IDARAH (Jurnal Pendidikan dan Kependidikan)
Vol. 7 No.2 (2023) p. 135-148
pISSN: 2549-8193 eISSN: 2656-8012

Transforming Online Learning Management: Generative Models on ChatGPT to Enhance Online Student Engagement Scale (OLE)

Ahmad Al Yakin,[1*] Muthmainnah,[1] Eka Apriani,[2] Ahmed J. Obaid,[3] Ahmed A. Elngar,[4]

[1] Universitas Al Asyariah Mandar, Polewali, Sulawesi Barat, Indonesia
[2] Institut Agama Islam Negeri Curup Bengkulu, Indonesia
[3] University of Kufa, Iraq,
[4] Beni-Suef University, Beni-Suef City, Egypt

History
Received
20 May 2023
Revised
28 November 2023
Accepted
02 December 2023

Keywords
ChatGPT,
Online Learning,
Student Engagement Scale,
Teaching Sociology.

Abstract

Artificial Intelligence (AI) technology in education is rising, with ChatGPT, an advanced AI chatbot developed by OpenAI, gaining popularity. This study focuses on exploring the potential of ChatGPT in enhancing academic learning in sociology and politics. Using a quantitative research approach, the study examines student engagement with ChatGPT in an educational setting. The research was conducted with 23 fourth-semester undergraduate students in early 2023. The findings indicate that ChatGPT generates enthusiasm and high levels of student engagement, facilitating activities such as idea exchange, discussions, analysis, and motivation. However, the integration of ChatGPT in education requires well-defined strategies and pedagogical approaches that prioritize critical thinking skills and access to fact-checking resources. The study suggests future research directions to ensure the responsible use of chatbots like ChatGPT in academic environments. Although challenges exist, such as potential bias, the need for human oversight, and risks of misuse, effective management can overcome these obstacles. Leveraging AI in education offers opportunities for students to develop an early understanding of social biases, critical elements, and risks associated with AI implementation. The study concludes with recommendations for addressing these challenges and promoting the ethical use of ChatGPT in education.

Corresponding Author: ✉ Ahmad Al Yakin | ✉ ahmadalyakin@unasman.ac.id
: https://doi.org/10.47766/idarah.v7i2.1514

INTRODUCTION

New technologies emerge, often challenging established norms and prompting individuals to reassess their priorities and adjust (Felzensztein & Tretiakov, 2023). Academics have previously deliberated on Google's potential impact on schools, debating whether search engines make individuals smarter or shallower (Bozkurt et al., 2023; Leon & Vidhani, 2023) and questioning the necessity of teachers. Massive Open Online Courses (MOOCs) garnered attention in the early 2010s (Cheng, 2022), but their performance fell short of expectations, leading to shifts in focus and business models (Cheng, 2022; Fui-Hoon Nah et al., 2023). Even a robust tool like ChatGPT is not immune to criticism. This research explores the advantages and disadvantages of using ChatGPT for online student engagement in the classroom (Gill et al., 2024; Yuzar et al., 2022).

Various educational institutions and organizations are increasingly exploring the potential benefits of AI-based technology for learning (Firat, 2023; Kooli, 2023), driven in part by widespread media coverage of AI applications in education. ChatGPT, developed by OpenAI as an advanced natural language processing (NLP) model in 2019, exemplifies this technology (Lund et al., 2023). Functioning as a generative AI, ChatGPT uses an algorithm to produce text that simulates human writing, interpreting natural language requests and generating human-sounding responses (Whittlestone et al., 2019). Designed for one-on-one conversations, ChatGPT serves as a powerful tool for activities such as answering queries, creating narratives, summarizing content, and even composing essays. OpenAI launched GPT-4, a more advanced version of ChatGPT, on March 14, 2023.

The usage of ChatGPT extends across various domains, including writing (Dergaa et al., 2023), libraries (Lund & Wang, 2023), and classrooms (Malinka et al., 2023). In educational settings, ChatGPT proves valuable by serving as a virtual tutor, managing student inquiries, and crafting individual lesson plans (Baidoo-Anu & Owusu Ansah, 2023). As a practical AI tool, it facilitates the acquisition of "AI literacy" for educators and students, encompassing knowledge and skills necessary for comprehending, utilizing, and assessing the social and ethical implications of AI technology (Hagerty & Rubinov, 2019). This includes understanding AI principles, methodologies, algorithms and the ability to analyze and evaluate AI systems and their applications (Purificato et al., 2023). An essential component of AI literacy is an awareness of AI's ethical, legal, and social consequences, coupled with effective communication about AI issues and ideas (Hagerty & Rubinov, 2019). ChatGPT, being a user-friendly AI application, can serve as a teaching tool, aiding instructors and students in better understanding and adapting to the evolving field of AI (Atlas, 2023).

Today's technology has transitioned from a benign pastime to a transformative force. Its success hinges on various factors and is impervious to bans or denials. Understanding the potential benefits, drawbacks, and limitations of technology reliant on large language models like ChatGPT is crucial. Moreover, comprehending the impact of ChatGPT and related technologies on specific areas, such as education, is essential for their practical application in the classroom. Educators and stakeholders can then assess the advantages and disadvantages, weighing the decision to incorporate such technology and developing a strategic plan (Dwivedi et al., 2023).

Upon gaining knowledge about what ChatGPT is capable of, individuals can make informed decisions regarding its usage, considering both advantages and disadvantages. However, adapting to ChatGPT may necessitate changing ingrained habits, posing a challenge due to natural reluctance to change. Over time, skepticism and disapproval tend to diminish as technology becomes integral to daily life, particularly for versatile tools penetrating diverse fields. Research by Alkaissi and McFarlane suggests that resistance and extreme reactions are unlikely to impede technology from reaching the pinnacle of productivity (Alkaissi & McFarlane, 2023). In the rapidly expanding field of computer science, artificial intelligence (AI) seeks to develop intelligent robots with human-like cognition and behavior. AI finds applications across diverse sectors, including healthcare, transportation, education, and training. AI can also be seamlessly integrated with the Internet of Things (IoT) to create a synergistic technology called AIoT. Among the most promising AI technologies is ChatGPT, a natural language processing (NLP) system adept at mimicking human-like conversation.

ChatGPT holds significant potential to enhance classroom teaching, problem-solving, and learning. For instance, technology can assist educators in tailoring lessons to each student, making them more specific and engaging (Kasneci et al., 2023). This individualized approach can potentially boost student interest, motivation, and performance in class. Additionally, the ChatGPT model proves helpful in evaluating and measuring the effectiveness of educational programs, providing teachers with a valuable tool for efficiently assessing and commenting on student work.

Applying powerful artificial intelligence technology like ChatGPT facilitates a quick and easy understanding of complex math topics for students. This technology allows users to pose questions about political sociology in natural language and receive instant answers. ChatGPT requires no prior knowledge or training in mathematics, yet it aids in comprehending complex critical thinking and problem-solving concepts. Users can engage in conversations with AI to seek assistance with political sociology phenomena and intricate political history. Furthermore, helpful hints and tips are available whenever users encounter difficulties. While ChatGPT boasts impressive features, it is not without limitations. The language model may

sometimes produce irrelevant, inaccurate, or biased answers and struggle with understanding the nuances or context of specific issues. It is essential to recognize that ChatGPT is a tool, not a substitute for real teachers and educators (Wardat et al., 2023).

In conclusion, while ChatGPT has the potential to enhance the educational experience for teachers and students, it is crucial to use it in conjunction with human instructors who provide guidance, direction, and monitoring in the classroom. Understanding the limitations of ChatGPT and using it ethically and responsibly are critical considerations for educators leveraging it to create individualized content, evaluate student learning, and provide feedback.

In online engagement, students must interact with course materials, peers, and the teacher for effective learning, reflecting a fundamental principle of social constructionism. According to research by Zhai (2023), successful course design and high levels of learning and satisfaction are associated with three factors: dynamic discussion (interaction with classmates), a transparent interface for easy navigation, and frequent, quality interaction with instructors. Hong supports that excellent practice entails interaction between teachers and students, peer learning, and active engagement. Similarly, scholars like Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, (2023) underscore the importance of student participation in online learning for positive learning outcomes. Offering students opportunities to connect with the instructor, peers, and course content can mitigate a common problem in online courses—students' feelings of isolation. However, there is still limited research examining the potential of ChatGPT to increase student engagement in the classroom. The conceptual paper aims to illustrate the potential benefits of using ChatGPT to enhance student engagement in learning.

METHOD

This study employs quantitative methods to describe, summarize, or explain data collected from materials such as questionnaires. The research is conducted at Al Asyariah Mandar University, where ChatGPT-based learning is utilized as online learning material in political sociology courses. The study was carried out from February to April 2023 with students in the fourth semester of the Faculty of Teacher Training and Education, specifically in the Pancasila and Citizenship Education study program. The survey form describes the respondents, with attitudes toward ChatGPT-based online education being the initial focus. Subsequently, the research explores the impact of ChatGPT-based treatment on students' abilities to function in the modern world. The sampling strategy employed is "purposeful sampling," a consciously chosen non-probability method that considers the researcher's opinion on

which sample is most likely to achieve the research objectives, as outlined by Kumar (2018:62). Therefore, the study focused on students enrolled in the Pancasila and Citizenship Education Study Program.

Questionnaires are usually used to collect information in the field of education. It is usually used to find out about other people's hobbies, values, and characteristics that cannot be seen at a glance (Gall et al., 1996). Students who previously took political sociology classes through the online learning platform ChatGPT were given a survey. Survey findings are expressed as a percentage and visualized using a graph. At the start of the 2022-2023 academic year sufficient time was allocated to retrospect the previous semester's deployment of online learning. There were a total of 23 people (8 boys and 15 girls) in this study. In this investigation, we adapted the questionnaire box to include questions about students' experiences with ChatGPT.

Sixty items were included in the survey, ten comments each for positive statements on ChatGPT. Students were asked to fill out a questionnaire using a Likert Scale so that the data collected could be analysed to show how they felt about ChatGPT while learning was being carried out. Questions and grids are placed in Table 1.

Table 1. Engagement Score in learning through ChatGPT

Positive Engagement	Score
Very good	5
Good	4
Fairly	3
Low	2
Very low	1

(Cohen et al., 2018)

The questionnaire has 16 positive statements. As a result, 120 is the maximum possible score and 30 is the minimum score. Interval scores are calculated using the following table for each ChatGPT scoring category:

Table 2. Students Classification score for ChatGPT questionnaire

Classification	Score
Very good	80-100
Good	79-80
Fairly	66-78
Low	48-65
Very low	30-47

Furthermore, to analyze the research data using quantitative and qualitative analysis using statistical analysis SPSS 26 for window.

RESULT AND DISCUSSION

ChatGPT can comprehend students' unique learning styles, enabling a personalized learning experience tailored to their needs. It can effectively structure course materials by analyzing students' academic performance to meet their specific requirements. This personalized approach allows students to learn comfortably, ensuring a comprehensive understanding of even the most intricate and complex concepts. With the assistance of ChatGPT, students can delve deep into the subject matter, clarifying any doubts or uncertainties along the way. The ability to provide such personalized and adaptive learning experiences sets ChatGPT apart, fostering a more effective and engaging educational journey for students.

After students receive treatment and complete the survey, the lecturer analyzes the data. Both observational learning and application learning behavior involve discussing political history with ChatGPT, analyzing political phenomena in Indonesia and the world, and examining people's behavior towards politics and money politics. Assignments submitted are recorded during the course. As mentioned earlier, there is a distinction between students who only attend classes and those actively involved in learning by logging into online platforms or clicking links. This analysis distinguishes between observing and learning through applications.

However, this data analysis solely focuses on the level of involvement and does not investigate its impact on students' learning ability. It would be easy for students to click and open ChatGPT, notice its content, and then take a quiz where they have to guess the answer. Although a rough estimate, the total number of behaviors helps test whether their engagement scale is positive with ChatGPT. Thus, the data analysis distinguishes between passive engagement of receiving information and engagement of being actively involved with the material using ChatGPT, alone or in collaboration with other students and teachers. Separate totals were prepared for observational learning behaviors and application learning activities.

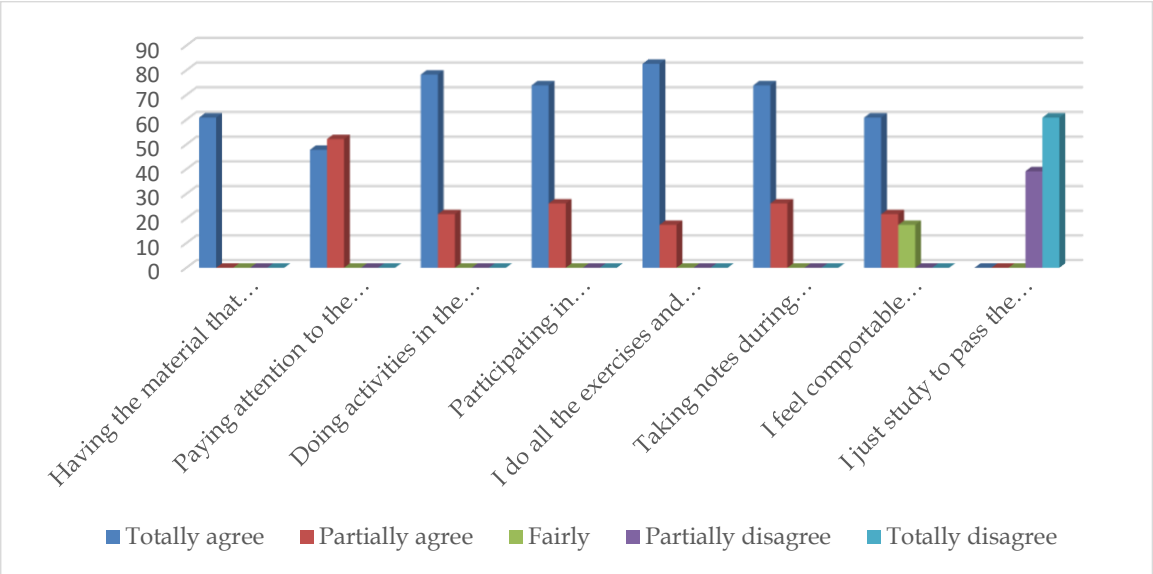

Figure 1. Students engaged in learning activities through ChatGPT

Figure 1, the first statement, reflects the survey results, indicating that 60.86 percent of respondents agree that ChatGPT is a priority to them, with an additional 39.13 percent of respondents falling into this category. Despite this, 47.82% of respondents guarantee paying attention to the teacher, and 39.13% partially agree. Doing activities in the class with ChatGPT is considered helpful by 78.26%, with 21.73% of respondents in the "totally agree" category. In the fourth statement, participating in discussion activities to increase students' critical thinking had 73.91% in agreement and 26.08% partially agreed, with no one choosing the shallow category. The following statement inquired about how ChatGPT helps with all exercises, with 82.6% of respondents agreeing with this assertion, while 17.39 percent partially agreed. Finally, most respondents expressed confidence in their ability to learn using ChatGPT. In the last statement, which asked about studying only to pass exams, the majority partially disagreed or disagreed with this statement.

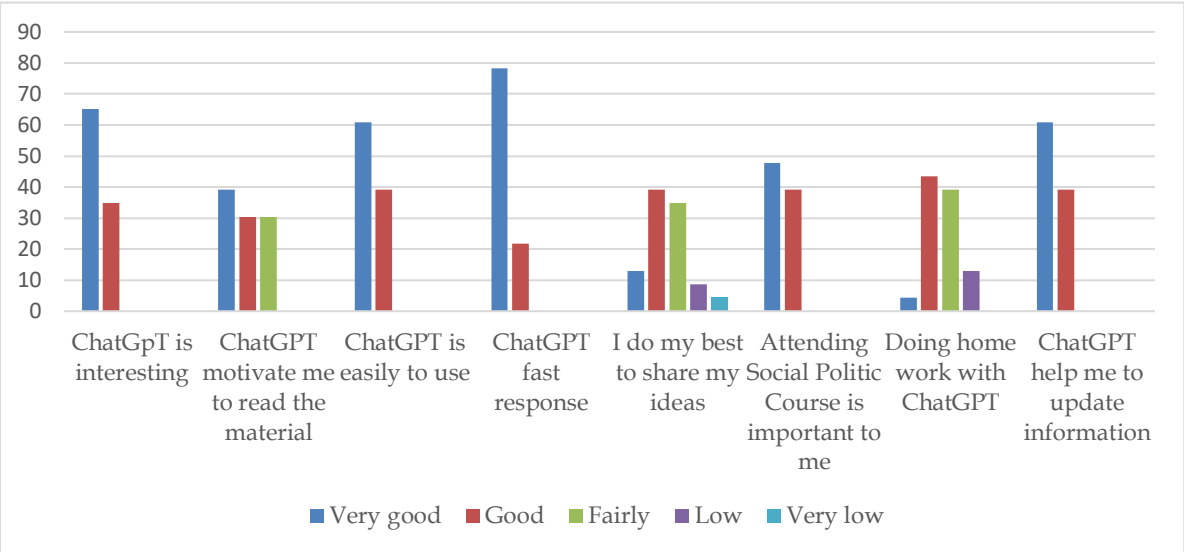

Figure 2. Students' perception on ChatGPT

These results shed light on the extent to which participants engage with ChatGPT technology. Of the respondents, 65.21% chose "very good," while 34.78% partially believe that ChatGPT is an exciting tool for learning and motivating to read materials (39.13% agree with this statement, and 30.43% partially agree). This indicates a high level of competence in using technology because 78.26% of respondents chose the "outstanding" category, and 21.73% took the "excellent" position for ChatGPT's fast response. However, overall, respondents provided positive statements. Only 4.34% of respondents were classified as deficient, and 8.69% fell into a low category regarding their technical problem-solving skills, showing ambivalence about sharing ideas.

Regarding the ability to obtain information with ChatGPT, 60.89% of respondents rated it excellent, while 39.13% considered it good. This finding aligns with the statements of the surveys. The good news is that none of these responses can be considered harmful, indicating support for ChatGPT as a learning tool to engage participants in the online class.

Figure 3. Students engaged in learning through ChatGPT

Quantitative and qualitative analyses were carried out on the data in this study. By verifying the questionnaire results, we gain insight into the potential of ChatGPT in engaging students to study political sociology. Researchers used SPSS version 26 for Windows to store, organize, and analyze research data. The following table displays the results of the student's scores on the questionnaire employed by the researcher.

Table 3. Mean score of students engaged to ChatGPT

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ChatGPT	23	65.00	76.00	71.0870	3.11759
Valid N (listwise)	23				

Based on table 3 In total, 23 students were willing to express their thoughts on their learning activities through ChatGPT and their responses matched the requirements for analysis. The next stage was to assign a letter grade to each student's answer on the questionnaire. Table 3 displays mean score of the students answer is 71.08, from the questionnaire to properly understand the results of the students score in good engage category.

Table 4. Descriptives Statistic

			Statistic	Std. Error
ChatGPT	Mean		71.0870	.65006
	95% Confidence Interval for Mean	Lower Bound	69.7388	
		Upper Bound	72.4351	
	5% Trimmed Mean		71.1667	
	Median		72.0000	
	Variance		9.719	
	Std. Deviation		3.11759	
	Minimum		65.00	
	Maximum		76.00	
	Range		11.00	
	Interquartile Range		6.00	
	Skewness		-.631	.481
	Kurtosis		-.610	.935

Twenty-three students/respondent's ass can be seen in the table 4 representation of the data provided ChatGPT engage students to learn in good category. In this paper, we found that academic integrity used in conjunction with ChatGPT and other AI-based text generators is highly likely to be compromised. Likewise, they have the potential to change the academic world. Student involvement is very important so that a student-centered class atmosphere can be implemented optimally. The presence of ChatGPT in the classroom can help students get and share ideas, increase participation in discussions, increase interest in reading and increase confidence in

learning as shown by figure 1 and study by Adiguzel, et al and Chaudry. (Adiguzel et al., 2023; Chaudhry et al., 2023).

The ability to access Information quickly, the ease of using ChatGPT which can motivate students to do homework more quickly. However, there were several students who said they had difficulty accessing ChatGPT due to inadequate network and limited quota. In addition, in figure 2 it was found that students were not sure that ChatGPT could fully assist them in working on their papers because the information was biased and prone to similarities if ChatGPT was used for this need.

The presence of ChatGPT adds interest to studying political sociology; access to information is fast and easy compared to reading textbooks. Chatbot ChatGPT, an artificial intelligence chat tool, is ready to answer any questions, similar to Rahman and Watanobe's research (Rahman & Watanobe, 2023). The reaction to the chatbot's debut has received mixed responses from the literary and journalistic community. Because it can simulate human reactions, many praise it as the best artificial intelligence technology. On the other hand, some journalists see it as an attack on their right to make impartial judgments.

Based on the research results, it is evident that ChatGPT offers undergraduate students and lecturers the ability to find appropriate solutions to theory-based problems, at least in the context of political sociology classes, discussing and describing political phenomena and making comparisons with other countries. ChatGPT replies are always concise and to the point. ChatGPT should be a viable option for students looking for immediate responses to the questions shown in Figure 1. ChatGPT provides replies depending on the user's word limit, unlike search engines that generate billions of results that may or may not be accurate and/or relevant. These comments can provide users with enough information to make an informed decision without requiring them to sift through a massive list of potential sources and evaluate their legitimacy.

ChatGPT provides lecturers and students with a way to model the process of active discussion, feedback, and interaction. The classroom can use ChatGPT to discuss and grade students' answers to questions, scenarios, and case studies. They can serve as examples of potential solutions, and their strengths and weaknesses can be examined. Students can then be asked to write their responses to the discussion questions. ChatGPT's quick response can free up time to create more substantial and active discussions. Due to ChatGPT's capabilities, teachers must adapt their methods to take advantage of cutting-edge AI tools and limit any adverse effects they may have. As previously mentioned, ChatGPT can generate text very similar to human levels. Teachers are urged to use anti-plagiarism software as a platform for receiving homework assignments to reduce the likelihood of students submitting comments generated by Chatbots.

Educators and school authorities raise concerns regarding the potential for plagiarism that may arise when students use ChatGPT to complete assignments. Plagiarism is a severe transgression in the scholarly domain, with specific academic establishments even threatening the expulsion of convicted offenders.

Positive aspects of ChatGPT in schools. Nevertheless, some authorities contend that software such as ChatGPT is here to stay, and educational institutions should capitalize on its advantages. ChatGPT eagerly anticipates the prospect of working with educators to devise pragmatic resolutions that empower students and instructors to benefit from the capabilities of artificial intelligence.

ChatGPT's capability to simplify difficult passages, thereby increasing their accessibility for students with reduced reading abilities, is one of its benefits. Moreover, ChatGPT is an invaluable instrument that enhances the reading experience of students with learning disabilities. Instead of being perceived as an impediment, the chatbot ought to be regarded as an innovative educational prospect, akin to the initial scepticism that accompanied graphing calculators until they ultimately assisted students in deciphering mathematical formulas.

The study provides evidence that ChatGPT substantially impacts creativity and that plagiarism, in turn, affects creativity. Additionally, creativity influences motivation, and the confluence of these elements ultimately affects academic achievement.

Most respondents agree that ChatGPT helps educators (both teachers and students) succeed by providing essential background information on a wide range of subjects. Participants also noted that ChatGPT helped them gain a broad perspective on various (complex) topics using straightforward language. The future of education is ripe with digital possibilities, and ChatGPT may cause a sea change in how education is delivered. This research adds findings and theoretical insights to the ongoing discussion about chatbots in the classroom.

This research also emphasizes the importance of rethinking education in light of the recent push to incorporate chatbots into the classroom. The practical topic of "raising competence" underscores the need to create a curriculum to improve the skills of teachers and students, given the rapid growth of chatbots. One route is to learn how best to incorporate chatbots into existing and future curricula and how best to create and implement such courses. A few caveats to this study need to be recognized before conclusions can be drawn. For example, this research focuses on universities that have just quantitatively started using ChatGPT. In addition, the sample size is relatively small, with only 23 students contributing to the study. Despite these caveats, this research lays a solid foundation for uncovering early adopter concerns about chatbots, particularly ChatGPT, in the classroom. Investigating how human and machine tutors (ChatGPT) can work together to increase engagement, as well as the changes and

outcomes this brings to the field of education, can be a potential focus for future research.

CONCLUSION

ChatGPT is a valuable tool for educators and students, providing essential background information and enabling a comprehensive understanding of complex topics. Its integration in education holds immense potential and could revolutionize knowledge imparting. This research contributes to the ongoing discourse on chatbot use in classrooms and emphasizes the need to re-evaluate education to enhance teachers' and students' skills. Future research should explore how human and machine tutors can collaborate to enhance engagement and investigate the resulting educational changes.

BIBLIOGRAPHY

Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing Education with AI: Exploring the Transformative Potential of ChatGPT. *Contemporary Educational Technology*, *15*(3), ep429. https://doi.org/10.30935/cedtech/13152

Alkaissi, H., & McFarlane, S. I. (2023). Artificial Hallucinations in ChatGPT: Implications in Scientific Writing. *Cureus*. https://doi.org/10.7759/cureus.35179

Atlas, S. (2023). *ChatGPT for Higher Education and Professional Development: A Guide to Conversational AI*. College of Business Faculty Publications.

Baidoo-Anu, D., & Owusu Ansah, L. (2023). Education in the Era of Generative Artificial Intelligence (AI): Understanding the Potential Benefits of ChatGPT in Promoting Teaching and Learning. *Journal of AI*, *7*(1), 52–62. https://doi.org/10.61969/jai.1337500

Bozkurt, A., Xiao, J., Lambert, S., Pazurek, A., Crompton, H., Koseoglu, S., Farrow, R., Bond, M., Nerantzi, C., & Honeychurch, S. (2023). Speculative Futures on ChatGPT and Generative Artificial Intelligence (AI): A Collective Reflection from the Educational Landscape. *Asian Journal of Distance Education*, *18*(1). https://digitalcommons.odu.edu/teachinglearning_fac_pubs/199/

Chaudhry, I. S., Sarwary, S. A. M., El Refae, G. A., & Chabchoub, H. (2023). Time to Revisit Existing Student's Performance Evaluation Approach in Higher Education Sector in a New Era of ChatGPT — A Case Study. *Cogent Education*, *10*(1). https://doi.org/10.1080/2331186X.2023.2210461

Cheng, Y.-M. (2022). How Different Categories of Gamified Stimuli Affect Massive Open Online Courses Continuance Intention and Learning Performance? Mediating Roles of Internal Experiences. *Social Science Computer Review*, 089443932211119. https://doi.org/10.1177/08944393221111928

Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education*. Routledge.

https://doi.org/10.4324/9780203224342

Dergaa, I., Chamari, K., Zmijewski, P., & Ben Saad, H. (2023). From Human Writing to Artificial Intelligence Generated Text: Examining The Prospects and Potential Threats of ChatGPT in Academic Writing. *Biology of Sport*, *40*(2), 615–622. https://doi.org/10.5114/biolsport.2023.125623

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., … Wright, R. (2023). Opinion Paper: "So what if ChatGPT Wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, *71*, 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Felzensztein, C., & Tretiakov, A. (2023). Technology Adaptation: Micro New Ventures in a COVID-19 Lockdown. *International Journal of Entrepreneurial Behavior & Research*, *29*(4), 1007–1026. https://doi.org/10.1108/IJEBR-10-2021-0838

Firat, M. (2023). How chat GPT can transform autodidactic experiences and open education. *Department of Distance Education, Open Education Faculty, Anadolu Unive*. https://doi.org/10.31219/osf.io/9ge8m

Fui-Hoon Nah, F., Zheng, R., Cai, J., Siau, K., & Chen, L. (2023). Generative AI and ChatGPT: Applications, Challenges, and AI-human Collaboration. *Journal of Information Technology Case and Application Research*, *25*(3), 277–304. https://doi.org/10.1080/15228053.2023.2233814

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction*. Longman Publishing.

Gill, S. S., Xu, M., Patros, P., Wu, H., Kaur, R., Kaur, K., Fuller, S., Singh, M., Arora, P., Parlikad, A. K., Stankovski, V., Abraham, A., Ghosh, S. K., Lutfiyya, H., Kanhere, S. S., Bahsoon, R., Rana, O., Dustdar, S., Sakellariou, R., … Buyya, R. (2024). Transformative Effects of ChatGPT on Modern Education: Emerging Era of AI Chatbots. *Internet of Things and Cyber-Physical Systems*, *4*, 19–23. https://doi.org/10.1016/j.iotcps.2023.06.002

Hagerty, A., & Rubinov, I. (2019). Global AI Ethics: A Review of The Social Impacts And Ethical Implications of Artificial Intelligence. *ArXiv Preprint ArXiv:1907.07892*. https://doi.org/10.48550/arXiv.1907.07892

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, 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

Kooli, C. (2023). Chatbots in Education and Research: A Critical Examination of

Ethical Implications and Solutions. *Sustainability*, *15*(7), 5614. https://doi.org/10.3390/su15075614

Leon, A. J., & Vidhani, D. (2023). ChatGPT Needs a Chemistry Tutor Too. *Journal of Chemical Education*, *100*(10), 3859–3865. https://doi.org/10.1021/acs.jchemed.3c00288

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

Lund, B. D., Wang, T., Mannuru, N. R., Nie, B., Shimray, S., & Wang, Z. (2023). Chatgpt And a New Academic Reality: Artificial Intelligence-Written Research Papers and The Ethics of The Large Language Models in Scholarly Publishing. *Journal of the Association for Information Science and Technology*, *74*(5), 570–581. https://doi.org/10.1002/asi.24750

Malinka, K., Peresíni, M., Firc, A., Hujnák, O., & Janus, F. (2023). On the Educational Impact of ChatGPT: Is Artificial Intelligence Ready to Obtain a University Degree? *Proceedings of the 2023 Conference on Innovation and Technology in Computer Science Education V. 1*, 47–53. https://doi.org/10.1145/3587102.3588827

Purificato, E., Lorenzo, F., Fallucchi, F., & De Luca, E. W. (2023). The Use of Responsible Artificial Intelligence Techniques in the Context of Loan Approval Processes. *International Journal of Human–Computer Interaction*, *39*(7), 1543–1562. https://doi.org/10.1080/10447318.2022.2081284

Rahman, M. M., & Watanobe, Y. (2023). ChatGPT for Education and Research: Opportunities, Threats, and Strategies. *Applied Sciences*, *13*(9), 5783. https://doi.org/10.3390/app13095783

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), em2286. https://doi.org/10.29333/ejmste/13272

Whittlestone, J., Nyrup, R., Alexandrova, A., Dihal, K., & Cave, S. (2019). Ethical and Societal Implications of Algorithms, Data, and Artificial Intelligence: a Roadmap for Research. In *London: Nuffield* …. http://www.nuffieldfoundation.org/sites/default/files/files/Ethical-and-Societal-Implications-of-Data-and-AI-report-Nuffield-Foundat.pdf

Yuzar, E., Rahmiaty, R., & Rahman, F. (2022). "Am I Being Rude": Exploring Indonesian Students' Intercultural Communicative Competence in Inner Circle Countries. *Lingual: Journal of Language & Culture*, *13*(1), 18–27.