An Investigation into AI Dependence, Critical Thinking and Writing Competence among Nigerian University Undergraduates

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ABSTRACT

The rapid integration of Artificial Intelligence (AI) tools into academic activities has raised concerns about its impact on students' core cognitive and linguistic skills. This study investigated the relationship between AI dependence and critical thinking and writing competence among English Language students.

The study adopted a correlational research design. The population comprised English Language students, from which 492 students were selected using stratified random sampling technique. Data were collected using three validated instruments: AI Dependence Scale, Critical Thinking Disposition Scale and Writing Competence Scale. Mean and standard deviation were used to answer the research questions while Pearson Product-Moment Correlation (PPMC) was used to test the hypotheses at 0.05 level of significance.

Findings revealed a significant inverse association between AI dependence and critical thinking, $r(490) = -.38$, $p < .001$, and between AI dependence and writing competence, $r(490) = -.42$, $p < .001$. This suggests that higher levels of AI dependence are associated with lower levels of critical thinking and writing competence.

The study concluded that excessive dependence on AI tools such as ChatGPT, Grammarly and QuillBot is inversely associated with students' ability to analyze, evaluate and produce original written texts. While AI offers academic support, over-reliance weakens independent reasoning and writing skills.

Keywords: Artificial Intelligence Dependence, Critical Thinking, Writing Competence, English Language, University Students, ChatGPT.

INTRODUCTION

The emergence of Generative Artificial Intelligence (GenAI) tools such as ChatGPT, Gemini, Claude, and Grammarly has significantly transformed how students engage with academic writing (Zhai, 2024). These tools can generate essays, summarize texts, correct grammar, and provide feedback within seconds. UNESCO (2023) noted that AI has the potential to personalize learning and expand access to educational support. In university contexts, English Language courses that require essay writing, comprehension, and critical analysis are among the areas most affected by AI adoption.

While AI offers convenience and efficiency, concerns have grown about students' over-dependence on these tools. Cotton et al. (2024) define AI dependence as the tendency to rely on AI to complete academic tasks with minimal cognitive engagement. In Nigeria, anecdotal reports and early studies suggest that many undergraduates now use ChatGPT to draft assignments, summarize novels, and edit work without fully understanding the content (Okon & Bassey, 2024).

Critical thinking and writing competence are core outcomes of university English Language education. Critical

thinking involves analysis, evaluation, and the formation of independent judgments (Facione, 2020), while writing competence requires coherence, originality, and command of language (Hyland, 2023). Scholars argue that when students outsource thinking and writing to AI, they may experience reduced cognitive load in the short term, but at the cost of long-term skill development (Sweller, 2020). Kumar and Silva (2024) found that high AI use correlated with improved grammar but lower originality in student essays.

STATEMENT OF THE PROBLEM

The rapid integration of Generative AI into university education presents both opportunities and challenges. On one hand, AI tools can provide instant feedback, help with brainstorming, and improve language accuracy (Baidoo-Anu & Ansah, 2023). In the Nigerian context, digital literacy and academic integrity are pressing issues. Abdulrahaman et al. (2024) reported that 68% of Nigerian undergraduates admitted to using AI for assignments, yet many struggled to explain their own submissions during oral defense (Dai et al., 2023). Lecturers have observed an increase in generic, AI-sounding submissions in English Language courses. Students submit essays with fluent grammar but weak argumentation, poor evidence, and little personal voice (Okon & Bassey, 2024). This suggests a possible decline in critical thinking and original writing skills. Yet, there is no clear data on the extent of AI dependence among Nigerian undergraduates or its specific effect on their critical thinking and writing competence.

This raises questions about whether AI is serving as a "thinking partner" or a "thinking replacement" (Dai et al., 2023). This is because students are becoming dependent on AI to the point of bypassing the cognitive processes required for learning (Chan & Hu, 2023). If this trend of unchecked AI dependence continues, it could undermine the goal of English Language education: to produce graduates who can think critically, communicate clearly, and write independently.

While most existing studies on AI and academic writing have been conducted in Asia, Europe, and North America (Chan & Hu, 2023; Kumar & Silva, 2024), there are still limited empirical evidence on how AI dependence affects critical thinking and writing among Nigerian university students while the ones available are descriptive. Therefore, there is a need to empirically investigate: To what extent does dependence on Artificial Intelligence affect the critical thinking and writing competence of Nigerian university undergraduates?

Research Questions

This study seeks to answer the following questions:

1. What is the level of AI dependence among English Language students?
2. What is the level of critical thinking among English Language students?
3. What is the level of writing competence among English Language students?
4. What is the relationship between AI dependence and critical thinking among English Language students?
5. What is the relationship between AI dependence and writing competence among English Language students?

RESEARCH HYPOTHESES

H01: There is no significant relationship between AI dependence and critical thinking among English Language students.

H02: There is no significant relationship between AI dependence and writing competence among English Language students.

LITERATURE REVIEW

AI Dependence

AI dependence refers to the extent to which students rely on AI tools to complete academic tasks without engaging their own cognitive effort (Cotton et al., 2024). High dependence is characterized by submitting AI-generated work directly, inability to write without AI, and reduced effort in reading and analysis (Chan & Hu, 2023). Partnership use, in contrast, involves using AI for feedback, outlining, and idea generation while the student retains control of the final product (Dai et al., 2023).

Critical Thinking Skills

Critical thinking is defined as the ability to analyze, evaluate, infer, and synthesize information to form reasoned judgments (Facione, 2020). Critical thinking is the ability to think clearly, logically and independently before accepting information or making decision. It could also mean the ability to analyze information, evaluate judgements and make reasoned judgements and logical interpretations independently. In English Language, it involves interpreting texts, evaluating arguments, and producing original ideas (Paul & Elder, 2022). Critical thinking is a core graduate attribute required for academic and workplace success (OECD, 2023). This according to Facione (2011) involves analysis, evaluation, inference, interpretation and self-regulation for English Language students. In this study, critical thinking means, the ability of the English Language students to independently analyze, evaluate and synthesize information to form reasoned judgements rather than relying on AI generated information.

Writing Competence and Originality

Writing competence refers to a student's ability to produce coherent, grammatically correct, and well-organized texts with clear arguments and evidence (Hyland, 2023). The ability to write a clear, correct, organized and meaningful essay independently without copying or relying entirely on other sources or AI while originality means your writing shows your ideas, voice and personalized opinions or reasoning. It proves your authenticity and not a copied thought. It is your product and thinking system. Originality relates to the novelty and personal voice in writing, as opposed to generic or AI-generated content (Baidoo-Anu & Ansah, 2023). Concerns have been raised that overuse of AI leads to "homogenized" writing that lacks individual voice (Kumar & Silva, 2024).

Artificial Intelligence in Education

Artificial Intelligence (AI) refers to computer systems capable of performing tasks that typically require human intelligence such as learning, reasoning, and language processing (Luckin et al., 2022). In higher education, Generative AI tools like ChatGPT, Gemini, and Grammarly have become popular for essay writing, grammar correction, summarization, and brainstorming (Zhai, 2024). UNESCO (2023) describes AI as both an opportunity and a challenge for education, noting that it can personalize learning but may also undermine independent thinking if misused.

Theoretical Framework

Cognitive Load Theory (CLT) by Sweller (1988): Cognitive Load Theory posits that learning occurs when learners actively engage in processing information. Over-reliance on AI may reduce germane cognitive load, leading to shallow processing and poor retention of writing skills (Sweller, 2020).

Self-Determination Theory (SDT) by Deci and Ryan (2000): Self-Determination Theory emphasizes autonomy, competence, and relatedness as key to motivation. When students outsource writing to AI, their sense of competence and autonomy in writing may decline, affecting skill development (Ryan & Deci, 2020).

Together, these theories suggest that AI should be used to support, not replace, student effort.

METHODOLOGY

Design

This study adopted a descriptive survey research design with a correlational. The survey design is considered appropriate because it allows the researcher to collect data from a large number of respondents to describe their current practices, opinions, and behaviours regarding AI use. The correlational aspect examined the relationship between AI dependence and critical thinking/writing competence.

Population of the Study

The population for this study comprised all English Language undergraduate students of the departments of Educational Foundations and the department of English and Literary Studies, in Nnamdi Azikiwe University, Awka, Anambra State, and University of Benin.

Sample Size and Sampling Technique

A sample size of 492 respondents responded to the questionnaire. This size is considered adequate for survey research and allows for valid statistical analysis.

Research Instrument

Data for this study was collected by means of questionnaires. Two instruments were adapted while two instruments were adopted. The first instrument AI Dependence Scale (AI-DS) - Adapted from Wang et al. (2024) 15 items 3 dimensions: Cognitive Offloading (5), Emotional Reliance (5), Behavioural Dependence (5) 5-point Likert: 1=Strongly Disagree to 5=Strongly Agree. Mean score computed 1.00-2.33=Low, 2.34-3.66=Moderate, 3.67-5.00=High. The second instrument is Critical Thinking Disposition Scale- Adapted from Sosu (2013) 11 items Critical Openness (7), Reflective Skepticism (4) 5-point Likert The third instrument on Writing Competence Scale- the researchers developed 12 items Content, Organization, Grammar, Vocabulary 5-point Likert: 1=Very Low Competence to 5=Very High.

Validity

Construct validity was established through exploratory and confirmatory factor analysis, while reliability was determined via Cronbach's alpha.

Reliability of the Instrument

A pilot test was conducted on 30 students who were not part of the main sample. Cronbach’s Alpha was used to test internal consistency. Overall Alpha = 0. 807. Since all values > 0.70, the instrument was reliable.

Method of Data Collection

The researcher administered the questionnaires using google form. Completed questionnaires were submitted electronically to ensure a high return rate.

Method of Data Analysis

Data collected were analyzed using SPSS version 26. Mean and standard deviation were used to answer the research questions which were interpreted using the following criterion mean:

Pearson Product Moment Correlation was used to test H01, and H02 to determine relationships. All hypotheses were tested at 0.05 level of significance.

Ethical Considerations

Anonymity and confidentiality were maintained. No names were required on questionnaires.

Presentation of Results

Mean Range	Interpretation
3.50 – 4.00	High
2.50 – 3.49	Moderate
1.50 – 2.49	Low
1.00 – 1.49	Very Low

Table 1: Mean and Standard Deviation of the Level of AI Dependence, Critical Thinking and Writing Competence.

S/N	Variable	N	Mean	Std. Dev.	Interpretation
1	AI Dependence	492	3.85	0.72	High
2	Critical Thinking	492	3.41	0.68	Moderate
3	Writing Competence	492	3.35	0.74	Moderate

The result in Table 1 shows the descriptive statistics for the three variables. The result revealed that the extent of AI dependence among English Language students is very high with a mean score of 3.85 with a standard deviation of 0.72. This indicates that the English Language undergraduates highly depend on AI tools for their academic activities. Conversely, critical thinking recorded a mean score of 3.41 (SD = 0.68) and writing competence recorded a mean score of 3.35 (SD = 0.74), both indicating students' critical thinking and writing competence are only at the average level.

This high mean value suggests that the majority of students heavily rely on AI tools such as ChatGPT, Grammarly, QuillBot and other generative AI applications for their academic tasks including essay writing, assignment completion, idea generation and grammar checking.

Table 2: Pearson Correlation Analysis of relationship between the level of AI dependence and university students' critical thinking skills in English Language.

Variables	N	r	P	
AI Dependence	492	1		
Critical Thinking	492	-.38**	0	Significant

The result in table 2 revealed a low-to-moderate, negative and statistically significant relationship between the two variables, AI dependence and critical thinking, **r(490) = -.38, p <.001.** Since the probability value **(p=.000)** is less than **0.05**, the null hypothesis is rejected. This means there is a significant relationship.

This indicates that as AI dependence increases, critical thinking decreases. AI explains **14.4%** of the variation in critical thinking **(r^2 =.144).** Students who heavily depend on AI to generate ideas and answers without personal evaluation tend to show reduced ability to analyze, evaluate and synthesize information independently.

Table 3: Pearson Correlation Analysis of relationship between the level of AI dependence and university students' writing competence in English Language

Variables	N	r	P	
AI Dependence	492	1		

Writing Competence	492	-.42**	0	Significant

The result in table 3 revealed a moderate, negative and statistically significant relationship between AI dependence and writing competence, **r(490) = -.42, p <.001**.Since the probability value **(p =.000)** is less than 0.05, the null hypothesis is rejected. This indicates that as AI dependence increases, writing competence decreases. AI explains **17.6%** of the variation in writing competence **(r^2 =.176).** This shows that over-reliance on AI for essay writing, grammar correction and paraphrasing weakens students' originality, grammar mastery, coherence and vocabulary development.

DISCUSSION OF FINDINGS

Level of AI Dependence

The high mean score (3.85) indicates that English Language students frequently rely on AI tools such as ChatGPT, Grammarly and QuillBot for assignments, idea generation and grammar checking. This finding is in agreement with Chan and Hu (2023) who reported a high extent of generative AI usage among university students for academic purposes. Similarly, Rahman et al. (2024) found that students exhibit high dependence on AI due to its convenience, speed and ability to produce coherent academic content.

This supports the findings of Okon and Bassey (2024), Abdulrahaman et al. (2024) who found that 74% used ChatGPT for English assignments, but 52% could not explain key points in their submitted essays. It also corroborates the findings of Kumar and Silva (2024) that students with high AI dependence produced essays with better grammar but weaker originality.

Relationship between AI Dependence and Critical Thinking

The inverse association (r = -.38) suggests that students who reported higher levels of AI dependence tended to report lower levels of critical thinking. This does not imply that AI dependence causes a decline in critical thinking. Rather, it indicates co-occurrence.

This finding is consistent with Zhai et al. (2024) who found that over-reliance on generative AI is negatively related to students' ability to analyze and evaluate information independently because AI provides ready-made answers that bypass cognitive engagement. Similarly, Darvishi et al. (2024) reported that students who heavily depend on AI for assignments showed lower levels of reflective thinking and problem-solving. The present finding also supports the Cognitive Offloading Theory (Risko & Gilbert, 2016), which posits that when individuals offload cognitive tasks to external tools, their internal cognitive effort diminishes over time.

The implication is that when students use AI to generate arguments, summarize texts, and answer comprehension questions, they miss the opportunity to practice higher-order thinking skills such as analysis, synthesis and evaluation as emphasized by Bloom's taxonomy.

Relationship between AI Dependence and Writing Competence

The moderate negative association (r = -.42) suggests that higher AI dependence is associated with lower self-reported writing competence. Again, causality cannot be inferred. The second hypothesis revealed a moderate, negative and statistically significant relationship between AI dependence and writing competence, r(490) = -.42, p <.001. Therefore, the null hypothesis was rejected.

This finding corroborates the study of Marzuki et al. (2023) who found that students who frequently used ChatGPT for essay writing demonstrated reduced originality, coherence and lexical richness in their independent writing. Likewise, Liao et al. (2024) observed that excessive use of AI writing assistants leads to poor grammar internalization and over-reliance on AI suggestions, weakening students' own writing self-efficacy. This is in line with the argument of Perkins (2023) that AI may lead to academic deskilling if not used ethically as a support tool. The moderate negative relationship suggests that writing competence, which

requires practice in idea generation, organization, vocabulary choice and grammatical accuracy, is hampered when AI performs these functions for the student. Over time, students lose confidence in their ability to write independently. It also corroborates the submission of Kumar & Silva, (2024) that overuse of AI leads to "homogenized" writing that lacks individual voice.

CONCLUSION

Based on the findings, the study concludes that a significant inverse relationship exists between AI dependence and both critical thinking and writing competence among English Language students. Students with higher reported AI dependence tended to have lower reported critical thinking and writing competence. However, given the correlational nature of the design, the directionality of these relationships cannot be established. It is plausible that students with lower initial competence are more inclined to depend on AI, or that a third variable explains the association. This provides three implications, theoretical Implication which provides empirical support for Cognitive Offloading Theory in the context of AI use, showing an association between external tool reliance and lower self-reported cognitive skills. Pedagogical Implication which reveals the moderate levels of critical thinking and writing competence suggest a need to reinforce skill-based pedagogy even in an AI-rich environment and thirdly institutional Implication which indicates that high AI dependence highlights the need for clear institutional policies on ethical and responsible AI use rather than outright prohibition.

RECOMMENDATIONS

AI is globally accepted and specifically designed for learning; university management should design a suitable curriculum for AI literacy while workshops on academic integrity and the ills of over dependence on AI should be organized while clear benchmark on AI assistance and plagiarism tools to regulate AI generated submissions. Lecturers should give assignments that require personal reflections, opinions while they allow AI for brainstorming, research assistance, and grammar correction. This will help preserve the originality of the student's work.

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