
ChatGPT Usage and Attention Related Cognitive Errors in Daily Lives of University StudentsJannat Khalil^{1*}, Maryam Munir², Saima Majeed³**Abstract**

This research explored the relationship between the usage of ChatGPT and attention-related cognitive errors in undergraduates. Using cognitive load theory, dual process theory, and automation bias, the research examines how the various ways of using ChatGPT (i.e., academic writing aid, task support, and trust and reliance) influence attention lapses. A cross-sectional survey research design was adopted and data was collected from 385 university students with an age range of 18–24 years across various disciplines. The sample size was determined through G power analysis with medium effect size and 95% confidence interval. Standardized instruments such as the Attention-Related Cognitive Errors Scale (ARCES) and a validated ChatGPT Usage Scale were used. Correlation analysis determined that greater trust and reliance on ChatGPT was strongly associated with increased attention-related cognitive errors ($r = .50, p < .01$) but writing aid showed a non-significant relationship with ARCES ($r = -.03$). Whereas task support showed a positive relationship ($r = .11, p < .05$). Independent samples *t* test indicated female students showed higher attention related cognitive errors in contrast to males. Furthermore, students from humanities and social science disciplines had higher attention errors as compared to the ones from natural science and communication fields. Based on these findings, the artificial intelligence (AI) implementation in education reveals the complex cognitive impact, possibly hinting at its risks of excessive use. The research emphasizes the careful, responsible and ethical use of generative AI technologies such as ChatGPT to maintain some balance between convenience and cognitive engagement and development.

Keywords: Artificial Intelligence in Education, Attention Lapses, ChatGPT, Cognitive Load, Critical Thinking, University Students

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Introduction

There is growing debate regarding ChatGPT's potential risks to cognitive engagement. With the increase in AI adoption in higher education, this argument has been in the limelight and has provided an opportunity for researchers to explore. Introduced in November 2022 by OpenAI, ChatGPT has gained popularity regarding its usefulness in educating students. A study that was done in the UK shows that the adoption of generative AI has skyrocketed, and now 92% of undergraduate students are using AI-powered tools (Higher Education Policy Institute, 2025). As a result of ChatGPT, the way students learn and complete academic tasks has evolved. ChatGPT revolutionizes

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learning and research through automating work, enabling interpretation of data, and bringing about new testing and learning methods (George & Wooden, 2023; Song & Xiong, 2021; Zhai et al., 2024). With the benefit of granting access to knowledge, there remain concerns regarding its potential negative impact on cognitive processes.

Superficial interaction, like not reflecting or carefully considering the responses, can over time lead people to depend too heavily on ChatGPT for quick answers, and this prevents them from thinking or conducting extensive research independently. Lack of interaction can impact focus and retention, as well as affect the development of critical thinking and creativity (Dergaa et al., 2023). This dependence, when combined with accepting responses as they are without verification, increases problems and overreliance. This may cause users to excessively trust generative AI tools, thereby increasing the risk of overreliance. Furthermore, critical thinking is impacted by overreliance on dialogue systems (Iskender, 2023), as well as decision-making (Pokkakillath & Suleri, 2023). Overuse may stifle creative and innovative thinking among educators and learners, thereby also negatively affecting standards in education (Ahmad et al., 2023). Furthermore, ChatGPT tends to hallucinate and provide inaccurate information at times (Hatem et al., 2023) that may lead to overdependence and laziness in verifying that information, which might stifle critical thinking ability (Dergaa et al., 2023). As a result of insufficient focus on tasks, mistakes occur in perception, memory, and daily tasks. An example could be absent-mindedly putting something in the wrong place without being aware of it or opening the fridge and not remembering why you opened it. Errors in attention that manifest as distractibility, forgetfulness, and absentmindedness are known as attention related cognitive errors (Cheyne et al., 2006).

In the longer run, these mistakes can compromise deep thinking skills and overall cognitive performance.

In this research, the relationship between ChatGPT usage and attention errors is being studied with the help of cognitive load theory, particularly with intrinsic and extraneous load (Sweller, 1988). Cognitive load theory recognizes three major elements, namely: intrinsic load (task difficulty), extraneous load (presentation of information), and germane load (cognitive processing). ChatGPT reduces intrinsic cognitive load by explaining complex subjects, facilitating enhanced understanding, and facilitating easy knowledge acquisition (Kung et al., 2023). However, such excessive use of ChatGPT can increase extraneous load, which translates into shallow learning and reduced long-term retention. People could become overly reliant on automation, known as automation bias, that distorts judgment and affects the quality of decision making and information processing (Skitka et al., 2000). This under-evaluation leads to fundamental omission errors (users failing to act because the system did not suggest an action) and commission errors (acting on incorrect AI-generated responses without verification). Relevant to this research, Dual Process Theory states that humans use two cognitive systems, System 1 and System 2, for processing. System 1 is intuitive, fast, and automatic (Kahneman, 2011), while system 2 is deliberate, slow, and analytical. Their propensity to use System 1 causes many users to become victims of automation bias and forget to check AI-generated information. System 2 requires conscious cognitive work. People who engage with the System 2 question ChatGPT's responses and don't consider them true without additional verification. Instead, they cross-check the information using research and turn to more sources of information before applying the

suggestions of ChatGPT in their works. In doing so, it reduces the chances of automation bias and improves the decision-making processes in academic writing and problem-solving with a high stake in correctness.

The rationale behind conducting this research was to find a relationship between ChatGPT usage and attention-related cognitive errors. In order to achieve the best outcomes, research is needed to help reduce the negative effects of AI on learning while increasing the positives. With an understanding of what leads to some people's attention distractions, the use of ChatGPT in education can be guided without causing damage to students' cognitive processes. The purpose of the study was also to assess whether the AI-generated responses affect male and female students differently in terms of certain attention-related errors, as well as to study which academic discipline is impacted the most by ChatGPT usage. To offer a more balanced approach in schools, these disadvantages are understood, both educators and policy leaders can apply AI to improve learning and lower risks to students' cognitive skills.

Objectives

- To investigate the relationship between trust and reliance on ChatGPT-generated responses and cognitive errors related to attention among university students.
- To explore whether using ChatGPT as a writing aid and academic task support is connected to attention-related cognitive errors among university students.
- To determine if trust and reliance on ChatGPT are the strongest predictors of cognitive errors in attention among university students.
- To investigate gender differences in attention-related cognitive errors caused by the use of ChatGPT among university students.

- To compare the prevalence of attention-related cognitive mistakes among students of social sciences and humanities, versus natural sciences, mathematics, and communication fields.

Hypotheses

- Increased reliance and trust on the answers generated by ChatGPT is associated with greater attention related cognitive errors among university students
- Using ChatGPT as writing aid and Academic Task Support will have a negative relationship with Attention Related Cognitive Errors among university students.
- Reliance and Trust on ChatGPT will be the strongest predictor of Attention Related Cognitive Errors among university students.
- There will be gender differences in attention related cognitive errors caused by ChatGPT Usage among university students.
- Students from social sciences and humanities are more likely to experience attention related cognitive errors compared to students from natural sciences, mathematics and communication among university students.

Method

Research Design

A cross-sectional survey research design is used to identify patterns and relationships between variables, ChatGPT usage, and attention-related cognitive errors at one point in time

Participants and Sampling

The sample size was calculated through G Power. Data was collected from 385 participants through purposive and convenience sampling from a private university. The age of the participants was between 18 and 24 years ($M = 21.11$, $SD =$

1.98). This research includes participants who have prior experience with using ChatGPT. Both male and female participants were a part of the research to identify if gender differences exist. It included 192 (46.7%) male students and 193 (53.3%) female students. There were 48 male and 49 female participants from social sciences (24.9%), 48 male and 48 female participants from humanities (25.3%), 48 male and 48 female participants from natural sciences (24.9%), and 48 male and 48 female participants from math and communication (24.9%).

Inclusion Criteria

Participants of age range 18 - 24 years were included because the study aimed to measure

ChatGPT Usage impact on university undergraduate students. Moreover, students from different majors like social sciences, humanities, mathematics and communication and natural sciences undergrad students were included to be able to analyze the difference in impact on students from various departments. Lastly, it was ensured that students had experience of ChatGPT Usage to study both variables

Exclusion Criteria

Participants with limited understanding of English Language were excluded because the data collection scales were in English language and understanding of English language was required.

Table 1

Demographic of Participants (N=385)

Variables	f	(%)	M	SD
Age (18-25 years)			21.11	1.98
Gender			-	-
Male	192	46.7		
Female	193	53.3		
Prefer not to tell	-	-		
Academic Discipline			-	-
Social Sciences	96	24.9		
Humanities	97	25.3		
Natural Sciences	96	24.9		
Mathematics and Communication	96	24.9		

Measures

ChatGPT Usage Scale

Nemt-allah et al. (2024) created the scale of ChatGPT Usage which measures students'

pattern of using ChatGPT. It consists of 15 items in it that scale, "Academic writing aid", which comprises items such as "I use ChatGPT to generate ideas for my academic

writing." Academic task Support such as items such as "I use ChatGPT to generate ideas for my academic writing." Academic task Support including items like "I use ChatGPT to quickly find relevant information for research tasks." Lastly, Reliance and Trust which includes items like "I trust quality and accuracy of ChatGPT outputs" on a 1 (strongly disagree) -5 (strongly agree) likert scale with high scores reflecting more use of ChatGpt in academic contexts out of 75. The scale indicated internal consistency with a value of alpha being .84. Validity was verified using EFA, which indicated a three-factor structure accounting for 49.186% of the total variance, and CFA, which established the three-factor structure. Average variance extracted value is .66, overall showing good validity of the scale (Nemt-allah et al., 2024).

Attention-Related Cognitive Errors Scale

Cheyne et al. (2006) created The Attention-Related Cognitive Errors Scale (ARCES) which is a self-reporting instrument used to measure the frequency of daily cognitive errors that happen as a result of attentional lapses. The ARCES has been commonly applied in studies aimed at explaining attentional lapses. The ARCES includes 12 items upon which the participants rate how frequently they commit certain cognitive errors, including absent-mindedness, distractibility, and task-switching. Scale items are such as "I have lost track of conversation because I zoned out when someone was talking" and "I have absentmindedly placed things in the unintended place." Participants answer each item on a Likert scale, often from 1 (never) to 5 (very often), with greater scores reflecting an increased frequency of attention-related cognitive mistakes out of 60. The ARCES is a validated instrument for measuring attention-related errors (Cheyne et al., 2006) and has been applied with a number of large student and community samples. The

ARCES has demonstrated good psychometric properties. Its internal consistency is high with Cronbach's alpha value of more than .90, indicating that it is a good measure to assess attentional lapses. It can be utilized for clinical as well as research purposes since it can give useful insight.

Procedure

Permission from the Board of Studies (BOS), Ethics Review Committee (ERC) and Institutional Review Board (IRB) was sought before starting the research as well as permission for using the validated scales is sought from the authors to ensure ethical standards and institutional guidelines are met. It is made sure to properly cite the scale and their work in this research. Topic and the researcher were introduced to the participants and scales (Attention Related Cognitive Error Scale and ChatGPT usage scale) were distributed to 385 students among social sciences, humanities, natural sciences, mathematics and communication to ensure equal representation and to facilitate comparison of mean differences among the disciplines. Consent was taken from participants and they were told about the purpose of the research as well as their rights as participants. Participants were told that their participation is voluntary and that they can withdraw anytime. Participants were also informed that their confidentiality will be maintained. Entire data is kept in password encrypted systems, and can be provided on request to the concerned party. The data collection took place over a fixed period of time after which it was entered into SPSS for analysis. The statistical findings will either approve or reject the hypothesis, demonstrate if any gender differences exist in findings and also present data regarding the impact of ChatGPT usage on attention related cognitive errors among various disciplines. This structured approach ensures a thorough and ethical investigation into the relationship between ChatGPT usage and attention-

related cognitive errors, paving the way for future research and interventions.

Ethical Considerations

Prior to data collection, approval was sought from Board of Studies and Ethical Review Committee. Once approved, data collection took place for which participants were fully informed about the study's topic and purpose before asking for informed consent. They

were told that their participation is voluntary and they can deny or withdraw if they want. Confidentiality was maintained by not disclosing identities of the participants and keeping the data safe in password encrypted systems. Lastly, the findings were accurately reported, and any manipulation of results was strictly avoided.

Results

Table 2

Descriptive Statistics of ChatGPT Usage Scale and Attention Related Cognitive Error Scales (N = 385)

Variables	<i>M</i>	<i>SD</i>	Range (min - max)	α
ChatGPT Usage Scale	51.96	6.94	3.0-3.8	.75
ARCES	38.95	10.35	2.9-3.5	.91

Note. ARCES = Attention-Related Cognitive Errors Scale

Table 2 demonstrates the characteristics of the scales employed in the study. The Cronbach alpha for the ChatGPT usage scale shows that the items in the scale possess a good degree of reliability, i.e., they are measuring the same underlying factor quite reasonably. Cronbach alpha coefficient for

attention-related cognitive error scale measures a very high internal consistency and implies that the items are strongly correlated and efficiently measure a single concept or construct. There are no subscales in this scale.

Table 3

Pearson's Correlation Table Displaying Correlations Between Trust and Reliance, Writing Aid and Task Support of ChatGPT and Attention Related Cognitive Errors (N = 385)

Variables	<i>M</i>	<i>SD</i>	1	2	3	4
Trust and Reliance in ChatGPT	10.97	2.51	-			
Writing Aid	24.50	4.20	-.01	-		
Task Support	14.0	2.30	-.053	.66**	-	
Attention Related Cognitive Errors	38.90	10.30	.50**	-.03	.11*	-

* $p < .05$, ** $p < .01$

Results indicated that users of ChatGPT for writing assistance was inclined to use it for wider task-based activities, indicating the

complementary nature of these abilities in enhancing productivity. Furthermore, increased confidence and trust in ChatGPT

were associated with increased rates of cognitive errors related to attention, indicating that higher dependence on the tool might be associated with lower attentional

control. Although writing support was not significantly related to such errors, a weak but significant link was found between task support and attention-based cognitive errors.

Table 4
Regression Coefficients of ChatGPT Usage and Attention Related Cognitive Errors (N = 385)

Variables	B	SE	95% CI LL	95% CI UL	β	t	p
Writing Aid	-0.50	.143	-0.78	-.22	-.21	-3.55	<.001**
Trust and Reliance	2.04	.18	1.69	2.50	.50	11.39	<.001**
Task Support	1.18	.255	-1.68	2.12	.27	4.67	<.001**

Note. *CI* = Confidence interval

Table 4 demonstrates the effect of writing aid, trust and reliance, and task support on attention-related cognitive errors. Linear regression analysis indicated that all three predictors together accounted for a significant amount of variance in cognitive errors. That is, trust and reliance significantly and positively predicted cognitive errors ($\beta = .50, p < .001$), reflecting greater reliance on ChatGPT with greater attention-related errors. The 95% confidence interval [1.69, 2.50] supports the reliability of this finding. Task support also emerged as a significant positive predictor ($\beta = .27, p < .001$),

indicating that employing ChatGPT for task support is associated with more cognitive errors. Its 95% confidence interval [1.68, 2.12] reflects a precise estimation. Conversely, writing aid was strongly negatively correlated with attention-related cognitive errors ($\beta = -.21, p < .001$), showing that users of ChatGPT for writing aid reported fewer errors. The confidence interval [-.78, -.22] validates the strength and direction of this correlation. These results point to differential effects of ChatGPT use patterns on cognitive functioning.

Table 5
Gender Differences in ChatGPT Usage and Attention Related Cognitive Errors (N=385)

	Male		Female		t	df	p	Cohen's d
	M	SD	M	SD				
Trust and reliance	10.93	2.38	11.01	2.6	-.30	383	.76	.032
Writing Aid	24.3	4.1	24.5	4.3	-.40	383	.68	.048
Task support	14.0	2.3	13.9	2.4	.37	383	.72	.043
Attention Related Cognitive Errors	37.5	9.9	40.4	10.5	-2.78	383	.006	.285

Table 5 revealed no significant gender differences regarding trust and usage of ChatGPT, writing aid, or task support, and hence male and female participants used the tool similarly across these categories. But the gap was large for attention-related cognitive

mistakes, with more occurrences of these types of errors among female subjects than among males. The size of this effect was small to moderate, indicating that although the difference is statistically significant, its practical size is limited.

Table 6

Mean Comparisons of Attention Related Cognitive Errors Across Academic Disciplines (N=385)

Variable	Social Sciences		Humanities		Natural Sciences		Mathematics and Communication		F	η^2	p	Post Hoc
	M	SD	M	SD	M	SD	M	SD				
Attention Related Cognitive Errors	42.3	8.8	44.5	9.4	33.9	9.1	34.9	9.8	31.2	.197	.00	SS, Hum > NS, Math & Comm

One way ANOVA Analysis revealed notable disciplinary differences in attention-related cognitive errors. Students enrolled in Humanities and Social Sciences demonstrated greater susceptibility to attentional lapses compared to those studying in Natural Sciences and Mathematics & Communication. Post hoc comparisons further supported this pattern, indicating that students from technical and quantitative disciplines exhibited stronger attentional control and fewer cognitive errors overall. No

significant differences emerged between Humanities and Social Sciences or between Natural Sciences and Mathematics & Communication, suggesting comparable patterns within these respective domains. Collectively, these results highlight that the cognitive demands and learning environments characteristic of each academic field may influence students' attentional functioning and error tendencies.

Discussion

This research was carried out to investigate how the use of ChatGPT is linked to attention-related cognitive errors (ARCES). Researchers studied ChatGPT usage in three ways—trust and reliance, writing aid and task support to learn how each kind uniquely affects attention-related mental mistakes.

Apart from the main variables, the research aimed to understand if gender and academic disciplines changed the relationships observed. The research looks at both psychology and education, which helps understand accurately the effects of ChatGPT on people's cognition, whether in learning or daily life. This work supports the growing

research on human-AI interaction, recommending that people use AI carefully to avoid disruption of their focus, attention or independent thinking.

The research provided strong evidence by showing that trusting ChatGPT predicts attention related errors, according to a significant statistical correlation. This means that those who rely on ChatGPT for education are more likely to become distracted and forgetful that can interfere with intended actions. These findings are consistent with what previous research found, that relying on ChatGPT might inhibit users' ability to judge responses generated by AI and accept them as they are (Dans, 2023). Using ChatGPT to help with writing was negatively correlated with attention-related errors but through a weak relationship. The sample could be a factor contributing to the weak relationship. Typically, an analysis with 385 participants is acceptable, but all subjects that took part were from the same university and were undergraduate students. Because of this, participants experienced similar academic environments and shared patterns when it came to using ChatGPT. Having homogeneity in the sample limits variability, which is essential for detecting more pronounced statistical relationships. Findings by Adigüzel et al. (2023) demonstrate that AI-driven environments foster higher-order thinking by allowing students to engage with diverse viewpoints and develop critical reasoning skills.

Furthermore, it was suggested that using ChatGPT as academic task support was not inversely related to attention-related cognitive errors (ARCES). This could imply that while students may not immediately experience attention-related drawbacks from using ChatGPT for planning, summarizing, or structuring tasks, the relationship is not strong enough to draw definitive conclusions from the correlation alone. Interestingly, when examined through regression analysis,

task support showed a positive and statistically significant predictive relationship with ARCES. This suggests that when other variables are accounted for, ChatGPT for academic task support is Furthermore, trust and reliance on ChatGPT would be the strongest predictor of attention-related cognitive errors. The potential long-term consequences of this over-reliance could lead to lasting changes in students' cognitive processes (Dans, 2023). Lastly, there were no significant gender differences in ChatGPT usage patterns across dimensions, yet a notable gender gap was found in ARCES scores, with females reporting significantly higher attention-related cognitive errors than males. A study by Bouzar et al. (2024) indicated female students expressed greater apprehension about becoming overly reliant on ChatGPT, fearing it might erode their critical thinking and independent learning abilities. Lastly, students from social sciences and humanities would exhibit more attention-related cognitive errors than those from natural sciences, math and communication, possibly due to the inherently abstract and interpretive demands of their disciplines, which may lead to cognitive fatigue or overstimulation when combined with AI tools. Kasneci et al. (2023) investigated the effects of ChatGPT usage on students in disciplines requiring extensive writing, critical thinking, and argumentation, such as humanities and social sciences. Their research found that students in these fields are more prone to cognitive disengagement due to over-reliance on ChatGPT-generated text.

Limitations and Suggestions

This study cannot prove if ChatGPT leads to cognitive errors, since there is a chance that students using it already suffer from concentration problems. Research in the future needs to use experimental design to find clear evidence of how ChatGPT use affects people's thinking. If the experimental

design is used, researchers can get a clear picture of how ChatGPT usage influences people's thinking abilities. Moreover, only analyzing data from a private university limits generalizability, since it may not accurately describe the whole population of students across Pakistan. Further studies should aim to recruit more people from different backgrounds to ensure the results apply to many situations. Furthermore, the study did not consider any possible cultural influences on the participants' responses. Reviewing the results using a cross-cultural approach will help better understand the results. Yet again, the use of measures that depend on participants responses lead to research bias and could affect the honesty of the findings. Future researchers should use measures that are not dependent on people's self-reports instead should be tracking how people use the system. It is possible that academic history or attention disorders have affected the way ChatGPT use relates to making errors, preventing accurate findings. In future, research should assess potential causes before the main study to gain a more accurate result about how ChatGPT use impacts cognitive errors.

Implications

The study findings suggest that students learn the right way to use them. This stresses the need to introduce AI related topics and accurate usage skills in curriculum that ensure responsible and reflective use of technology. In addition, the findings recommend that educational institutions should try to avoid cognitive offloading by developing suitable interventions. As the research results pointed out that students from humanities and social sciences, along with female students, were more likely to make mistakes therefore, there should be separate support plans for them. Discipline-specific and gender-responsive strategies can play a big role in overcoming these differences since they meet the different

needs and habits of students in different areas. Future studies need to closely examine these differences in large samples that separate people by academic background and gender to learn how they relate to AI and attention to establish causality between AI use and cognitive effects, future research should adopt longitudinal or experimental designs, which would allow for the control of confounding variables such as academic history or attention disorders. Such methodological rigor is essential for distinguishing correlation from true cause-effect relationships. Lastly, integrating objective measures, for example, tracking behavior or testing students with tasks, will increase the accuracy and better show the level of students' involvement with AI. As a result, the study supports those in charge of shaping policies in the use of AI. These policies have to make sure technology does not compromise students' learning or academic standards.

Conclusion

In conclusion, ChatGPT offered help in writing, but people who use it often show more mistakes in paying attention to tasks. People who depend a lot on ChatGPT for information scored lower on the ARCES, revealing that relying too much on automation may reduce their ability to pay full attention and come up with ideas by themselves. It turned out that girls and students pursuing humanities and social sciences had more moments of forgetting than people taking other courses. These observations agree with theories from the field of cognitive psychology such as automation bias and dual process theory. All in all, the report makes it clear that using AI responsibly in classrooms requires students to use them mindfully rather than just letting machines take over.

Ethics Statement

All the ethical standards of APA were met. Informed consent was taken in written form from all the respondents to participate in this study.

Contribution of Authors

Jannat Khalil: Conceptualization, Investigation, Methodology, Data Curation, Formal Analysis, Writing – Original Draft
Maryam Munir: Methodology, Writing - Reviewing & Editing, Supervision
Saima Majeed: Methodology, Writing - Reviewing & Editing

Conflict of Interest

There is no conflict of interest declared by the authors.

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Data Availability Statement

The datasets of the current study are not available publicly due to ethical reasons but are available from the corresponding author [J.K.] upon the reasonable request.

References

- 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.
- Ahmad, S. F., Han, H., Alam, M. M., Rehmat, M., Irshad, M., Arraño-Muñoz, M., & Ariza-Montes, A. (2023). Impact of artificial intelligence on human loss in decision making, laziness, and safety in education. *Humanities and Social Sciences Communications, 10*(1), 1–14. <https://doi.org/10.1057/s41599-023-01787-8>
- Bouzar, H., Benali, H., & Boudia, A. (2024). Gender differences in perceptions and usage of ChatGPT: An empirical study. *International Journal of Humanities and Educational*

Research, 6(2), 1–15. [10.47832/2757-5403.25.32](https://doi.org/10.47832/2757-5403.25.32)

- Cheyne, J. A., Carriere, J. S. A., & Smilek, D. (2006). Absent-mindedness: Lapses of conscious awareness and everyday cognitive failures. *Consciousness and Cognition, 15*(3), <https://doi.org/10.1016/j.concog.2005.11.009>
- Dans, E. (2023, January 27). *ChatGPT and the decline of critical thinking*. IE Insights. <https://www.ie.edu/insights/articles/chatgpt-and-the-decline-of-critical-thinking/>
- Dergaa, I., Chamari, K., Zmijewski, P., & Saad, H. B. (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, [10.5114/biol sport.2023.125623](https://doi.org/10.5114/biol sport.2023.125623)
- George, B., & Wooden, O. (2023). Managing the strategic transformation of higher education through artificial intelligence. *Administrative Sciences, 13*(9), 196. <https://doi.org/10.3390/admsci13090196>
- Hatem, R., Simmons, B., & Thornton, J. E. (2023). Chatbot confabulations are not hallucinations. *Chatbot Confabulations Are Not Hallucinations, JAMA Internal Medicine, 10.1001/jamainternmed.2023.4231*
- Higher Education Policy Institute (HEPI). (2025). Student Generative AI Survey 2025. <https://www.hepi.ac.uk/reports/student-generative-ai-survey-2025/>
- Iskender, A. (2023). Holy or unholy? Interview with OpenAI's ChatGPT. *European Journal of Tourism Research, 34*, 3414–3414. DOI:

- 10.54055/ejtr.v34i.3169
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103*. <https://doi.org/10.1016/j.lindif.2023.102274>
- Krämer, W. Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux. Kahneman, D. (2011): <https://doi.org/10.1007/s00362-013-0533-y>
- Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., Madriaga, M., Aggabao, R., Diaz-Candido, G., Maningo, J., & Tseng, V. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLOS Digital Health, 2*(2), e0000198. DOI: 10.1371/journal.pdig.0000198
- Nemt-allah, M., Khalifa, W., Badawy, M., Elbably, Y., & Ibrahim, A. (2024). Validating the ChatGPT Usage Scale: Psychometric properties and factor structures among postgraduate students. *BMC Psychology, 12*. <https://doi.org/10.1186/s40359-024-01983-4>
- Pokkakillath, S., & Suleri, J. (2023). ChatGPT and its impact on education. *Research in Hospitality Management, 13*(1), 31–34. <https://doi.org/10.1080/22243534.2023.2239579>
- Skitka, L. J., Mosier, K. L., Burdick, M., & Rosenblatt, B. (2000). Automation bias and errors: Are crews better than individuals? *International Journal of Aviation Psychology, 10*(1), 85–97. 10.1207/S15327108IJAP1001_5
- Song, X., & Xiong, T. (2021). A survey of published literature on conversational artificial intelligence. In *2021 7th International Conference on Information Management (ICIM)*. 10.1109/ICIM52229.2021.9417135
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*(2), 257–285. [https://doi.org/10.1016/0364-0213\(88\)90023-7](https://doi.org/10.1016/0364-0213(88)90023-7)
- Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learning Environments, 11*(1) <https://doi.org/10.1186/s40561-024-00316-7>