Education in AI ERA: The extent of higher education students' use of ChatGPT in Oman

iD Sarah Attia[1*], iD Elsayed Elsawy[2], Lamiaa Shaheen[3]

[1]*Oman College of Management and Technology, Oman.*
[2]*Sultan Qaboos University, Oman.*
[3]*Amity University Dubai, United Arab Emirates.*

Corresponding author: Sarah Attia (*Email: sattia@ocmt.edu.om*)

Abstract

This study examined ChatGPT usage among students in the Sultanate of Oman, their views, purposes, and perceived advantages and disadvantages. The study applied a survey to undergraduate students at Oman College of Management and Technology (OCMT) during the summer semester 2023-2024. 124 participants were selected through convenience sampling. The results showed that the most used AI application by students was ChatGPT at a rate of 65%, and the most common learning purpose for using ChatGPT was searching for information to understand curriculum topics, at a rate of 100%. Moreover, students consider ChatGPT as an intelligent virtual assistant to provide instant answers to questions, aid research, and assist with homework assignments with its vast knowledge and natural language processing capabilities. Further, results revealed that as students increasingly engage with ChatGPT, several concerns emerge regarding its potential unethical use, excessive dependency, and impact on writing and thinking capabilities. An overreliance on ChatGPT for academic tasks could impede critical thinking and creativity, as students may become overly dependent on AI for solutions. The insights gained from this study hold significant implications for the responsible and effective integration of ChatGPT in higher education environments, considering its perceived benefits and ethical concerns.

Keywords: Artificial intelligence (AI), ChatGPT, Education, Learning, Oman college of management and technology (OCMT).

1. Introduction

Artificial Intelligence (AI) has significantly transformed education in various aspects. Today, AI-enabled language models, such as ChatGPT (Chat Generative Pre-Trained Transformer), are becoming increasingly popular due to their features and advantages. However, users also view them as a threat to educational integrity and objectives. These

technologies have introduced new opportunities in teaching and learning, capable of supporting and enhancing educational processes while improving student performance and motivation. Understanding how ChatGPT can facilitate self-paced learning is essential for maximizing the potential of chatbots and AI in educational contexts, thereby guiding future developments in technology-assisted education. Effective integration of technology involves key considerations such as defining the problem, selecting appropriate technologies aligned with educational goals, and developing strategies for their optimal use [1]. Similarly, Lastiri emphasizes the transformative role of information technology in enhancing teaching and learning, improving student productivity, engagement, and overall academic performance [2]. ChatGPT can produce new content based on its training data (pre-training) and is designed to process natural language, analyze the meanings of sentences (natural language understanding), and generate new sentences based on inputs [3]. Teachers and students alike can use these technologies to enrich their learning experiences and personal development effectively. It not only aids in enhancing internal processes within institutions but also accelerates implementation timelines and boosts overall productivity [4]. In this study, the researchers aimed to investigate the usage of AI applications among students at OCMT, focusing particularly on ChatGPT. They sought to understand how students utilize it, evaluate its impact on enhancing productivity, and identify its advantages as well as disadvantages that could potentially hinder its broader adoption in education.

This topic holds significance as it emphasizes how AI influences teaching and learning within Omani academic institutions. Although some studies outside the scope of Oman College have addressed this topic, notably, there has been no prior research on students' attitudes towards AI at OCMT.

1.1. Study Questions

The study tried to provide valuable insights to stakeholders in Omani higher education and answer the following inquiries:

SQ1. How frequently do students utilize ChatGPT applications at OCMT in their studies?
SQ2. What are the main languages utilized by students with ChatGPT?
SQ3. In which activities do students use ChatGPT applications in their studies?
SQ4. What is the impact of students' use of ChatGPT on their GPA?
SQ5. What are the perceived advantages of using ChatGPT applications in education among students at OCMT?
SQ6. What are the perceived disadvantages of using ChatGPT applications in education among students at OCMT?

These questions aim to explore the current usage, benefits, and challenges of ChatGPT among students at OCMT, providing insights that can inform educational stakeholders at OCMT and contribute to the broader discourse on integrating AI technologies in education.

2. Study Method

The study employed a descriptive analytical method to examine the use of ChatGPT among students at OCMT. Its objectives included data collection, analysis, presentation of findings, and drawing conclusions regarding ChatGPT's role in learning. A survey served as the primary data collection tool to evaluate students' usage patterns and perceptions of both the advantages and disadvantages of ChatGPT. The survey comprised four sections. The first gathered demographic information about the participants, including their name, department, gender, academic level, primary language used for research or AI interaction, and their experience with AI applications for chatting, specifically with ChatGPT. The second section explored how students utilize ChatGPT in their studies, including reasons for usage and the courses in which it was employed. The third section assessed the perceived benefits of using ChatGPT in academic activities. The fourth section addressed students' views on its potential drawbacks. Additionally, the survey was reviewed by three education experts from Sultan Qaboos University and OCMT to ensure its validity. It was administered via Google Forms during May and June 2024, in the summer semester.

2.1. Characteristics of the Study Sample

The study population included 1,200 undergraduate students aged 18 to 22 at OCMT. A total of 308 students, constituting 25.7% of the population, agreed to participate in the study. Among them, 192 students, accounting for 62.3% of the participants, reported using AI applications. This group formed the basis of the study and was a prerequisite for completing the survey.

Table 1.
The population and sample of the study.

Program	Total number of students academic year (2023-2024)	Number of students surveyed	%
BA	1200	308	25%
MA	4	-	-

Table 2.
Academic departments of students participating in the survey.

| Department	Number of Students	%	Number of Students (GFP/ Academic Departments)	%
Interior Design	100	32.5%		70.2%
Computer Sciences and MIS	32	10.4%	216	
Admin. & Financial Sciences	84	27.3%		
GFP	92	29.8%	92	29.8%
Total	308	100%	308	100%

From the total of 308 students who responded to the survey, 248 are female, constituting 81%, and 60 are male, representing 19% of the sample. The students involved in the study who utilize AI applications in their academic searches and activities (as indicated in Table 2) are categorized into four departments: The General Foundation Program Department (GFP) includes 92 students, making up 29.8% of the total participants, while 216 students, accounting for 70.2% of the total, are from other academic departments. Among these, 100 students are enrolled in the Department of Design, 32 in Computer Sciences and MIS, and 84 in the Department of Administration and Financial Sciences.

Table 3.
Participants' use of AI applications.

Category	Number of students	%
Students using AI applications	192/308	62.3%
Students using ChatGPT	124/192	64.6%
Students using ChatGPT in studying their courses	105/124	100%
Students using ChatGPT in studying courses related to the English Language	89/105	84.8%
Students using ChatGPT in studying courses related to their major	72/105	68.6%

Concerning the utilization of AI applications by participants (as displayed in Table 3), 192 students (62.3%) report using AI chatting applications, whereas 116 students (38%) indicate that they do not use them. Among the students using AI applications, the most utilized AI chatting application is ChatGPT, used by 37.7% of the total students using AI applications (105 students). Other AI chatting applications used by students include Chatbot at 14%, Claude at 12%, and Sage at 9%.
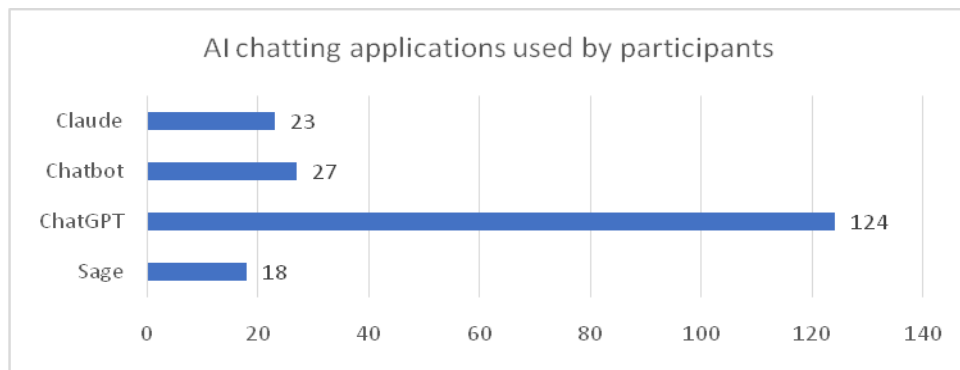
Figure 1.
AI chatting applications used by participants.

2.2. Operational Definitions of Terms

AI (Artificial Intelligence): The phrase refers to a wide variety of technologies, ideas, and applications. In this research work, the term "AI" is used to describe a collection of computer science methods that enable systems to perform operations that would typically require human intelligence, such as speech recognition, visual perception, decision-making, and language translation [5].

ChatGPT (Chat Generative Pre-Trained Transformer) is a chatbot developed by OpenAI and launched on November 30, 2022. Based on a large language model, it enables users to refine and steer a conversation towards a desired length, format, style, level of detail, and language. Successive prompts and replies, known as prompt engineering, are considered at each conversation stage as context [6].

3. Literature Review

3.1. AI and Enhancing Learning Outcomes

AI applications are crucial for improving educational outcomes. As outlined by Shidiq [7] these technologies, such as virtual mentors, voice assistants, smart classrooms, automated assessments, and self-learning platforms, modernize and simplify the teaching and learning processes. AI's influence on education aims to enhance graduates' competitiveness by

promoting independent learning, leveraging open educational resources, and enabling individuals to customize their educational journey to their specific preferences and objectives [8].

One technology that has the potential to enhance student efficiency is ChatGPT, serving as a virtual assistant aiding with assignments and delivering lecture-related information. This chatbot relies on cutting-edge AI technology, specifically the GPT-3.5 model created by OpenAI, to provide accurate responses fitted to user inquiries [9].

3.2. Advantages of using ChatGPT in Education

According to Biswas [8] research, technologies such as ChatGPT have revolutionized human-machine interactions by enabling AI systems to respond to user inputs, thus introducing new dimensions to teaching and learning [8]. ChatGPT, an AI-driven chatbot, can generate text in diverse styles, whether it is formal, informal, or creative writing. This natural language model, trained extensively on vast datasets, offers versatile applications, as highlighted by Shidiq [7], who recognizes its potential as a virtual assistant to enhance student productivity [7].

ChatGPT is considered a useful tool that can support open education by delivering personalized assistance, guidance, and feedback to learners, enhancing motivation and engagement due to its human-like writing capabilities and capacity for multiple simultaneous conversations Biswas [8]. Ausat [10] also emphasizes the educational potential of ChatGPT, noting its role in aiding student learning and simplifying teacher responsibilities [10]. One method through which ChatGPT can enhance learning is by providing pertinent, top-notch reading materials to students [11].

By increasing its natural language processing capabilities, ChatGPT can produce texts in a user-friendly language suited to the educational level of students. Likewise, teachers can use ChatGPT to develop high-quality reading materials aligned with students' requirements. Moreover, ChatGPT is adept at generating automated questions and quizzes, utilizing its understanding of natural language to create adapted assessments that align with students' comprehension levels [12]. Impressively, students can find support and motivation through ChatGPT, utilizing it as a platform to discuss their worries and seek advice on time and task management [13].

Trained by OpenAI, ChatGPT contributes to enhancing students' productivity by offering valuable information and resources necessary for completing assignments and projects [11]. Furthermore, students can ask ChatGPT about specific topics, with the model generating responses based on online data. ChatGPT also provides recommendations for relevant books and articles related to the student's discussion topic, as noted by AlAfnan et al. [14] and Fauzi et al. [15].

3.3. Disadvantages of using ChatGPT in Education

Hutson [16] highlights the urgent necessity to address the disadvantages of utilizing ChatGPT, particularly in activities like creative writing, and their probable negative impact on students. Similarly, an analytical study [9] examines the utilization of ChatGPT by students within the classroom learning process. The research emphasizes that while technology like ChatGPT can serve as a valuable tool, it cannot entirely substitute the role of a teacher. Hence, the integration of technology into education must be done carefully and efficiently, alongside the enhancement of teachers' skills in using and developing technology for effective learning management.

Firat [17] displays various obstacles associated with utilizing ChatGPT to enhance students' creative writing abilities. These challenges include the essential need for direct interaction with teachers in the learning process, which cannot be done with ChatGPT. Moreover, ChatGPT cannot discern individual nuances and learning styles, which can vary among students. Relying excessively on ChatGPT can also diminish critical thinking skills, hindering individuals from effectively addressing real-life problems. Zen et al. [18] similarly emphasize the indispensable role of teachers in classrooms, asserting their ability to provide instruction and guide students in their educational journey. Conversely, others emphasize ChatGPT's potential to revolutionize teaching methodologies but stress the importance of ethical use to maximize its benefits without misuse [19].

Furthermore, ChatGPT's capabilities are limited to text generation and lack the capacity to offer direct explanations or examples, functionalities that teachers are proficient in providing. Its operations are confined to existing data and do not extend to conducting comprehensive assessments of students' capabilities [1]. One common use of ChatGPT is automating text generation. For instance, researchers may utilize it to write reports or articles much faster compared to manual writing processes. However, this automation does not mean that ChatGPT can entirely replace researchers' tasks. Researchers still need to analyze data and draw suitable conclusions, tasks beyond ChatGPT's capabilities. In this context, ChatGPT can aid educators and researchers by generating initial drafts that can subsequently be edited and revised [9].

Hence, ChatGPT serves as a valuable tool within the learning environment rather than a direct replacement for the teacher's role. While ChatGPT can significantly support educators, it still necessitates the teacher's presence for providing guidance and conducting detailed assessments of students' skills. Essentially, incorporating ChatGPT in classrooms can make teachers' tasks easier and enhance student learning [13]. Nevertheless, the teacher's fundamental role as a mentor and guide remains irreplaceable by technology. Thus, ChatGPT should be viewed as a supplementary aid in the educational process rather than a substitute for the teacher's role. Moreover, there is a need to thoughtfully integrate technology into education in alignment with the educational context [1].

Table 4.
The respondents' usage frequency of ChatGPT.

Frequency	Number of students	%
Always	20	19%
Often	18	17%
Sometimes	38	36%
Rarely	29	28%
Total	105	

4. Study Results and Discussion

4.1. Respondents' use of ChatGPT

Regarding the students' utilization of the ChatGPT application in their academic activities and research, 105 out of 124 students using the application, representing 84.7%, reported using it for academic purposes at the college during the summer semester of 2023-2024. Concerning the frequency of usage, within this group of ChatGPT users, 19% chose "always," 17% indicated "often," 36% selected "sometimes," and 28% chose "rarely."
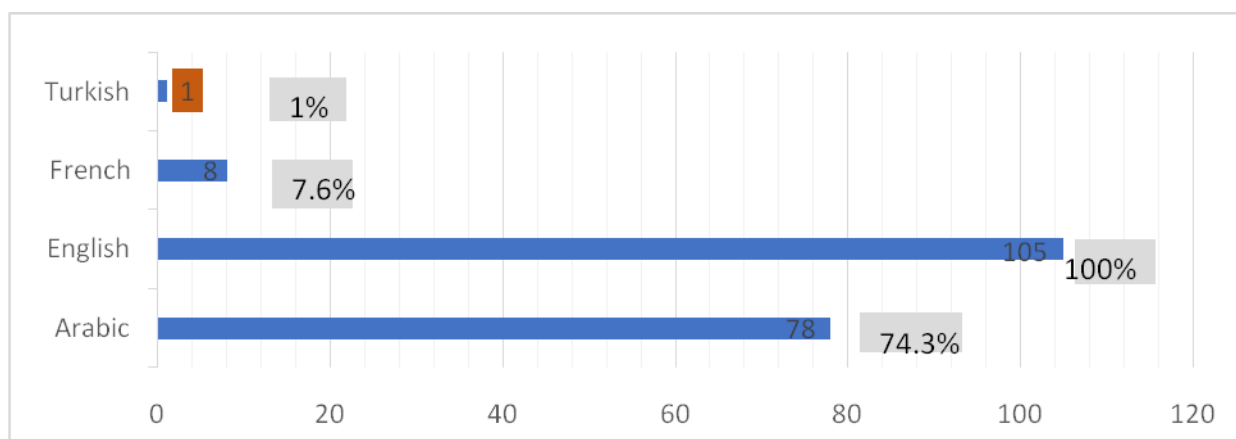
Figure 2.
Languages used by students in chatting in ChatGPT.

In terms of the main languages utilized by students with ChatGPT during their course studies (105 students), the ranking based on usage is as follows, from highest to lowest: English at 100%, followed by French at 7.6%, and Turkish at 1%. The preference for English as the primary language for research and chatting on ChatGPT among students can be attributed to the prevalence of English-language compulsory and elective courses within academic departments. Conversely, college-mandated courses, such as Arabic language and Omani society, are typically taught in Arabic, although in fewer numbers compared to English courses, thus establishing English as the primary language for students' engagement with AI applications like ChatGPT. Additionally, a minor percentage of students utilize French in their chatting, likely due to the presence of non-Omani students from the Maghreb or Francophone countries where French is spoken.

Table 5.
Respondents' use of ChatGPT in Academic activities.

Activities related to teaching and learning	Number	%
Searching for information to understand topics	105	100%
Preparing presentations	69	65.7%
Preparing assignments	63	60%
Searching for information to enrich the educational aspect	48	45.7%
Translation	3	2.9%
Answering previous exam questions	3	2.9%

In terms of academic activities where students utilize ChatGPT and their reasons for using the application (as shown in Table 5), the study revealed that all students utilizing the application (105 students) use it for various study-related purposes. These include searching for information to comprehend topics at 100%, preparing presentations at 65.7%, completing assignments at 60%, enhancing educational content through searching for information at 45.7%, engaging in translation at 2.9%, and answering past exam questions at 2.9%. This indicates the extensiveness of learning tasks in which students utilize the application, emphasizing its role in boosting their academic and cognitive progress.

Table 6.
Impact of students' utilization of ChatGPT on their GPA.

Effect of use on GPA	Number of students	%
increased significantly	14	13%
increased somewhat	39	37%
increased slightly	18	17%
It didn't affect	34	33%
Total	105	

Regarding students' belief about the impact of using the ChatGPT application on their GPA (as shown in Table 6), 13% of students believe that their GPA significantly increased, while 54% feel it increased to some degree or slightly. Conversely, a third of the students (33%) believe that using the application had no effect on their GPA.

Table 7.
Students' probability to recommend ChatGPT to their peers.

Likelihood	Number	%
Very likely	35	33%
Somehow likely	51	49%
Somewhat unlikely	10	9%
Very unlikely	9	9%
Total	105	

Moving on to Table 7, which illustrates students' satisfaction with the ChatGPT application, a third of the users (33%) express a likelihood of recommending the application to peers for academic benefits, and nearly half (49%) are somewhat motivated to make such recommendations. This indicates that the majority of students (82%) are supportive of suggesting ChatGPT to others. However, a small number of students (18%) state that they are unlikely to recommend the application to their peers. This unwillingness may stem from the fact that some students (28%) rarely use the application (Table 4) and may not be aware of all the features it offers to enhance their learning experience.

Table 8.
Benefits of using ChatGPT for students.

Benefits of using ChatGPT	Frequency	%
It helps me answer any questions related to the course I study	105	100%
It helps me find information relevant to my studies	105	100%
Saving time searching for information related to my studies	100	95.2%
It is easy and simple to use	98	93.3%
It is for free	93	88.6%
It helps me correct and edit articles	75	71.4%
It is a motivating tool for self-learning	60	57.1%
It provides interactive activities and questions that are compatible with academic courses	51	48.6%
It provides personal support and guidance	42	40%
It is a tool that provides an outline for any topic related to my studies	33	31.4%

4.2. Benefits of using ChatGPT

When students were asked about the benefits of using the ChatGPT application (Table 8), the main advantages, according to their viewpoint, include that the application aids in answering any course-related questions (100%) and assists in locating study-relevant information (100%) by providing appropriate resources, articles, and papers related to the research topic. Additionally, it was noted that the application saves time spent searching for information related to studies (95.2%); it is user-friendly and simple (93.3%); it is available at no cost (88.6%); and it enables the correction and editing of articles by providing feedback on grammar, sentence structure, and content (71.4%).

However, according to the students' viewpoints, the least prominent advantages of using the application include its role as a self-learning motivator (57.1%), its provision of interactive activities and questions aligned with academic courses (48.6%), its offering of personal support and guidance for study and answering questions (40%), and its function as a tool that outlines topics related to their studies (31.4%). These findings reflect the predominant viewpoint among a significant number of students at Oman College of Management and Technology that ChatGPT assists them in various learning-related activities. This aligns with the research conducted by Fauzi et al. [15] and Shidiq [7], which highlighted ChatGPT's potential to notably enhance students' productivity, performance, and motivation in educational environments. ChatGPT achieves this by providing personalized and interactive aid, giving valuable information and resources, enhancing language skills, fostering collaboration, increasing time efficiency and effectiveness, and offering support and motivation. A key aspect of the application's advantages stems from its AI-based chatbot nature, enabling interaction and task facilitation, as well as the system's user-friendly nature and its capability to provide responses to user questions in text or voice format.

Nevertheless, students did not highlight additional aspects within ChatGPT that could be used to enhance the application's benefits in their academic activities, such as personalized learning opportunities. For instance, they could

utilize the app to receive personalized recommendations for learning materials and activities aligned with their learning objectives and preferences, as well as to set reminders for upcoming assignments and examinations. This emphasizes the necessity of training students at the College about the advantages of incorporating ChatGPT into their studies. [8] proposes that ChatGPT has the potential to assist students in managing their class schedules and establishing reminders for forthcoming assignments and tests. Moreover, it can offer personalized suggestions for learning resources and activities based on individual learning goals and preferences, aiding in grammar improvement, vocabulary expansion, and writing development [20].

Table 9.
Disadvantages of using ChatGPT.

Disadvantages	Frequency	%
There is no possibility of working with images	81	77.1%
It weakens individuals' ability to think critically thinking	33	31.4%
Information is not always accurate	25	23.8%
It is considered cheating	20	19%

4.3. Disadvantages of using ChatGPT

Table 9 discussions among students regarding the negatives of integrating ChatGPT into their academic searches highlight several concerns. The primary negative aspect, as reported by 77.1% of students, is the absence of image support within ChatGPT. Additionally, 31.4% expressed concerns that the use of ChatGPT could weaken critical thinking skills, particularly because the application does not cater to individual learning styles, potentially leading to overdependence on the tool and a decline in information analysis and critical thinking abilities. Concerns about the inaccuracy of information provided by ChatGPT were raised by 23.8%, while 19% perceived its use as potentially equivalent to cheating, due to the risk of encouraging excessive reliance on AI for completing tasks. The researchers suggest that some of these disadvantages are related to the novelty of the technology, emphasizing the importance of students gaining a better understanding of its capabilities and limitations, as indicated in [17]. Furthermore, students' utilization of ChatGPT can complement the role of academic staff in teaching, guiding, counseling, and conducting comprehensive assessments of students' capabilities [13].

Moreover, ChatGPT serves as a quick tool for obtaining summaries of essential concepts, facts, principles, or terms, making it beneficial for adult learners seeking quick overviews of various areas of knowledge, generating text, and expediting the writing process. It offers personalized support, guidance, and feedback to learners, thereby enhancing motivation and engagement.

5. Recommendations

Based on the study findings and their analysis, and to improve the utilization of ChatGPT to enhance learning efficiency among higher education students, the research suggests the following to the education and quality assurance stakeholders at OCMT:

- Integrating ChatGPT as a supplementary tool alongside existing educational methods at OCMT can enrich the learning process, enhance students' abilities in summarizing information, understanding, and explaining concepts. This integration can offer valuable resources and information, strengthen language proficiency, provide support and encouragement, present interactive activities and questions adapted to courses, and improve the learning journey through personalized and interactive assistance. By doing so, it can enhance the quality of learning, deliver increased benefits to both learners and educators, and improve the overall educational experience at OCMT.
- Instructors should enhance their proficiency in utilizing technologies like ChatGPT and actively engage in preventing acts of academic fraud facilitated by AI tools such as ChatGPT.
- Expand training programs for students to enhance their competencies and provide them with the ability to effectively utilize ChatGPT and similar technologies. These training programs should be conducted regularly to keep students updated on managing learning with technology. Educators should also possess a solid knowledge of the technology used and be skilled at integrating it into the learning process.
- Determine clear regulations and policies governing the use of ChatGPT and other technologies to maintain academic integrity.

6. Conclusion

ChatGPT serves as a valuable tool to enhance students' productivity and assist them in reaching their academic objectives. Its contribution to boosting students' productivity should be perceived as a supplement rather than a replacement for human interaction and students' diligent efforts in achieving their academic aims with greater effectiveness and efficiency, thereby enhancing the learning process. However, ChatGPT introduces various apprehensions, including issues regarding academic fraud, increased cases of plagiarism, and similar concerns. Hence, it is necessary for the college to establish explicit instructions regarding the utilization of ChatGPT and other technologies to maintain academic integrity effectively.

In conclusion, the integration of ChatGPT in higher education presents a promising avenue for enhancing learning experiences and boosting students' productivity. While ChatGPT can offer personalized support, interactive activities, and valuable resources to aid students in their academic pursuits, its implementation should be approached as a complementary

tool rather than a standalone solution. Educators should strive to enhance their technological proficiency and actively address concerns surrounding academic integrity and plagiarism. Training programs for students can help develop their competencies in utilizing ChatGPT effectively. Clear policies and regulations should be established to ensure the ethical use of AI technologies like ChatGPT in educational environments. By leveraging ChatGPT as a supportive tool alongside traditional teaching methods, higher education institutions can foster a more engaging and enriched learning environment while upholding academic standards and integrity.

References

[1] A. M. A. Ausat, B. Massang, M. Efendi, N. Nofirman, and Y. Riady, "Can chat GPT replace the role of the teacher in the classroom: A fundamental analysis," *Journal on Education*, vol. 5, no. 4, pp. 16100-16106, 2023b.

[2] L. Lastiri, *What is productivity for students? (9 Ways to Increase It)*. USA: Iris Reading, 2022.

[3] E. Elsawy, Y. Elseadawy, and S. Attia, "ChatGPT's potential in the deep exploration of Islamic manuscripts," *IFLA Journal*, p. 03400352251342331, 2025. .https://doi.org/10.1177/03400352251342331

[4] E. S. Elsawy, A. S. Al-Riyami, S. N. Attia, A. Ismaeil, and H. S. Al, "The potential of AI in improving the media role of audiovisual content in Oman," *Journal of Ecohumanism*, vol. 3, no. 7, pp. 5086-5098, 2024. https://doi.org/10.62754/joe.v3i7.4617

[5] N. Gerlich, *Artificial intelligence: Concepts and applications in modern computing*. Germany: Springer, 2023.

[6] S. Lock, *What is ChatGPT?* United Kingdom: Tech Monitor, 2022.

[7] M. Shidiq, "The use of artificial intelligence-based Chat-GPT and its challenges for the world of education; from the viewpoint of the development of creative writing skills," in *Proceeding of International Conference on Education, Society and Humanity*, 2023, pp. 353-357.

[8] S. Biswas, "Role of chat GPT in education," Retrieved: https://ssrn.com/abstract=4369981. [Accessed 2023.

[9] A. M. A. Ausat, S. Suherlan, and H. K. Azzaakiyyah, "Is ChatGPT dangerous for lecturer profession? An in-depth analysis," *Jurnal Pendidikan Dan Konseling*, vol. 5, no. 2, pp. 3226-3229, 2023a.

[10] M. Ausat, "The educational potential of ChatGPT: Enhancing student learning and supporting teachers," *Journal of Educational Technology Studies*, vol. 5, no. 2, pp. 45–53, 2022.

[11] E. Kasneci *et al.*, "ChatGPT for good? On opportunities and challenges of large language models for education," *Learning and individual differences*, vol. 103, p. 102274, 2023. https://doi.org/10.1016/j.lindif.2023.102274

[12] G. Cooper, "Examining science education in ChatGPT: An exploratory study of generative artificial intelligence," *Journal of Science Education and Technology*, vol. 32, no. 3, pp. 444-452, 2023. https://doi.org/10.1007/s10956-023-10039-y

[13] A. Haleem, M. Javaid, M. A. Qadri, and R. Suman, "Understanding the role of digital technologies in education: A review," *Sustainable Operations and Computers*, vol. 3, pp. 275-285, 2022. https://doi.org/10.1016/j.susoc.2022.05.004

[14] M. A. AlAfnan, S. Dishari, M. Jovic, and K. Lomidze, "Chatgpt as an educational tool: Opportunities, challenges, and recommendations for communication, business writing, and composition courses," *Journal of Artificial Intelligence and Technology*, vol. 3, no. 2, pp. 60-68, 2023.

[15] F. Fauzi, L. Tuhuteru, F. Sampe, A. M. A. Ausat, and H. R. Hatta, "Analysing the role of ChatGPT in improving student productivity in higher education," *Journal on Education*, vol. 5, no. 4, pp. 14886-14891, 2023. https://doi.org/10.31004/joe.v5i4.2563

[16] M. Hutson, "Could AI help you to write your next paper?," *Nature*, vol. 611, no. 7934, pp. 192–193, 2022. https://doi.org/10.1038/d41586-022-03479-w

[17] M. Firat, "What ChatGPT means for universities: Perceptions of scholars and students," *Journal of Applied Learning and Teaching*, vol. 6, no. 1, pp. 57-63, 2023.

[18] A. Zen, R. Kusumastuti, D. Metris, S. S. Gadzali, and A. M. A. Ausat, "Implications of entrepreneurship education as a field of study for advancing research and practice," *Journal on Education*, vol. 5, no. 4, pp. 11441-11453, 2023.

[19] B. D. Lund and T. Wang, "Chatting about ChatGPT: How may AI and GPT impact academia and libraries?," *Library Hi Tech News*, vol. 40, no. 3, pp. 26–29, 2023.

[20] D. R. Cotton, P. A. Cotton, and J. R. Shipway, "Chatting and cheating: Ensuring academic integrity in the era of ChatGPT," *Innovations in education and teaching international*, vol. 61, no. 2, pp. 228-239, 2024.