Edureligia
Jurnal Pendidikan Agama Islam
https://ejournal.unuja.ac.id/index.php/edureligia

ANALYSIS OF THE IMPACT OF CHATGPT ON LEARNING PRODUCTIVITY OF ISLAMIC EDUCATION STUDENTS

Ahmad Baiquni[1](✉), Tri Indah Rusli[2], Juhardin[3], Lely Kholida[4], Arsam[5]

[1,2,3,4,5] Universitas Muhammadiyah Kendari, Southeast Sulawesi, Indonesia

(✉)**Correspondence to:**
arsam@umkendari.ac.id

Abstract: This study aimed to investigate the impact of ChatGPT use on students' learning productivity and provide recommendations for its effective utilization. Employing a descriptive qualitative approach, data were collected through observation, documentation, and semi-structured interviews with 12 purposively selected active users. The data analysis employed the Miles and Huberman interactive model, emphasizing data reduction, data display, and conclusion drawing. The findings revealed that ChatGPT contributed significantly to enhancing efficiency in learning processes, improving conceptual understanding, and stimulating creativity among students. However, the study also uncovered several drawbacks, such as a decline in critical thinking skills, reduced motivation for independent literacy practices, and an increased tendency toward technological dependence. Within the specific context of Islamic Religious Education, the research further identified that some ChatGPT-generated responses were less accurate or misaligned with authoritative references, necessitating additional validation by educators and learners. The implications of this research highlight that ChatGPT can serve as a valuable supportive learning tool if applied proportionally. To achieve holistic and high-quality learning, students and teachers are advised to use ChatGPT with careful attention to information validation, cultivation of critical thinking, and strategies that minimize overreliance on technological assistance.

INTRODUCTION

Education, science and technology must be balanced with the human ability to think critically analyze and use rational reasoning. This issue of religion and technology has been reviewed in the book "Al Quran Science and Technology" by Ahmad Baiquni (in Ryan & Deci, 2020). long before technology developed rapidly today. At that time there was no Artificial Intelligence (AI) from Open AI called ChatGPT. Now, ChatGPT has a huge effect on advancing the academic world in exciting new ways (Lund & Wang, 2023). The use of A.I.

can also increase efficiency and effectiveness in learning productivity (Mannuru et al., 2023). ChatGPT is able to understand context and generate text and audio naturally. The ease and accuracy of the answers provided makes it easy to solve academic questions. However, ethical issues, such as data security and potential bias in the generation of results, are a serious concern (Huynh-The et al., 2023).

Learning productivity can basically be seen from two perspectives, namely from the perspective of the individual himself and from a group perspective. Productivity based on individuals is nothing but the various activities carried out by students (Lyu & Liu, 2021). This learning activity is a factor that determines the standard of achievement of the student learning process. Everyone who learns must be active, without activity, the learning process will not occur optimally. Meanwhile, from another point of view, the concept of productivity as a whole becomes another dimension of efforts to achieve the quality and quantity of an activity process. Therefore, it is oriented to how to think and act to use input sources to get optimal output. In this discussion, productivity is seen from an individual perspective, emphasizing the character of individuals in a group. So, learning productivity is a result of the work of an individual who has expertise in his field.

Starting from the view that technology in Islamic understanding is expressed by the term "*shina'ah* or *handasah*", meaning something related to artistic and technical run by the sensory aspects. Laato et al. (2023) stated something that comes from sense perception, common sense process, heart intuition is not necessarily true according to the consideration of correspondence, coherence and other truth theories (Anshori et al., 2022). Objective truth exists, but when it merges with humans, who are confined by their subjectivity. Then the meaning of truth becomes subjective (Alnefaie, 2024). Moreover, technology must have an attitude of limitation in our daily lives, especially in the academic world. Artificial Intelligence is also feared to surpass human cognitive tasks. So analysis is needed in this case. Analysis is the ability to break down informational material into components, examine, draw conclusions, identify, find evidence that supports generalizations (Rospigliosi, 2023). This becomes the basic cognitive domain of humans, and should be different from technology.

The use of ChatGPT in education brings a new paradigm and transformation of the world of technology-based education. All aspects of life have been influenced by modern knowledge, including religion or Islamic education. The use of ChatGPT in the learning process, of course, will have both positive and negative impacts. Because uncontrolled use will actually reduce students' ability to think critically. ChatGPT in its excessive use is considered a factor in the decline in the quality of students' critical thinking (Biswas, 2023). Based on our observations, not a few students in the Islamic Education Study Program use ChatGPT in every learning activity. Many researchers have mapped this issue and considered it a serious matter. The reality is that the use of ChatGPT has decreased academic morale to students. Like the research conducted by Wardat et al. (2023) explained that there were social changes to

students, including dependence on technology. In addition, the use of ChatGPT also gave students the inability to uphold academic values and morals, causing the ability to reason critically to decrease due to dependence on the use of ChatGPT. ChatGPT integration is very necessary in the world of education. Students are required to be able to know the advantages and disadvantages and reexamine the answers given by ChatGPT (Zafar et al., 2024).

The result of technology that becomes an artificial intelligence tool or system capable of communicating with humans through text or audio. Systems that adopted knowledge like human nature (Grassini, 2023) named ChatGPT had the ability to understand conversations with users using natural language. ChatGPT (Generative Prepared Transformer) is an artificial intelligence-based natural language model that has been trained using massive data (Ge & Lai, 2023). The ChatGPT platform was launched by the "Open AI" company on November 30, 2022. Open AI uses several publicly available data sources from the Internet which ChatGPT will then process into information. ChatGPT is an additional tool that strengthens learning capabilities in various educational environments. ChatGPT has a positive impact on critical thinking skills, problem solving, and creativity, although perceptions vary (Qawqzeh, 2024).

Therefore, researchers were interested in whether the previous concept had the same impact on different populations and backgrounds, in this case Islamic Religious Education Students or not. Because it is has seen the gap that occurs in empirical facts and also practical experience. The factors included when doing assignments, making papers, students who using the ChatGPT tend to think instantly so that the loss of critical thinking skills in class, and literacy motivation (learning and reading books) decreased. This study aimed to identify the impact of using ChatGPT on the learning productivity of Islamic Religious Education students and provided recommendations for effective ChatGPT utilization methods to increase student learning productivity.

The use of ChatGPT must be optimally balanced in order to produce holistic knowledge. If it turns out that the results of this study were in accordance with the theory of previous research, there were concerns about the risks that can reduce critical thinking skills. Besided the empirical contribution that the use of ChatGPT can facilitate, it also increased the effectiveness of student learning productivity. But, if the results found were different from the theory, then that the previous research theory was not suitable for certain conditions and becomes a suggestion for future research to develop the theory of Artificial Intelligence (ChatGPT) in the world of education. Thus revealing both conceptual and empirical distinctions that set this study apart from previous works. This research was unique because it specifically examined the impact of using ChatGPT on Islamic Religious Education students, by considering the dimensions of technology, ethics, and Islamic academic values. The urgency lied in the increasing use of ChatGPT without clear guidance, which had the potential to reduce critical thinking skills and accuracy of understanding religious material if not used proportionally. The advantage of this research was

that it provided a comprehensive picture of the positive and negative impacts of ChatGPT, along with practical strategies for its effective and ethical utilization.

RESEARCH METHOD

This study used a qualitative approach with descriptive analysis. Data collection techniques included (1) Observation by recording student activities during the learning process involving the use of ChatGPT, (2) In-depth interviews using semi-structured interviews to explore student experiences in using ChatGPT and its impact on learning productivity. (3) Documentation, in this qualitative research was a complement to the use of observation and interview techniques. The results will be more credible or reliable if accompanied by documentation (Halaweh, 2023).

Based on the population of Semester 2 students as many as 92, Semester forth as many as 81, and Semester sixth as many as 100. Consisting of 4 classes, namely regular (a, b) and extension classes (c) in the Islamic Religious Education study program at Universitas Muhammadiyah Kendari at the time of the research in May 2024. The sample was selected using purposive sampling technique. Participants consisted of 4 students representing each semester proportionally with a total of 12 students. The selection of respondents was based on inclusion criteria and initial interviews, namely students who actively use ChatGPT in the learning process. Although the shortcomings cannot be generalized to all populations. However, the respondent criteria were appropriate to be interviewed with questions that had been tested and applied consistently (Sumargo, 2020).

Data collection was conducted until data saturation was reached. When the interviews no longer generated new information. The instruments used in this study include (1) A qualitative interview guide, containing a list of questions designed to explore the effectiveness of ChatGPT usage and its impact on productivity. (2) An observation sheet used to record students' behavior and interaction with ChatGPT during the learning process.

Data analysis was carried out using the Miles and Huberman model, which includes (1) Data collection, namely collecting data from interviews, observations, and documentation. (2) Data reduction by simplifying and focusing relevant data. (3) Presentation of data, namely organizing data in the form of narratives or tables. And (4) Verification and conclusion drawing based on the pattern of findings. To ensure the validity of the data, this research used triangulation techniques, namely comparing data from interviews, observations, and documentation to get a more comprehensive understanding (Mai et al., 2024). Based on data analysis, conclusions will be drawn regarding the impact of using ChatGPT on student learning productivity.

RESULT AND DISCUSSION
Result

The use of ChatGPT in a learning context was essential for increasing student learning productivity. ChatGPT accelerated student access to

information, provides adaptive explanations tailored to individual needs, and offers alternative solutions to learning challenges. By utilizing this technology, students can optimize their learning time, no longer limited to conventional sources of knowledge, but rather had a responsive, interactive, and reference-rich digital assistant. Furthermore, ChatGPT also encouraged independent learning, encouraging students to explore material in greater depth through personalized, question-and-answer-based dialogue. From a productivity perspective, this meant the learning process becomes more efficient, effective, and focused, as students can achieve more optimal learning outcomes with relatively fewer resources of time, energy, and information compared to traditional methods.

In accordance with the respondents and observation results showed several important things regarding the aspects mentioned above as follows.
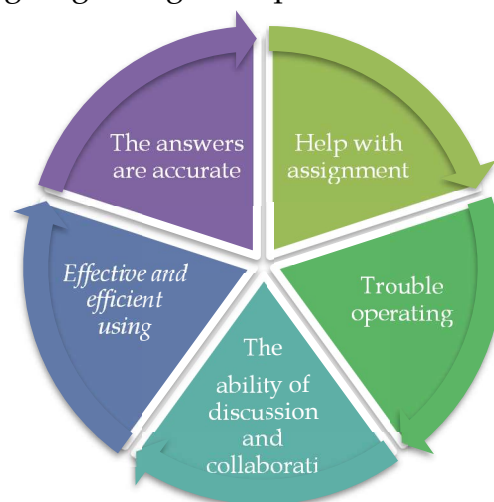

Figure 1. Aspect of Using ChatGpt

Using ChatGPT help with assignments

Based on the interviews conducted prior to the survey, students reported that they often utilize ChatGPT in various learning activities. They found it helpful because the answers provided by ChatGPT were considered satisfactory and acceptable by many students. However, there was one student who disagreed that the use of ChatGPT can help in completing assignments. The student had a subjective argument that the presence of ChatGPT made him less motivated to look for answers in depth and thoroughly.

The answers from ChatGPT related to Islamic Religion material are accurate

In addition, some students thought that the use of ChatGPT was less effective. They thought that the answers through ChatGPT did not have an adequate level of credibility to be used as a basis for learning Islamic Religion. While some students agreed that the answers were accurate, there were also aspects that needed further evaluation. Answers were not always correct and needed verification although errors were difficult to identify.

The use of ChatGPT effective and efficient in learning

ChatGPT's interpretation was invalid and made many mistakes and was not in accordance with the *qawa'id tafsir* that has been formulated by Quranic exegetes, such as errors in numbering Quranic verses, errors in translation, errors in interpretation, errors in providing information. In conclusion, ChatGPT had limitations in use and does not guarantee 100% accurate user answers. Students also rated the use of ChatGPT as very effective and efficient. The effectiveness in question was the ability of ChatGPT to provide answers that were considered satisfactory and had advantages over relying solely on personal reasoning in compiling arguments or answers. With the interview data above justifying by using different methods, students feel that ChatGPT was quite helpful in understanding lecture material, finding references, and increasing student learning productivity, although there is still room for further improvement or adjustment. Some students only agreed to the use of ChatGPT. Based on the results of interviews with students of the Islamic Religious Education (PAI) Study Program, they revealed that the use of ChatGPT has a significant impact on classroom discussions and collaboration between students.

Use of ChatGPT influences discussion, collaboration between students

Some students revealed that the use of ChatGPT in discussions was actually influential. They felt that by involving ChatGPT, they were able to open discussions, get more structured and easy-to-understand explanations, especially when dealing with complex concepts. In addition, ChatGPT was considered to be able to provide additional positive and negative perspectives that made it easier for students to see problems from various perspectives, so that discussions became more productive and informative. Based on interview data, students who used ChatGPT also compared information with other references, in order to provide data based on scientific findings. Therefore, the impact of ChatGPT was currently difficult to separate from the academic world, because its presence helps to facilitate existing academic tasks.

Having trouble operating ChatGPT

Based on the responses gathered, most users did not have significant problems when using ChatGPT. Most participants found the platform user-friendly, easy to use, and responsive. Many noted that they quickly got the hang of it, even if they were unfamiliar at first. However, some respondents mentioned challenges such as overly long responses, trouble creating effective prompts, and occasional issues with relevance or speed of responses, especially after system updates. Despite these minor concerns, the overall perception was positive. Users emphasized ChatGPT's accessibility and its usefulness in completing tasks efficiently.

To find out the analysis of the respondents' answers from the explanation above, the following is the analysis data.

Table 1. Use of ChatGPT

Questions	SS (%)	S (%)	TS (%)	STS (%)
Does using ChatGPT help with assignments?	7 (58.33%)	4 (33.33%)	1 (8.33%)	**0 (0%)**
The results of the answers from chatgpt related to Islamic Religion material are accurate?	0 (0%)	2 (15.38%)	7 (53.85%)	**4 (30.77%)**
Is the use of ChatGPT effective and efficient in learning?	6 (50%)	5 (41.67%)	1 (8.33%)	**0 (0%)**
This use of ChatGPT influences discussion, collaboration between students?	3 (25%)	6 (50%)	2 (16.67%)	**1 (8.33%)**
Having trouble operating ChatGPT?	0 (0%)	4 (33.33%)	8 (66.67%)	**0 (0%)**

Table 1 explained the majority of students (58.33% strongly agree and 33.33% agree) stated that using ChatGPT helped them in completing assignments, while only 8.33% disagreed and none strongly disagreed. However, when asked whether the answers from ChatGPT related to Islamic Religion material are accurate, most students expressed doubt, with 53.85% disagreeing and 30.77% strongly disagreeing. Only 15.38% agreed, and no respondents strongly agreed. Regarding its effectiveness and efficiency in learning, 50% strongly agreed and 41.67% agreed, showing that most students view ChatGPT as a helpful learning tool, while 8.33% disagreed and none strongly disagreed. For its influence on discussion and collaboration, 50% agreed and 25% strongly agreed, whereas 16.67% disagreed and 8.33% strongly disagreed. Finally, when asked about difficulties in operating ChatGPT, the majority (66.67%) disagreed, meaning they did not experience significant problems, while 33.33% agreed to having some difficulties. No respondents strongly agreed or strongly disagreed in this category.

Effective Chatgpt Utilization Strategy

Based on the previous findings, the existence of chatGPT and the student learning process cannot be separated. There were two perspectives related to the learning productivity of PAI students. First, learning productivity increased after using ChatGPT. Second, productivity decreased or considers ChatGPT ineffective in helping students improve their learning outcomes. Therefore, providing strategies for managing the use of ChatGPT also needed to be done. We realize that, the impact of excessive use of ChatGPT on the academic world will produce individuals with academic moral defects. More concerned with the results than the process in achieving learning outcomes. So the use of chatGPT must be streamlined in order to produce better quality education.
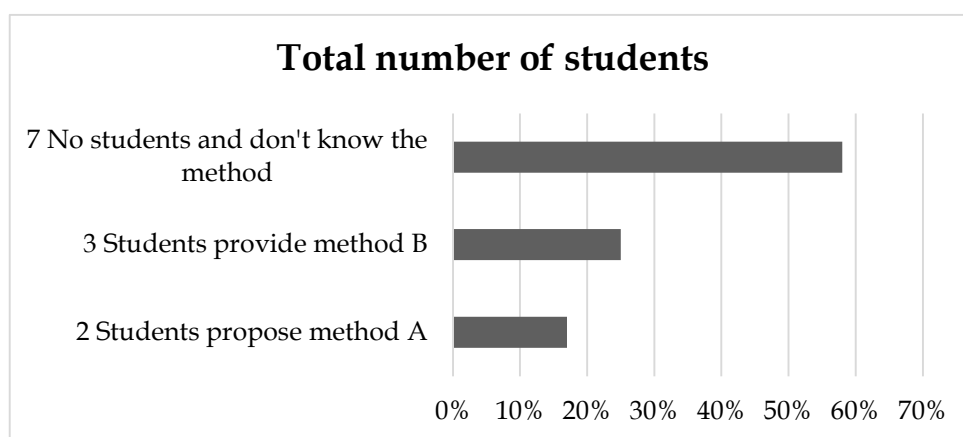
Total number of students

Chart data labels:
- 7 No students and don't know the method
- 3 Students provide method B
- 2 Students propose method A

X-axis: 0% 10% 20% 30% 40% 50% 60% 70%

Chart 1. Utilization Strategy Survey

In our interviews, the majority of respondents chose the answer "don't know" on what methods to use or what strategies are suitable to increase effective learning productivity. So we looked for other literacy sources to answer the research problem. Based on the chart above, the methods, uses and respondents' responses were explained: Method A, this method emphasized the importance of using ChatGPT proportionally to prevent over-reliance. With this approach, the information generated can be more assured of accuracy and support accountability in its use. Method B, this method intended to involve the process of validating the answers provided by ChatGPT or always double-checking the information obtained from ChatGPT against the answers generated by ChatGPT to ensure that the information was in accordance with scientific principles and did not deviate from the actual facts.

Discussion
Usage of ChatGPT

The findings of this study showed that ChatGPT plays various roles in students' academic experiences, especially in Islamic Religious Education (PAI). The data revealed that students generally find ChatGPT useful for completing assignments, learning new concepts, and encouraging discussions. However, there were also concerns about motivation, content accuracy, and dependence on the tool. These results related to cognitive load theory, which stated that tools like ChatGPT can reduce unnecessary mental effort, allowing learners to concentrate on essential tasks. Still, as one respondent noted, this reduced effort might unintentionally lead to less engagement with learning materials. This connects to self-determination theory, which highlights the importance of intrinsic motivation for meaningful learning.

Regarding content accuracy, especially with Islamic Religious materials, the results were mixed. Some students found ChatGPT's answers accurate, while others questioned the credibility of its religious explanations, particularly concerning Quranic interpretation. Moreover, stating that ChatGPT's interpretations often did not align with established qawa'id al-tafsir (rules of interpretation) and contain errors. Similarly, Egunjobi (2025) point out the AI's limitations in consistently generating accurated religious content, emphasizing

the need for checking facts and critical reading when using AI-generated materials in theology. This underscored the importance of media literacy and critical thinking skills in today's digital age, especially as students interact with algorithmically generated content in sensitive academic areas.

Despite these challenges, many students view ChatGPT as a helpful and effective learning tool. Its ability to provide structured explanations and different viewpoints has positively affected classroom dynamics, particularly in peer discussions and collaborative learning, supporting findings by Belkhir (2024). This aligneed with Vygotsky's social constructivist theory in Alshahrani & Qureshi (2024), which highlights the importance of social interaction and tools in building knowledge together. ChatGPT acted as a cognitive mediator, helping students clarified difficult concepts and enhancing the depth and quality of academic conversations.

Moreover, most respondents reported ease of use, indicating a high level of acceptance of technology. This reflects the Technology Acceptance Model (TAM) proposed by Davis (in Patac & Jr, 2025). Where the perceived ease of use and usefulness are key factors for user adoption (Messeri & Crockett, 2024; Mannuru et al., 2023). Although some students experienced challenges, such as formulating prompts and receiving lengthy or off-topic responses, these did not significantly diminish their overall positive view of the platform. These user challenges showed the need for digital literacy education, especially in prompting skills and critically evaluating AI outputs, which were often overlooked in current curricula.

Overall, the study confirmed that ChatGPT, while not perfect, has become an important academic tool that aided learning efficiency, encouraged collaboration, and promoted idea exploration, as long as its limitations were recognized and managed responsibly. Future research could further explore teaching strategies that effectively incorporated AI tools like ChatGPT without hindering students' critical thinking or the integrity of their studies, particularly in religious and ethical contexts.

Impact of ChatGPT on Productivity
Efficiency in Task Completion

ChatGPT serves as a tool that made it very easy for students to complete various academic tasks, such as compiling papers, making presentations, and solving problems, in a faster and more effective way (Rony et al., 2024). In terms of perception, most students consider that A.I. based applications help them save time and effort in doing coursework (Morgan, 2024). With this technology, students can optimally utilize their time without sacrificing the quality of their work. Based on interview data, it is also proven to be able to provide answers quickly. With the help of ChatGPT, students can prepare for relevant search time, thus having more time to deepen their understanding.

1) ChatGPT can improve the quality of education if utilized appropriately, namely by not doing the original copy and paste and conducting critical analysis. Therefore, ChatGPT can reduce the quality of education if used inappropriately, because ChatGPT can create the potential for lazy thinking

(Banh & Strobel, 2023). 2) ChatGPT can be utilized to produce a fairly scientific writing with a prompt formulated at the beginning with good and effective techniques. So that it can improve students' writing ability (Salvagno et al., 2023). 3) ChatGPT is a tool, a tool is different from a human. A.I. can essentially replace human work but A.I. can never replace the emotional side of humans (Wang et al., 2023). This next strategy is to construct an understanding in the form of "moral knowing" needed to understand the ethical and moral boundaries when someone uses ChatGPT media (Adeshola & Adepoju, 2024).

Reinforces Understanding of Concept

Through systematic, simple explanations and relevant examples, ChatGPT makes it easier for students to understand complicated or difficult material. This technology is a very useful support in deepening the understanding of academic concepts (Salmaan, 2023).

Improving Academic Productivity.

ChatGPT offered ideas, inspiration, and a purposeful work structure for various academic writing purposes, such as term papers, final projects, or scientific articles. With this help, students can work more productively and produce more structured and weighty work. It can also simplify the tasks of administrators and improve teaching effectiveness and efficiency. (Erizal et al., 2024).

Encourages Creativity and New Ideas

On the positive side, students thought that ChatGPT provided benefits in improving their quality, creativity, knowledge, and skills as students (Nurbayan & Anwar, 2022). This technology allows students to think more innovatively by providing fresh perspectives, new ideas, and creative solutions. By utilizing ChatGPT, students can create more unique and creative works. Therefore, there is a need for creativity in prompting so that students can further explore the answers from ChatGPT (Liu et al., 2021). On the negative side, ChatGPT can also affect students' motivation levels. According to research showing that there is an influence of ChatGPT on the level of laziness of thinking of students.

The findings of this research showed that of course the use of ChatGPT greatly affects student learning productivity. This was evidenced by the high percentage of students who use ChatGPT in the learning process. Most students felt helped by ChatGPT's ability to provide answers quickly and efficiently. However, there were concerns regarding the credibility of the answers, especially on certain material in Islamic Studies, where some students felt the information provided is not accurate. Nonetheless, many found the technology effective in speeding up the completion of assignments and making it easier to understand difficult material.

The impact of ChatGPT on student productivity was also twofold. First, ChatGPT helped improve task efficiency and understanding of complex concepts, as well as encouraging creativity in generating new ideas. Secondly, some students felt that the reliance on this technology reduced their critical thinking ability, which negatively impacted the quality of learning. Therefore, it was important for students to use ChatGPT proportionally and critically, by

validating the information provided and avoiding dependency by increasing literacy from Journals, Books, Magazines, Internet, other sources of information.

This research contributed to a new understanding of how ChatGPT can be utilized as a tool to support student learning productivity, particularly in increasing information search efficiency, enriching conceptual understanding, and fostering more focused independent learning patterns. This research also provided practical contributions for teachers and educational institutions in designing technology-based learning strategies relevant to the needs of the digital generation. However, this study had limitations, including the reliability of ChatGPT responses, which are sometimes generalized or inappropriate to the local learning context. Furthermore, limited accesed to technology and digital literacy among some students also hinders equitable implementation. Therefore, the results of this study needed to be complemented by further studies integrating the use of ChatGPT with teacher monitoring systems to ensure the effectiveness and accuracy of learning.

CONCLUSION

This study revealed that the use of ChatGPT significantly influenced the learning productivity of students in the Islamic Education Study Program, highlighting both its advantages and challenges. The key finding shows that ChatGPT enhanced efficiency in completing academic tasks, deepened conceptual understanding, and motivated students to increase their academic performance; however, it also reduced critical thinking, fostered dependence, and occasionally weakened academic morale. The main implication of this research is the urgent need to integrate AI literacy into educational curricula so that students are trained to critically evaluate AI-generated information, maintain independent reasoning, and align technological use with Islamic ethical values. Scientifically and practically, this study contributes to the growing discourse on responsible AI use in Islamic higher education and offers pedagogical strategies for balancing technological efficiency with moral and intellectual development. Despite its strengths in capturing students' real experiences and providing contextual understanding, the study is limited by its scope and potential self-report bias. Therefore, future research should employ longitudinal and mixed-method designs to examine the long-term effects of AI integration on students' critical thinking, motivation, and academic achievement.

ACKNOWLEDGMENT

REFERENCES

Adeshola, I., & Adepoju, A. P. (2024). The Opportunities and Challenges of ChatGPT in Education. *Interactive Learning Environments*, *32*(10), 6159–6172. https://doi.org/10.1080/10494820.2023.2253858

Alnefaie, S. S. M. (2024). *Artificial Intelligence for Answering Questions from the Holy Quran and Hadith* (Doctoral dissertation, University of Leeds).

Alshahrani, K., & Qureshi, R. J. (2024). Review the Prospects and Obstacles of AI-Enhanced Learning Environments: The Role of ChatGPT in Education. *International Journal of Modern Education and Computer Science*, *16*(4), 71–86. https://doi.org/10.5815/ijmecs.2024.04.06

Anshori, H. A. Al, Baharun, H., Hamada, S. E., & Hasanah, N. (2022). Digital Literacy Culture in Milenial Students At Boarding Schools. *Edureligia; Jurnal Pendidikan Agama Islam*, *06*(02), 204–214. https://doi.org/http://doi.org/10.33650/edureligia.v6i2.4741

Banh, L., & Strobel, G. (2023). Generative Artificial Intelligence. *Electronic Markets*, *33*(1), 1–17. https://doi.org/10.1007/s12525-023-00680-1

Bauer, E., Greiff, S., Graesser, A. C., Scheiter, K., & Sailer, M. (2025). Looking Beyond the Hype: Understanding the Effects of AI on Learning. *Educational Psychology Review*, *37*(2), 1–27. https://doi.org/10.1007/s10648-025-10020-8

Belkhir, F. Z. (2024). Challenges and Opportunities of AI-Assisted Learning: A Systematic Literature Review on the Impact of ChatGPT Usage in Higher Education. *IJLTER*, *22*(7), 25–39. https://doi.org/https://www.nature.com/articles/s41586-023-06221-2

Biswas, S. S. (2023). Role of Chat GPT in Public Health. *Annals of Biomedical Engineering*, *51*(5), 868–869. https://doi.org/10.1007/s10439-023-03172-7

Erizal, R. M., Safitra, A., Mulia, P. F., & Azmi, Z. (2024). Analisis Pemanfaatan Kecerdasan Buatan Menggunakan Platform Chat-GPT untuk Mendukung Proses Pendidikan bagi Mahasiswa. *Student Scientific Creativity Journal*, *2*(1), 187-197. https://doi.org/10.55606/sscj-amik.v2i1.2711

Ge, J., & Lai, J. C. (2023). Artificial Intelligence-Based Text Generators in Hepatology: ChatGPT is Just the Beginning. *Hepatology Communications*, *7*(4), e0097. https://doi.org/10.1097/HC9.0000000000000097

Grassini, S. (2023). Education: Exploring the Potential and Consequences of AI and ChatGPT in Educational Settings. *Education Sciences*, *13*(692), 1–13. https://doi.org/https:// doi.org/10.3390/educsci13070692

Halaweh, M. (2023). ChatGPT in Education: Strategies for Responsible Implementation. *Contemporary Educational Technology*, *15*(2), 1–11. https://doi.org/10.30935/cedtech/13036

Huynh-The, T., Pham, Q. V., Pham, X. Q., Nguyen, T. T., Han, Z., & Kim, D. S. (2023). Artificial Intelligence for the Metaverse: A Survey. *Engineering*

Applications of Artificial Intelligence, *117*(1), 1–24. https://doi.org/10.1016/j.engappai.2022.105581

Laato, S., Morschheuser, B., Hamari, J., & Bjorne, J. (2023). AI-Assisted Learning with ChatGPT and Large Language Models: Implications for Higher Education. *Proceedings - 2023 IEEE International Conference on Advanced Learning Technologies, ICALT 2023*, *12*(November 2022), 226–230. https://doi.org/10.1109/ICALT58122.2023.00072

Lee, D., Kim, H. hyeon, & Sung, S. H. (2023). Development Research on an AI English Learning Support System to Facilitate Learner-Generated-Context-Based Learning. *Educational Technology Research and Development*, *71*(2), 629–666. https://doi.org/10.1007/s11423-022-10172-2

Liu, X., Zheng, Y., Du, Z., Ding, M., Qian, Y., Yang, Z., & Tang, J. (2024). GPT understands, too. *AI Open*, *5*, 208-215. https://doi.org/10.48550/arXiv.2103.10385

Lund, B. D., & Wang, T. (2023). Chatting about ChatGPT: How May AI and GPT Impact Academia and Libraries?. *Library Hi Tech News*, *40*(3), 26-29. https://doi.org/10.1108/LHTN-01-2023-0009

Lyu, W., & Liu, J. (2021). Artificial Intelligence and Emerging Digital Technologies in the Energy Sector. *Applied Energy*, *303*(February), 117615. https://doi.org/10.1016/j.apenergy.2021.117615

Mai, D. T. T., Da, C. Van, & Hanh, N. Van. (2024). The Use of ChatGPT in Teaching and Learning: a Systematic Review Through SWOT Analysis Approach. *Frontiers in Education*, *9*(February), 1–17. https://doi.org/10.3389/feduc.2024.1328769

Mannuru, N. R., Shahriar, S., Teel, Z. A., Wang, T., Lund, B. D., Tijani, S., Pohboon, C. O., Agbaji, D., Alhassan, J., Galley, J. Kl., Kousari, R., Ogbadu-Oladapo, L., Saurav, S. K., Srivastava, A., Tummuru, S. P., Uppala, S., & Vaidya, P. (2023). Artificial Intelligence in Developing Countries: The Impact of Generative Artificial Intelligence (AI) Technologies for Development. *Information Development*, *10*(September), 1–19. https://doi.org/10.1177/02666669231200628

Messeri, L., & Crockett, M. J. (2024). Artificial Intelligence and Illusions of Understanding in Scientific Research. *Nature*, *627*(8002), 49–58. https://doi.org/10.1038/s41586-024-07146-0

Morgan, H. (2024). Using Triangulation and Crystallization to Make Qualitative Studies Trustworthy and Rigorous. *Qualitative Report*, *29*(7), 1844–1856. https://doi.org/10.46743/2160-3715/2024.6071

Nurbayan, Y., & Anwar, S. (2022). Digital Library Utilization ; Strategies to Improve Digital Islamic Digital Literacy for Religion Teachers. *EDURELIGIA: Jurnal Pendidikan Agama Islam*, *6*(December), 150–160. https://doi.org/10.33650/edureligia.v6i2.4536

Patac, L. P., & Patac Jr, A. V. (2025). Using ChatGPT for Academic Support: Managing Cognitive Load and Enhancing Learning Efficiency–A

Phenomenological Approach. *Social Sciences & Humanities Open*, *11*, 101301. https://doi.org/10.1016/j.ssaho.2025.101301

Qawqzeh, Y. (2024). Exploring the Influence of Student Interaction with ChatGPT on Critical Thinking, Problem Solving, and Creativity. *International Journal of Information and Education Technology*, *14*(4), 596-601. https://doi.org/10.18178/ijiet.2024.14.4.2082

Rony, M. K. K., Kayesh, I., Bala, S. Das, Akter, F., & Parvin, M. R. (2024). Artificial Intelligence in Future Nursing Care: Exploring Perspectives of Nursing Professionals - A Descriptive Qualitative Study. *Heliyon*, *10*(4), e25718. https://doi.org/10.1016/j.heliyon.2024.e25718

Rospigliosi, P. 'asher.' (2023). Artificial Intelligence in Teaching and Learning: What Questions Should We Ask of ChatGPT? *Interactive Learning Environments*, *31*(1), 1–3. https://doi.org/10.1080/10494820.2023.2180191

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and Extrinsic Motivation from a Self-Determination Theory Perspective: Definitions, Theory, Practices, and Future Directions. *Contemporary educational psychology*, *61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Salmaan, A. F. (2023, September). Analysis of the Effect of ChatGPT on the Learning Productivity of Secondary School Students. In *Proceeding International Conference on Education* (pp. 175-181). https://jurnalfaktarbiyah.iainkediri.ac.id/index.php/proceedings/article/view/1819/641

Salvagno, M., Taccone, F. S., & Gerli, A. G. (2023). Can Artificial Intelligence Help for Scientific Writing? *Critical Care*, *27*(1), 1–5. https://doi.org/10.1186/s13054-023-04380-2

Sumargo, B. (2020). *Teknik Sampling*. UNJ Press.

Wang, H., Fu, T., Du, Y., Gao, W., Huang, K., Liu, Z., Chandak, P., Liu, S., Van Katwyk, P., Deac, A., Anandkumar, A., Bergen, K., Gomes, C. P., Ho, S., Kohli, P., Lasenby, J., Leskovec, J., Liu, T. Y., Manrai, A., … Zitnik, M. (2023). Scientific Discovery in the Age of Artificial Intelligence. *Nature*, *620*(7972), 47–60. https://doi.org/10.1038/s41586-023-06221-2

Wardat, Y., Tashtoush, M. A., AlAli, R., & Jarrah, A. M. (2023). ChatGPT: A Revolutionary Tool for Teaching and Learning Mathematics. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(7), 1–18. https://doi.org/10.29333/ejmste/13272

Zafar, S., Shaheen, F., & Rehan, J. (2024). Use of ChatGPT and Generative AI in Higher Education: Opportunities, Obstacles and Impact on Student Performance. *IRASD Journal of Educational Research*, *5*(1), 01–12. https://doi.org/10.52131/jer.2024.v5i1.2463