and Kasneci et al. (2023), which suggest that while ChatGPT can augment teaching, it cannot replace the irreplaceable value of human interaction and emotional engagement in learning, a sentiment echoed in the findings of Ausat et al. (2023). These studies reinforce the notion that ChatGPT should be viewed as a tool to enhance, rather than replace, traditional teaching methods.

In summary, students highlighted the necessity of becoming proficient in utilizing ChatGPT, underpinned by two principal reasons. Firstly, the unstoppable momentum of innovation positions AI technology as an inevitable fixture in our daily lives. Therefore, adapting to and mastering this trend is crucial for personal and professional success. The ability to leverage AI tools effectively can facilitate staying ahead in a rapidly evolving digital landscape. Secondly, the job market is progressively valuing AI proficiency. Consider fields like journalism, where production efficiency is increasingly prioritized. With AI skills, tasks that traditionally took two days can potentially be completed in just two hours. This efficiency gain underscores the competitive advantage that individuals with AI competencies may hold, possibly influencing hiring decisions. Possessing such skills not only aligns with current technological advancements but also positions individuals favorably in the eyes of potential employers, reflecting a blend of foresight and adaptability that is highly sought after in the modern workforce.

Conclusion

In conclusion, ChatGPT presents both promising opportunities and potential pitfalls. While it offers students immediate and comprehensible answers, enhancing their understanding of various topics, there's a risk it could foster over-reliance, potentially diminishing their critical thinking skills. Universities cannot merely prohibit the use of ChatGPT. Instead, they must devise effective strategies to harness its benefits while mitigating its drawbacks. This includes reminding students of the core objectives of higher education: to cultivate a broadened mindset and deepen knowledge. Students should be encouraged to reflect on the true essence and purpose of their university journey. Additionally, the use of ChatGPT could be restricted to areas that don't demand higher-order thinking. The rise of ChatGPT calls for a collaborative approach involving lecturers, students, and policymakers. This collaboration aims to maximize its benefits while minimizing potential negative impacts. Universities should

invest time and resources to adapt and innovate with ChatGPT, ensuring they remain aligned with rapid technological advancements.

Recommendations

Future research in the realm of ChatGPT and its impact on education should delve deeper into several key areas. Firstly, there is a need for longitudinal studies to track the long-term effects of ChatGPT usage on students' learning outcomes, critical thinking abilities, and overall academic performance. Understanding how prolonged exposure to AI tools influences students' cognitive processes and academic habits over time is crucial for informing educational policies and practices. Secondly, qualitative studies exploring the perspectives of educators, administrators, and policymakers regarding the integration of ChatGPT into higher education institutions would provide valuable insights. By understanding stakeholders' attitudes, concerns, and perceived benefits of incorporating AI technology into teaching and learning environments, future research can offer practical recommendations for effectively integrating ChatGPT while addressing potential challenges and ethical considerations. Additionally, investigating the effectiveness of different strategies for regulating ChatGPT usage, such as setting boundaries or implementing supervised assignments, would contribute to the development of evidence-based guidelines for promoting responsible and effective use of AI tools in education.

References

- Abd Rahim, E. M., Abd Rahim, M. E., Razawi, N. A., & Mohamed, N. A. (2023). Students' perception on the use of ChatGPT as a language learning tool. *Ideology Journal*, 8(2), 70-78. <https://doi.org/10.24191/ideology.v8i2.456>
- Abouammoh, N., Alhasan, K., Raina, R., Malki, K. A., Aljamaan, F., Tamimi, I., Muaygil, R., Wahabi, H., Jamal, A., Al-Tawfiq, J. A., Al-Eyadhy, A., Soliman, M., & Temsah, M.-H. (2023). Exploring perceptions and experiences of ChatGPT in medical education: A qualitative study among medical college faculty and students in Saudi Arabia. *medRxiv*, 2023-07. <https://doi.org/10.1101/2023.07.13.23292624>
- Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, 2, 100006. <https://doi.org/10.1016/j.mlwa.2020.100006>
- Ajzen, I. (2012). The theory of planned behavior. *Handbook of Theories of Social Psychology: Volume 1*, 438–459. <https://doi.org/10.4135/9781446249215.N22>
- Ausat, A. M. A., Massang, B., Efendi, M., Nofirman, N., & Riady, Y. (2023). Can Chat GPT replace the role of the teacher in the classroom: A fundamental analysis. *Journal on Education*, 5(4), 16100–16106. <https://doi.org/10.31004/JOE.V5I4.2745>
- Bai, L., Liu, X., & Su, J. (2023). ChatGPT: The cognitive effects on learning and memory. *Brain-X*, 1(3). <https://doi.org/10.1002/brx2.30>
- Barrett, A., & Pack, A. (2023). Not quite eye to A.I.: Student and teacher perspectives on the use of generative artificial intelligence in the writing process. *International Journal of Educational Technology in Higher Education*, 20(1), 1–24. <https://doi.org/10.1186/S41239-023-00427-0/TABLES/8>
- Baskara, R., & Mukarto, R. X. (2023). Exploring the implications of ChatGPT for language learning in higher


- education. *Indonesian Journal of English Language Teaching and Applied Linguistics*, 7(2), 343–358.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Carr, N. G. (2010). *The shallows: What the Internet is doing to our brains* (1st ed). W.W. Norton.
- Chen, Y., Jensen, S., Albert, L. J., Gupta, S., & Lee, T. (2023). Artificial Intelligence (AI) Student Assistants in the Classroom: Designing Chatbots to Support Student Success. *Information Systems Frontiers*, 25(1), 161–182. <https://doi.org/10.1007/s10796-022-10291-4>
- Creswell, J. W., & Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed). SAGE Publications.
- Dempere, J., Modugu, K., Hesham, A., & Ramasamy, L. K. (2023). The impact of ChatGPT on higher education. *Frontiers in Education*, 8. <https://doi.org/10.3389/FEDUC.2023.1206936>
- Dixon, S. (2023). *Global daily social media usage 2023*. Statista. <https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/>
- Doody, O., & Noonan, M. (2013). Preparing and conducting interviews to collect data. *Nurse Researcher*, 20(5), 28–32. <https://doi.org/10.7748/nr2013.05.20.5.28.e327>
- Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*, 0(0), 1–15. <https://doi.org/10.1080/14703297.2023.2195846>
- Firat, M. (2023). What ChatGPT means for universities: Perceptions of scholars and students. *Journal of Applied Learning and Teaching*, 6(1), Article 1. <https://doi.org/10.37074/jalt.2023.6.1.22>
- Gilson, A., Safranek, C. W., Huang, T., Socrates, V., Chi, L., Taylor, R. A., & Chartash, D. (2023). How Does ChatGPT Perform on the United States Medical Licensing Examination? The Implications of Large Language Models for Medical Education and Knowledge Assessment. *JMIR Medical Education*, 9. <https://doi.org/10.2196/45312>
- Hadi Mogavi, R., Deng, C., Juho Kim, J., Zhou, P., D. Kwon, Y., Hosny Saleh Metwally, A., Tlili, A., Bassanelli, S., Bucchiarone, A., Gujar, S., Nacke, L. E., & Hui, P. (2024). ChatGPT in education: A blessing or a curse?. A qualitative study exploring early adopters' utilization and perceptions. *Computers in Human Behavior: Artificial Humans*, 2(1), 100027. <https://doi.org/10.1016/j.chbah.2023.100027>
- Imran, A., & Lashari, A. A. (2023). *Exploring the World of Artificial Intelligence: The Perception of the University Students about ChatGPT for Academic Purpose*. 8, 375 – 384. [https://doi.org/10.31703/gssr.2023\(VIII-I\).34](https://doi.org/10.31703/gssr.2023(VIII-I).34)
- Kaiser, F. G., & Gutscher, H. (2003). The Proposition of a General Version of the Theory of Planned Behavior: Predicting Ecological Behavior ¹. *Journal of Applied Social Psychology*, 33(3), 586–603. <https://doi.org/10.1111/j.1559-1816.2003.tb01914.x>
- Kanabar, V. (2023). An empirical study of student perceptions when using ChatGPT in academic assignments. In T. Zlateva & G. Tuparov (Eds.), *Computer Science and Education in Computer Science* (pp. 385–398). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-44668-9_30
- Karyotaki, M., Drigas, A., & Skianis, C. (2022). Chatbots as cognitive, educational, advisory & coaching systems. *Technium Social Sciences Journal*, 30, 109–126. <https://doi.org/10.47577/tssj.v30i1.6277>
- Kasneci, E., Sessler, K., Kuchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G.,

- Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good?. On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103*, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Khalil, M., & Er, E. (2023). *Will ChatGPT get you caught?. Rethinking of plagiarism detection*. In P. Zaphiris & A. Ioannou (Eds.), *Learning and Collaboration Technologies. HCII 2023. Lecture Notes in Computer Science* (vol. 14040, pp. 475–487). Springer. https://doi.org/10.1007/978-3-031-34411-4_32
- Limna, P., Jangjarat, K., & Klayklung, P. (2023). *The Use of ChatGPT in the Digital Era: Perspectives on Chatbot Implementation*. <https://doi.org/10.37074/jalt.2023.6.1.32>
- Liu, B. (2023). Chinese University Students' Attitudes and Perceptions in Learning English Using ChatGPT. *International Journal of Education and Humanities, 3*(2), Article 2. [https://doi.org/10.58557/\(ijeh\).v3i2.145](https://doi.org/10.58557/(ijeh).v3i2.145)
- Mohamed, A. M. (2023). Exploring the potential of an AI-based Chatbot (ChatGPT) in enhancing English as a Foreign Language (EFL) teaching: Perceptions of EFL Faculty Members. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-023-11917-z>
- Montenegro-Rueda, M., Fernández-Cerero, J., Fernández-Batanero, J. M., & López-Meneses, E. (2023). Impact of the implementation of ChatGPT in education: A systematic review. *Computers 2023, 12*(8), 153. <https://doi.org/10.3390/COMPUTERS12080153>
- Ngo, T. T. A. (2023). The perception by university students of the use of ChatGPT in education. *International Journal of Emerging Technologies in Learning (Online), 18*(17), 4–19. <https://doi.org/10.3991/ijet.v18i17.39019>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Perkins, M. (2023). Academic integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond. *Journal of University Teaching and Learning Practice, 20*(2). <https://doi.org/10.53761/1.20.02.07>
- Petricini, T., Wu, C., & Zipf, S. T. (2023). Perceptions about generative AI and ChatGPT use by faculty and college students. *EdArXiv*. <https://doi.org/10.35542/osf.io/jyma4>
- Quitadamo, I. J., & Kurtz, M. J. (2007). Learning to Improve: Using Writing to Increase Critical Thinking Performance in General Education Biology. *CBE—Life Sciences Education, 6*(2), 140–154. <https://doi.org/10.1187/cbe.06-11-0203>
- Shoufan, A. (2023). Exploring students' perceptions of ChatGPT: Thematic analysis and follow-up survey. *IEEE Access, 11*, 38805–38818. <https://doi.org/10.1109/ACCESS.2023.3268224>
- Smutny, P., & Schreiberova, P. (2020). Chatbots for learning: A review of educational chatbots for the Facebook Messenger. *Computers & Education, 151*, 103862. <https://doi.org/10.1016/j.compedu.2020.103862>
- Susnjak, T. (2022). ChatGPT: The end of online exam integrity?. *ArXiv*. <https://doi.org/10.48550/arXiv.2212.09292>
- Yilmaz, R., & Karaoglan Yilmaz, F. G. (2023). Augmented intelligence in programming learning: Examining

student views on the use of ChatGPT for programming learning. *Computers in Human Behavior: Artificial Humans*, 1(2), 100005. <https://doi.org/10.1016/j.chbah.2023.100005>


Author Information

Ahmed Azmi

 <https://orcid.org/0009-0003-2290-2443>

University Malaysia Sabah
Malaysia

Ismail Maakip


 <https://orcid.org/0000-0003-3343-3251>

(Corresponding Author)

University Malaysia Sabah
Malaysia


Contact e-mail: daeng@ums.edu.my

Peter Voo

 <https://orcid.org/0000-0002-3836-8375>


University Malaysia Sabah
Malaysia

Nurul Hudani Mohd Nawi

 <https://orcid.org/0000-0002-2566-4802>


University Malaysia Sabah
Malaysia

Dg Norizah Ag Kiflee @ Dzul kifli

 <https://orcid.org/0000-0001-7308-0185>


University Malaysia Sabah
Malaysia

Murnizam Halik

 <https://orcid.org/0000-0001-5431-3131>


University Malaysia Sabah
Malaysia

Sanen Marshall

 <https://orcid.org/0009-0004-5125-6265>

University Malaysia Sabah
Malaysia

Wei Boon Quah

 <http://orcid.org/0000-0002-7138-5900>

Universiti Putra Malaysia
Malaysia