Impact of Artificial Intelligence-Assisted Writing on Academic Performance among English Education Undergraduates

Olowoyeye, Cyril Abioye Charles (Ph.D)
Department of Art Education, Bamidele Olumilua University of Education, Science and Technology, Ikere
Tel: +2348067034575
Orcid: 0000-0003-4933-977*
E-mail: olowoyeye.charles@bouesti.edu.ng
olowoyeyec@gmail.com

Dr Obadare, Felicia Tomi.
Department of Arts Education,
Bamidele Olumilua University of Education, Science and Technology,
Ikere-Ekiti. Obadare.felicia@bouesti.edu.ng | 07034826903
ORCID: 0000-0001-6036-2335

Abstract

The rapid emergence of Artificial Intelligence (AI) technologies has transformed academic writing practices in higher education globally. English Education undergraduates increasingly utilize AI-assisted writing tools such as ChatGPT, Grammarly, QuillBot, and other generative AI systems for idea generation, grammar correction, essay organization, paraphrasing, and academic support. Despite the growing use of these technologies, concerns persist regarding whether AI-assisted writing enhances academic performance or weakens critical thinking, originality, and authentic writing competence. This study investigated the impact of Artificial Intelligence-assisted writing on academic performance among English Education undergraduates in Nigeria. The study adopted a descriptive experimental research design using a pretest-posttest control group approach. The population comprised English Education undergraduates from selected Nigerian universities, while a sample of 240 students was selected through multistage sampling techniques. Instruments used for data collection included the Academic Writing Achievement Test (AWAT), AI Writing Perception Questionnaire (AIWPQ), and Essay Performance Record Sheet. Data were analyzed using mean, standard deviation, and Analysis of Covariance (ANCOVA).The findings revealed that students exposed to Artificial Intelligence-assisted writing performed significantly better than those taught through conventional instructional methods in essay writing, grammar, essay organization and coherence, and vocabulary development. The findings further showed that students held positive perceptions toward the use of AI-assisted writing tools, although concerns regarding overdependence and reduced originality were identified. The study concludes that Artificial Intelligence-assisted writing possesses substantial educational potential when integrated responsibly into instructional practices. The study recommends the integration of AI literacy into English Education curricula, ethical AI-use training, critical evaluation of AI-generated content, and the development of institutional policies guiding AI usage.

Keywords: Artificial Intelligence, AI-assisted writing, academic performance, English Education undergraduates, academic writing, AI literacy, Nigeria.

Introduction

The emergence of Artificial Intelligence (AI) has brought significant transformation across

virtually every sector of society, including healthcare, finance, manufacturing, communication, and education (Chen & Park, 2024). In recent years, the integration of AI technologies into educational environments has gained substantial attention because of their ability to automate tasks, support personalized learning, and improve educational outcomes. Educational institutions across the world increasingly adopt AI-powered tools to facilitate teaching, learning, assessment, and academic support services. The rise of generative AI technologies has further accelerated this transformation by introducing intelligent systems capable of producing human-like responses, generating texts, and assisting students in solving academic tasks. According to Adebayo and Yusuf (2023), AI technologies are gradually reshaping the structure of teaching and learning within higher education institutions. Intelligent educational systems are redefining how students access information, construct knowledge, and engage with academic content and university students are increasingly interact with AI-driven technologies during academic activities, thereby transforming conventional learning practices (Ibrahim & Suleiman, 2022). These studies clearly indicate that AI is becoming deeply embedded within writing and learning environments and is changing how students approach writing tasks and academic engagement.

Academic writing constitutes an essential component of university education because it serves as a medium through which students communicate knowledge, demonstrate understanding, develop critical thinking skills, and engage in scholarly discourse (Adams et al., 2023). Within English Language Education particularly, writing occupies a central role because students are expected to demonstrate competence in grammar, vocabulary usage, organization, coherence, critical analysis, and communication skills (Davies, 2024). Writing proficiency is not only necessary for academic success but also contributes significantly to professional development and future workplace readiness. However, many undergraduates encounter challenges in academic writing due to inadequate language competence, poor grammar skills, weak organization of ideas, and writing anxiety. Several studies have reported that students often struggle with generating ideas, structuring essays logically, and maintaining coherence in written communication, thereby affecting their academic performance (Olatunji & Bello, 2021; Musa & Adeyemi, 2020).

The advancement of AI technologies has introduced a new generation of digital tools designed specifically to support writing activities. According to Lewis (2020), AI-assisted writing refers to the use of intelligent technological systems that assist users in generating, editing, revising, organizing, and improving written content. Such technologies provide support through grammar correction, paraphrasing, sentence restructuring, vocabulary enhancement, content generation, and instant feedback mechanisms. In contemporary higher education settings, students increasingly rely on AI-assisted writing tools for academic tasks because of their accessibility and ease of use. Commonly used systems include ChatGPT, Grammarly, and QuillBot, which offer different forms of writing assistance (Patel, 2021; Adrian, 2022). These technologies can generate ideas, improve sentence structures, suggest vocabulary alternatives, identify grammatical errors, and assist learners in revising written content. Researchers have increasingly noted that students use these tools not only for editing purposes but also during different stages of the writing process.

The release of generative AI systems has significantly expanded the possibilities associated with AI-assisted writing. Unlike earlier writing technologies that focused mainly on spell checking and grammar correction, recent AI tools can generate entire essays, summarize texts, answer academic questions, create outlines, and simulate human interaction. Students now interact with AI systems as collaborative writing partners rather than passive editing applications. Human-AI collaboration in academic writing has become increasingly common among university students, creating a shift from traditional writing practices toward interactive digital writing environments. Studies on AI-assisted academic writing suggest that learners increasingly integrate AI tools throughout planning, drafting, revising, and editing stages of writing activities (Rahim et al., 2023; López et al., 2024).

The growing popularity of AI-assisted writing technologies among students may be attributed to numerous educational advantages associated with their use. One notable benefit is immediate feedback provision. Unlike conventional classroom writing instruction where students may wait several days before receiving comments from lecturers, AI systems provide instant responses that enable students to identify and correct writing errors promptly. Such rapid feedback mechanisms create opportunities for continuous learning and self-improvement. Additionally, AI writing technologies may support individualized learning experiences by adapting responses to learners' needs and writing patterns. Yusuf and Okon (2021) maintained that AI-supported learning systems provide personalized guidance capable of improving students' confidence and engagement during writing activities. Ahmed and Musa (2022) also emphasized that intelligent writing technologies may enhance learning efficiency by identifying specific weaknesses and providing targeted academic support. Students experiencing writing difficulties can therefore receive assistance tailored to their individual learning needs.

Similarly, AI-assisted writing may contribute positively to students' academic performance through improved grammar usage, vocabulary development, coherence, and essay organization. Students who receive consistent support while writing may gradually improve their language competence and writing quality. Research findings indicate that AI technologies can reduce writing anxiety by creating supportive environments that encourage experimentation and revision (Akyol & Aktaş, 2018; AlKhalaf & AlMegren, 2023; Allison, 2025). Students often perceive AI systems as non-judgmental assistants that provide opportunities to practice writing without fear of criticism. Consequently, learners may become more willing to engage in writing activities and develop confidence in their academic abilities. Some studies have further suggested that AI-supported writing environments contribute to increased learner motivation and self-directed learning practices.

Despite these promising opportunities, the growing adoption of AI-assisted writing has generated considerable debates within educational communities. Scholars, educators, and policymakers have raised concerns regarding the implications of AI technologies for learning authenticity and academic integrity. One major concern involves overdependence on AI systems. James and Carter (2023) warned that excessive reliance on intelligent writing technologies may reduce students' active engagement in critical thinking and independent learning processes. Similarly, Olusegun and Ibrahim (2024) argued that students who depend heavily on AI-generated content may gradually weaken their ability to construct original academic arguments. Instead of developing essential academic writing skills, learners may

become passive consumers of automatically generated content. This situation raises concerns regarding the sustainability of learning outcomes and students' long-term competence development.

Another issue attracting scholarly attention relates to plagiarism and ethical use of AI-generated content. Generative AI systems can produce sophisticated academic texts that closely resemble human writing (Audichya & Saini, 2023). Consequently, distinguishing between original student work and AI-generated content has become increasingly difficult. Educational institutions continue to struggle with establishing policies that define acceptable and unacceptable AI use. Recent findings suggest that AI-generated academic submissions are becoming increasingly difficult to detect, thereby creating concerns regarding authenticity and assessment credibility (Bouzar et al., 2024; Chen & Cukurova, 2024; Cortez, 2025).

Furthermore, concerns have emerged regarding fabricated information and inaccurate references generated by AI systems. AI tools occasionally produce false citations and misleading information commonly referred to as "hallucinations." Students unfamiliar with verification practices may unknowingly include inaccurate information in academic tasks, thereby compromising academic quality. Johnson and Williams (2024) explained that AI-generated inaccuracies can negatively affect the reliability and scholarly quality of students' academic work. Adesina and Yusuf (2023) also stressed that excessive dependence on AI-generated materials may undermine originality, analytical thinking, and authentic communication skills among learners in English Education programmes. Educational researchers therefore increasingly emphasize the need to integrate ethical AI literacy and critical evaluation skills into instructional practices.

The implications of AI-assisted writing appear particularly significant within English Language Education because writing competence remains central to academic and professional development. English Education undergraduates are expected to acquire writing skills necessary for teaching, communication, and scholarly engagement. Their future responsibilities as language educators require strong competencies in grammar, writing organization, vocabulary use, and communication strategies. Consequently, technologies capable of influencing writing practices deserve careful educational investigation. While AI tools may provide substantial support during writing processes, concerns remain regarding whether these technologies genuinely improve students' academic performance or merely create dependence on automated systems.

Within the Nigerian educational system, the rapid diffusion of digital technologies and increased internet accessibility have contributed to the growing use of AI-assisted writing tools among university students (Ogundele, 2023). Nigerian undergraduates increasingly utilize digital applications for academic support, assignment completion, research activities, and language improvement (Ajayi, 2023). However, the adoption of AI technologies within higher education institutions presents unique challenges associated with digital literacy gaps, infrastructure limitations, technological inequalities, and limited institutional policies regarding AI use. Ogunleye and Akinwale (2024) observed that although AI technologies are gaining visibility among Nigerian university students, institutional preparedness for responsible AI integration remains inadequate. Eze and Mohammed (2022) similarly noted

that infrastructural challenges and unequal access to digital resources continue to affect technology adoption within many Nigerian universities.

Given the increasing integration of AI technologies into academic environments and the growing dependence of students on intelligent writing systems, there is a need for empirical investigation regarding their educational implications. Understanding the impact of AI-assisted writing on academic performance among English Education undergraduates may provide valuable insights for educators, curriculum developers, and policymakers seeking to maximize the educational benefits of AI while minimizing associated risks. Therefore, this study investigates the impact of Artificial Intelligence-assisted writing on academic performance among English Education undergraduates.

Statement of the Problem

The rapid rise of Artificial Intelligence-assisted writing tools among university students has introduced a major shift in academic writing practices and created an urgent educational concern. English Education undergraduates increasingly depend on AI systems for generating ideas, correcting grammatical errors, organizing essays, improving vocabulary, and completing academic tasks. While these technologies promise convenience and writing support, their widespread use has raised serious questions about what students are truly learning and whether writing competence is being developed or merely outsourced to intelligent systems. The increasing dependence on AI for academic writing has created uncertainty regarding its actual impact on students' academic performance.

The problem becomes more critical because there is no clear consensus on whether AI-assisted writing improves students' writing abilities or gradually weakens essential skills such as critical thinking, originality, and independent writing competence. As future language educators, English Education undergraduates are expected to possess strong writing abilities that extend beyond error correction and automated support. However, despite the growing use of AI technologies in academic environments, empirical evidence within the Nigerian context remains limited. If this situation continues without adequate investigation, educational institutions may adopt or discourage AI usage without evidence-based direction, potentially leading to poor instructional decisions, declining writing competence, and long-term threats to academic integrity and quality education.

Purpose of the Study

The main purpose of this study is to investigate the impact of Artificial Intelligence-assisted writing on academic performance among English Education undergraduates. Specifically, the study seeks to:

1. Determine the impact of Artificial Intelligence-assisted writing on the academic performance of English Education undergraduates in essay writing.
2. Examine the impact of Artificial Intelligence-assisted writing on students' performance in grammar among English Education undergraduates.
3. Investigate the impact of Artificial Intelligence-assisted writing on students' performance in essay organization and coherence among English Education undergraduates.
4. Determine the impact of Artificial Intelligence-assisted writing on students' performance in vocabulary development among English Education undergraduates.

5. Examine students' perceptions toward the use of Artificial Intelligence-assisted writing tools in academic writing.

Research Questions

The following research questions guided the study:

1. What is the impact of Artificial Intelligence-assisted writing on the academic performance of English Education undergraduates in essay writing?
2. What is the impact of Artificial Intelligence-assisted writing on students' performance in grammar among English Education undergraduates?
3. What is the impact of Artificial Intelligence-assisted writing on students' performance in essay organization and coherence among English Education undergraduates?
4. What is the impact of Artificial Intelligence-assisted writing on students' performance in vocabulary development among English Education undergraduates?
5. What are students' perceptions toward the use of Artificial Intelligence-assisted writing tools in academic writing?

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

H01: There is no significant impact of Artificial Intelligence-assisted writing on the academic performance of English Education undergraduates in essay writing.

H02: There is no significant impact of Artificial Intelligence-assisted writing on students' performance in grammar among English Education undergraduates.

H03: There is no significant impact of Artificial Intelligence-assisted writing on students' performance in essay organization and coherence among English Education undergraduates.

H04: There is no significant impact of Artificial Intelligence-assisted writing on students' performance in vocabulary development among English Education undergraduates.

H05: There is no significant difference in students' perceptions toward the use of Artificial Intelligence-assisted writing tools in academic writing.

2. Literature Review

2.1 Concept of Artificial Intelligence

Artificial Intelligence (AI) has emerged as one of the most transformative technological innovations of the twenty-first century, reshaping activities across social, economic, and educational domains. AI generally refers to computer systems designed to simulate human intelligence processes such as learning, reasoning, problem-solving, decision-making, and language understanding. According to Edoki (2021), Artificial Intelligence involves the development of intelligent systems capable of performing tasks that traditionally require human cognitive abilities. Ahmed and Lee (2022) described AI as computational technologies designed to imitate human thinking processes through machine learning algorithms and adaptive systems. Miller (2024) further conceptualized AI as a collection of intelligent technologies capable of analyzing data, recognizing patterns, generating responses, and improving performance through continuous interaction with users. The concept of AI has evolved significantly over the years. Earlier forms of AI primarily focused on rule-based systems where machines followed predetermined instructions. However, developments in machine learning, neural networks, and deep learning technologies have transformed AI into

more adaptive and intelligent systems capable of independent learning. Brown and Clark (2023) observed that recent advances in AI have shifted emphasis from automation toward generative intelligence, allowing systems to create texts, images, and human-like interactions. The emergence of generative AI has expanded educational possibilities by introducing systems that support interactive learning experiences and content generation.

Within educational settings, AI has increasingly become integrated into teaching and learning activities. Educational AI refers to the application of intelligent technologies to improve instructional delivery, learner engagement, assessment practices, and educational outcomes. Garcia and Williams (2020) argued that educational AI promotes personalized learning through adaptive systems that respond to students' individual needs. Likewise, Yusuf and Adeyemi (2023) explained that AI technologies in education facilitate intelligent tutoring systems, automated feedback mechanisms, virtual assistants, and learning analytics. Educational institutions increasingly utilize AI tools to support teaching effectiveness and improve learning experiences. The evolution of AI in education has progressed from basic computer-assisted instruction to sophisticated intelligent learning environments. Earlier technologies emphasized programmed instruction and computer-based tutorials; however, modern educational AI incorporates predictive analytics, adaptive learning platforms, and conversational agents. According to Davis and Moore (2022), educational technologies are transitioning from content delivery systems to collaborative learning assistants capable of supporting higher-order thinking skills. This evolution has significantly influenced language learning and writing instruction, where AI technologies increasingly provide writing assistance and academic support.

2.2 Concept of AI-Assisted Writing

AI-assisted writing represents one of the rapidly expanding applications of artificial intelligence within academic environments. AI-assisted writing refers to the use of intelligent technologies designed to support writing activities through automated feedback, language correction, idea generation, and content development. Thompson and Richards (2023) defined AI-assisted writing as a process through which learners interact with intelligent systems to improve writing quality and productivity. In educational contexts, AI-assisted writing systems serve as digital partners that assist learners throughout different stages of the writing process.

The emergence of generative AI technologies has significantly transformed writing support systems. Generative AI refers to intelligent systems capable of producing original content including essays, responses, summaries, and textual outputs based on user prompts. Miller and Brown (2024) argued that generative AI represents a major advancement beyond traditional software because it enables machines to create rather than merely process information. Technologies such as AI chatbots and language models increasingly support students in generating ideas, developing essay outlines, and refining academic writing tasks.

Writing support systems constitute another important dimension of AI-assisted writing. Earlier writing support technologies focused primarily on spell checking and grammar correction. Contemporary systems now include advanced features such as sentence restructuring, style enhancement, paraphrasing, vocabulary suggestions, and content generation. According to Wilson and Ahmed (2021), intelligent writing support systems

provide immediate feedback that enables learners to identify weaknesses and improve writing performance. Such systems increasingly function as personalized learning assistants rather than simple editing tools. Academic applications of AI-assisted writing continue to expand within higher education. Students increasingly use AI tools for assignments, research tasks, essay development, academic editing, and idea generation. Ibrahim and Bello (2024) observed that AI-assisted writing technologies support learners during planning, drafting, revising, and proofreading stages of writing. Educational researchers have also emphasized that AI tools provide opportunities for independent learning and self-regulated writing practices. Despite these benefits, concerns regarding originality and overdependence continue to attract scholarly attention.

2.3 Academic Performance in English Education

Academic performance generally refers to the extent to which students achieve intended educational outcomes and demonstrate competence in learning tasks. Within English Education, academic performance extends beyond examination scores and includes writing ability, communication skills, grammar competence, vocabulary usage, and critical thinking abilities. Academic performance in language education reflects students' ability to apply linguistic knowledge effectively within academic contexts. Writing achievement constitutes a significant indicator of performance among English Education undergraduates. Writing serves as an essential communication tool through which learners demonstrate understanding and engage in academic discourse. According to Ojo and Hassan (2020), writing achievement reflects learners' ability to organize ideas coherently and communicate effectively using appropriate language structures. Strong writing performance contributes substantially to overall academic success.

Essay performance similarly represents an important component of academic performance in English Education. Essays require learners to integrate language knowledge, critical thinking, coherence, and organization skills. Adekunle and Musa (2022) explained that effective essay writing involves idea generation, logical sequencing, vocabulary usage, and grammatical accuracy. Students with strong essay-writing abilities often demonstrate higher academic competence. Language competence further influences students' academic performance. Language competence encompasses grammar proficiency, vocabulary development, communication skills, and linguistic accuracy. Yusuf and Ibrahim (2021) argued that language competence remains central to successful learning outcomes among English Education students because communication skills affect classroom participation and academic engagement.

2.4 Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM) and Social Constructivism Theory. These theories provide a suitable explanation for students' adoption and use of Artificial Intelligence-assisted writing technologies in academic environments. The relationship among the major concepts in the study is presented in Figure 1.

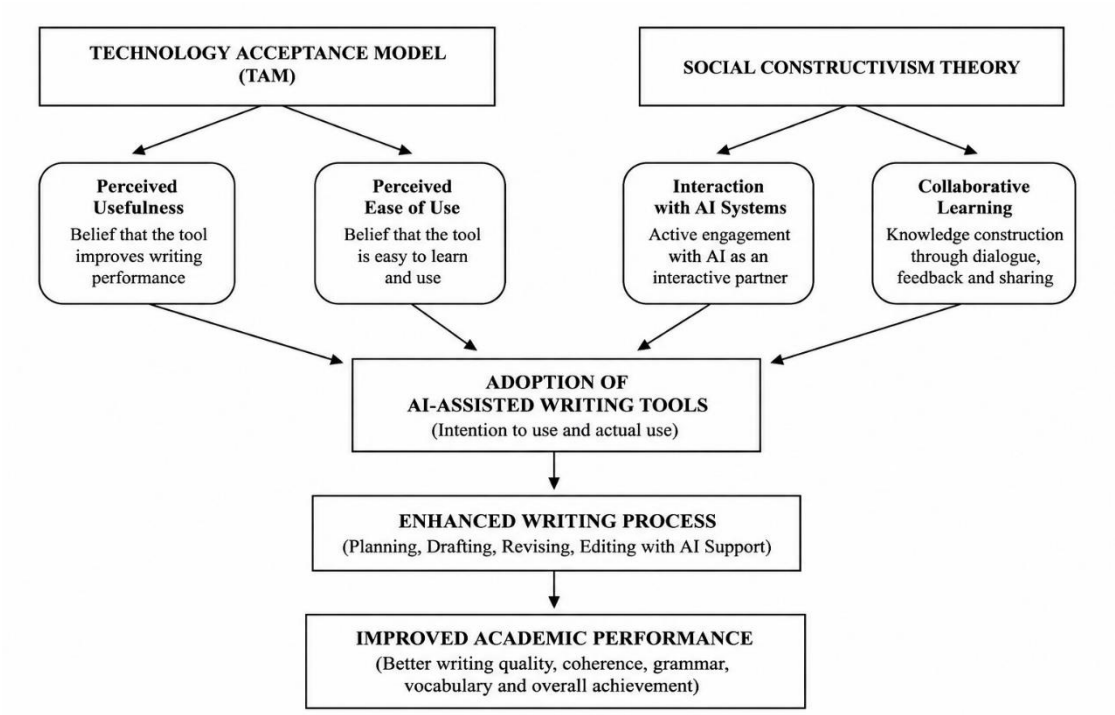


Figure 1: Theoretical Framework of AI-Assisted Writing and Academic Performance

The Technology Acceptance Model was developed to explain factors influencing users' acceptance and adoption of technological innovations. The model proposes that two major variables determine technology use: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which individuals believe that a technology improves performance, while perceived ease of use concerns users' perception regarding the level of effort required during technology usage. Davis (1989) originally proposed that technologies perceived as useful and easy to use are more likely to be adopted by users. As illustrated in Figure 1, students are more likely to adopt AI-assisted writing tools when they perceive such technologies as beneficial for improving writing quality, reducing academic workload, and enhancing learning efficiency. Johnson and Clark (2022) further explained that students increasingly utilize AI writing systems because they believe these tools improve writing performance and make academic tasks easier to accomplish.

Social Constructivism also provides a useful explanation for AI-assisted writing practices. Social Constructivist theory views learning as a collaborative process that occurs through interaction, participation, and knowledge construction within learning environments. Garcia and Lopez (2021) argued that learning takes place through active engagement and interaction with supportive learning systems. In the context of this study, AI writing technologies increasingly function as interactive learning partners that support collaboration, feedback, and guided writing experiences. As shown in Figure 1, interaction with AI systems and collaborative learning processes contribute to students' adoption and effective use of AI-assisted writing technologies. The integration of the Technology Acceptance Model and Social Constructivism Theory therefore provides a comprehensive framework for understanding how students perceive, adopt, and utilize AI-assisted writing tools. The framework further explains how the use of these technologies may contribute to enhanced writing processes and improved academic performance among English Education undergraduates.

2.6 Empirical Review

Several international studies have examined AI-assisted writing within higher education contexts. Chen and Morris (2022) conducted a quasi-experimental study involving 420 undergraduate students in China. Using pretest-posttest procedures, findings indicated that students exposed to AI-supported writing demonstrated improved grammar and writing organization. However, the study focused primarily on language learners and did not examine long-term learning effects. Williams and Carter (2023) investigated students' use of AI writing systems in the United States using survey methodology involving 650 participants. Findings revealed increased writing confidence and improved productivity among users. However, the study relied exclusively on self-reported perceptions rather than objective performance indicators. Similarly, Brown et al. (2024) conducted mixed-method research among university students in Canada and found that AI-assisted writing enhanced revision practices and reduced writing anxiety. The study did not investigate English Education students specifically.

Within Africa, AI-related educational studies remain relatively limited. Musa and Okeke (2022) examined students' perceptions toward AI-supported learning among South African undergraduates using descriptive survey design. Findings indicated positive attitudes toward AI technologies. However, the study focused broadly on educational technologies rather than writing performance. Adebisi and Mensah (2023) investigated AI-supported writing tools among Ghanaian students. Results suggested that students perceived AI systems as useful for grammar improvement and idea generation. The study relied on descriptive data and lacked experimental investigation.

In Nigeria, available studies have largely emphasized awareness and perception regarding AI technologies. Ogunleye and Bello (2024) investigated university students' perceptions toward AI use through descriptive survey design. Findings indicated increasing use of AI writing tools among students. However, academic performance variables were not examined. Similarly, Eze and Yusuf (2023) studied digital technologies and learning outcomes among undergraduates in selected universities. Findings revealed positive relationships between technology use and academic engagement. The study focused on broad digital learning technologies rather than AI-assisted writing. Adeyemi and Ibrahim (2024) examined students' attitudes toward AI technologies among education undergraduates using survey methodology. Findings suggested favorable perceptions toward AI adoption but did not investigate objective writing outcomes.

A major limitation across these studies involves methodological approaches. Most Nigerian studies employ descriptive designs and perception-based investigations with limited experimental evidence regarding AI-assisted writing and academic performance.

3. Methodology

Research Design

This study adopted a descriptive experimental research design using a pretest-posttest control group design. The design was considered appropriate because it enabled the researcher to determine the impact of Artificial Intelligence-assisted writing on academic performance among English Education undergraduates by comparing outcomes between students exposed to treatment and those taught using conventional instructional approaches. The design

involved administering a pretest to both groups before treatment and a posttest after the intervention period. The use of pretest-posttest procedures helped establish students' baseline writing performance and allowed for the measurement of changes attributable to the treatment. The design also controlled for initial group differences and enhanced the internal validity of the study.

The experimental structure is represented as:

Experimental Group: $O_1 \rightarrow X \rightarrow O_2$

Control Group: $O_1 \rightarrow - \rightarrow O_2$

Where:

O_1 = Pretest

X = AI-assisted writing treatment

O_2 = Posttest

Population of the Study

The population of the study comprised all undergraduate students in the Department of English Education in selected public universities in Nigeria. The target population specifically consisted of students enrolled in English Education programmes at the 200 and 300 levels. These categories of students were selected because they had already undertaken foundational English and writing-related courses and were more likely to possess basic digital literacy skills necessary for interaction with AI-assisted writing tools.

The choice of public universities was informed by their diverse student population and increasing exposure to digital technologies within teaching and learning environments. English Education undergraduates constitute an appropriate population because academic writing competence remains central to their programme requirements and future professional responsibilities as language educators.

Sample and Sampling Techniques

A sample size of 240 English Education undergraduates was selected for the study. The sample size was considered adequate for experimental studies involving treatment and control conditions and sufficient for statistical analysis using Analysis of Covariance (ANCOVA).

A multistage sampling procedure was adopted. At the first stage, two public universities offering English Education programmes were selected through purposive sampling based on availability of internet facilities and accessibility of participants. At the second stage, faculties and departments offering English Education were identified. Thereafter, simple random sampling techniques were used to select intact classes from the participating institutions.

The selected participants were then assigned into experimental and control groups comprising 120 students each. The use of intact classes minimized disruption to existing academic activities and maintained natural classroom settings.

Instruments for Data Collection

Three instruments were used for data collection:

1. **Academic Writing Achievement Test (AWAT):** The Academic Writing Achievement Test (AWAT) was developed by the researcher to assess students' academic writing

performance. The test consisted of structured essay writing tasks designed to measure dimensions such as grammar, essay organization, coherence, vocabulary development, and overall writing competence. Students were required to respond to essay prompts on contemporary educational and social issues relevant to undergraduate learning contexts. Responses were scored using a standardized marking guide developed based on writing assessment criteria.

2. **AI Writing Perception Questionnaire (AIWPQ):** The AI Writing Perception Questionnaire (AIWPQ) was designed to obtain information regarding students' perceptions toward the use of AI-assisted writing technologies. The instrument consisted of two sections. Section A elicited demographic information such as gender, age, and level of study, while Section B contained Likert-scale items measuring students' perceptions regarding usefulness, ease of use, writing confidence, and concerns associated with AI-assisted writing technologies. The response format followed a four-point scale: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, Strongly Disagree (SD) = 1.
3. **Essay Performance Record Sheet:** The Essay Performance Record Sheet was used to record students' essay scores during the pretest and posttest phases. The instrument provided a structured format for documenting individual performance scores across identified writing dimensions including grammar, organization, coherence, and vocabulary development.

Validity of Instruments

The instruments were subjected to face and content validation procedures through expert review. Copies of the instruments, research objectives, research questions, and hypotheses were presented to specialists in English Language Education, Educational Technology, and Measurement and Evaluation at Bamidele Olumilua University of Education, Science, and Technology, Ikere-Ekiti. The experts examined the instruments with respect to clarity of language, appropriateness of content, relevance to study objectives, adequacy of item coverage, and suitability for measuring intended variables. Their observations and recommendations guided the modification and final development of the instruments before administration.

Reliability of Instruments

The reliability of the instruments was established using Cronbach Alpha and test-retest methods. The AI Writing Perception Questionnaire (AIWPQ) was subjected to internal consistency reliability testing using Cronbach Alpha statistics. The instrument was administered to a pilot group of students outside the study area, and reliability coefficients were computed for the questionnaire items. Similarly, the Academic Writing Achievement Test (AWAT) was subjected to test-retest reliability procedures. The instrument was administered twice to a group of students at an interval of two weeks. Scores obtained from both administrations were correlated using Pearson Product Moment Correlation to determine the stability and consistency of the instrument over time. The obtained reliability coefficients were considered adequate for research purposes.

Procedure for Data Collection

Data collection followed three major stages: pretest, treatment, and posttest. During the pretest stage, both experimental and control groups were administered the Academic Writing Achievement Test before the commencement of treatment. This was done to establish

participants' initial writing performance and determine baseline equivalence between groups. Following the pretest administration, treatment sessions commenced and lasted for six weeks. At the end of the treatment period, the posttest was administered using equivalent writing tasks. Students' responses were scored and recorded for analysis.

Participants in the experimental group were exposed to AI-assisted writing instruction using selected AI tools such as ChatGPT, Grammarly, and QuillBot. During instructional sessions, students received training on how to use AI technologies for idea generation, grammar correction, essay organization, sentence restructuring, and vocabulary enhancement. Students interacted with AI tools while completing guided writing tasks and assignments. The control group received conventional writing instruction through traditional classroom teaching methods. Instruction involved teacher explanations, note-taking, essay exercises, and manual feedback procedures without the use of AI technologies. Both groups received instruction on similar writing topics and content areas to ensure instructional uniformity.

Method of Data Analysis

Data collected for the study were analyzed using mean and standard deviation to answer the research questions. Mean scores and standard deviations were used to determine differences in students' writing performance and perceptions. The hypotheses were tested using Analysis of Covariance (ANCOVA) at a 0.05 level of significance. ANCOVA was considered appropriate because it adjusted for possible pre-existing differences between groups and determined the impact of treatment on students' academic performance after controlling for pretest scores.

4. Results

This study presents the results obtained from the analysis of data based on the research questions and hypotheses formulated. Preliminary analyses were first conducted to describe respondents' characteristics. Thereafter, research questions were answered using mean and standard deviation. For questionnaire items measured on a four-point Likert scale, a criterion mean of 2.50 was used as the basis for decision making. Mean scores of 2.50 and above were accepted, while mean scores below 2.50 were rejected. Hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance.

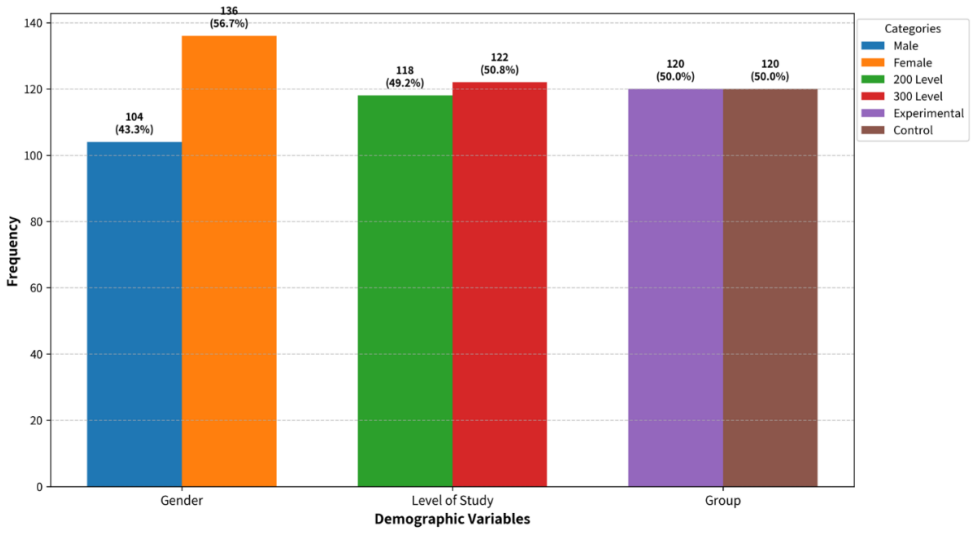


Figure 2: Demographic characteristics of respondents

Figure 2 presents the demographic characteristics of respondents. The result shows that 104 respondents representing 43.3% were male while 136 respondents representing 56.7% were female. The column chart further indicates that 118 respondents representing 49.2% were in 200 level while 122 respondents representing 50.8% were in 300 level. In addition, participants were equally distributed into experimental and control groups with 120 respondents each representing 50.0%. The distribution suggests adequate representation of participants across categories.

Table 1: ***Pretest mean scores of experimental and control groups before treatment***

Group	N	Mean	SD	Mean Difference
Experimental	120	46.28	6.12	
Control	120	45.91	5.84	0.37

Table 1 shows that the experimental group obtained a pretest mean score of 46.28 while the control group recorded a mean score of 45.91. The mean difference of 0.37 indicates that both groups possessed relatively similar writing abilities before treatment. This suggests baseline equivalence between groups before exposure to the intervention.

Analysis of Research Questions

Research Question One

What is the impact of Artificial Intelligence-assisted writing on the academic performance of English Education undergraduates in essay writing?

Table 2: ***Mean and standard deviation scores of experimental and control groups on academic performance in essay writing***

Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Mean Gain
Experimental (AI-assisted writing)	120	46.28	6.12	74.85	7.31	28.57
Control (Conventional instruction)	120	45.91	5.84	59.42	6.75	13.51

Table 2 shows that the experimental group had a pretest mean score of 46.28 and posttest mean score of 74.85 with a mean gain of 28.57, while the control group had a pretest mean score of 45.91 and posttest mean score of 59.42 with a mean gain of 13.51. This indicates that students exposed to Artificial Intelligence-assisted writing demonstrated greater improvement in essay writing performance than those taught through conventional instruction.

Research Question Two

What is the impact of Artificial Intelligence-assisted writing on students' performance in grammar among English Education undergraduates?

Table 3: ***Mean and standard deviation scores of experimental and control groups on grammar performance***

Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Mean Gain
Experimental	120	11.34	2.61	18.86	2.94	7.52
Control	120	11.02	2.55	14.76	2.87	3.74

Table 3 reveals that students in the experimental group obtained a mean gain score of 7.52 compared with 3.74 obtained by students in the control group. This suggests that AI-assisted writing improved students' performance in grammar.

Research Question Three

What is the impact of Artificial Intelligence-assisted writing on students' performance in essay organization and coherence among English Education undergraduates?

Table 4: ***Mean and standard deviation scores of experimental and control groups on essay organization and coherence***

Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Mean Gain
Experimental	120	12.15	2.72	19.34	2.86	7.19
Control	120	11.94	2.69	15.62	2.58	3.68

Table 4 indicates that students exposed to AI-assisted writing recorded a mean gain score of 7.19 compared with 3.68 among students in the control group. The result suggests that AI-assisted writing positively influenced students' performance in essay organization and coherence.

Research Question Four

What is the impact of Artificial Intelligence-assisted writing on students' performance in vocabulary development among English Education undergraduates?

Table 5: ***Mean and standard deviation scores of experimental and control groups on vocabulary development***

Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Mean Gain
Experimental	120	10.47	2.14	17.82	2.68	7.35
Control	120	10.26	2.08	14.15	2.43	3.89

Table 5 shows that the experimental group obtained a mean gain score of 7.35 while the control group obtained a mean gain score of 3.89. This indicates that AI-assisted writing had a positive impact on students' vocabulary development performance.

Research Question Five

What are students' perceptions toward the use of Artificial Intelligence-assisted writing tools in academic writing?

Table 6: ***Mean ratings of students' perceptions toward Artificial Intelligence-assisted writing tools***

S/N	Items	Mean	SD	Decision
1	AI-assisted writing improves writing confidence	3.46	0.73	Agree
2	AI tools help improve grammar accuracy	3.58	0.69	Agree
3	AI-assisted writing improves essay organization	3.33	0.78	Agree
4	AI tools reduce writing anxiety	3.41	0.76	Agree
5	AI-assisted writing promotes academic productivity	3.55	0.72	Agree
6	Excessive use of AI may reduce originality	3.49	0.81	Agree
	Grand Mean	**3.47**	**0.75**	**Agree**

Note. Criterion mean = 2.50.

Table 6 shows a grand mean score of 3.47, which is above the criterion mean of 2.50. This indicates that students generally held positive perceptions toward the use of Artificial Intelligence-assisted writing tools while also expressing concerns regarding excessive dependence and originality.

Test of Hypotheses

Hypothesis One

H01: There is no significant impact of Artificial Intelligence-assisted writing on the academic performance of English Education undergraduates in essay writing.

Table 7: ***ANCOVA summary of the impact of AI-assisted writing on academic performance in essay writing***

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7642.812	2	3821.406	48.632	.000
Pretest	1298.411	1	1298.411	16.524	.000
Group	5944.756	1	5944.756	75.648	.000
Error	18543.277	236	78.573		
Total	1107320.000	240			
Corrected Total	26186.089	239			

Table 7 shows that the significance value for group effect is .000, which is less than .05 level of significance. Therefore, the null hypothesis was rejected. This implies that there was a

significant impact of Artificial Intelligence-assisted writing on students' academic performance in essay writing.

Hypothesis Two

H02: There is no significant impact of Artificial Intelligence-assisted writing on students' performance in grammar among English Education undergraduates.

Table 8: ***ANCOVA summary of impact of AI-assisted writing on grammar performance***

Source	SS	df	MS	F	Sig.
Pretest	322.715	1	322.715	12.314	.001
Group	947.654	1	947.654	36.162	.000
Error	6182.433	236	26.197		

Table 8 reveals a significance value of .000 which is less than .05. Therefore, the null hypothesis was rejected. This indicates that AI-assisted writing had a significant impact on students' grammar performance.

Hypothesis Three

H03: There is no significant impact of Artificial Intelligence-assisted writing on students' performance in essay organization and coherence among English Education undergraduates.

Table 9: ***ANCOVA summary of impact of AI-assisted writing on essay organization and coherence***

Source	SS	df	MS	F	Sig.
Pretest	289.633	1	289.633	11.702	.001
Group	1045.874	1	1045.874	42.264	.000
Error	5838.177	236	24.738		

Table 9 shows that the significance level of .000 is less than .05. Hence, the null hypothesis was rejected. This implies that AI-assisted writing significantly impacted students' performance in essay organization and coherence.

Hypothesis Four

H04: There is no significant impact of Artificial Intelligence-assisted writing on students' performance in vocabulary development among English Education undergraduates.

Table 10: ***ANCOVA summary of impact of AI-assisted writing on vocabulary development***

Source	SS	df	MS	F	Sig.
Pretest	264.507	1	264.507	10.881	.001
Group	1013.561	1	1013.561	41.693	.000
Error	5738.544	236	24.316		

Table 10 indicates a significance value of .000, which is less than .05. Therefore, the null hypothesis was rejected. This suggests that AI-assisted writing significantly impacted students' vocabulary development performance.

Hypothesis Five

H05: There is no significant difference in students' perceptions toward the use of Artificial Intelligence-assisted writing tools in academic writing.

Table 11: ***One-sample t-test of students' perceptions toward AI-assisted writing tools***

Variable	N	Mean	SD	t	df	Sig. (2-tailed)
Students' perception	240	3.47	0.75	19.633	239	.000

Table 11 shows that the significance value (.000) is less than .05. Therefore, the null hypothesis was rejected. The result indicates a significant positive perception toward the use of Artificial Intelligence-assisted writing tools among English Education undergraduates.

5. Discussion of Findings

The findings of this study revealed that Artificial Intelligence-assisted writing significantly improved the academic performance of English Education undergraduates in essay writing. As presented in Table 2, students exposed to AI-assisted writing achieved a higher mean gain score of 28.57 compared with 13.51 recorded by students taught through conventional instruction. The ANCOVA result presented in Table 7 further showed a significant group effect, indicating that AI-assisted writing had a statistically significant influence on students' essay writing performance. The improvement may be attributed to the capacity of AI tools to provide immediate feedback, support idea generation, and assist students during revision processes.

This finding agrees with the studies of Chen and Morris (2022) and Brown et al. (2024), who reported that AI-supported writing environments improved students' essay quality and overall writing performance through personalized support and real-time feedback. Williams and Carter (2023) also found that students who used AI-assisted writing technologies demonstrated higher writing productivity and confidence. Similarly, Adebisi and Mensah (2023) observed that students perceived AI writing technologies as useful in improving academic writing experiences. Ogunleye and Bello (2024) further reported increasing adoption of AI tools among university students because of their perceived contribution to academic performance.

However, the finding differs from the concerns raised by James and Carter (2023), who argued that excessive dependence on AI systems may weaken independent writing and critical thinking skills. Olusegun and Ibrahim (2024) similarly warned that overreliance on AI tools could reduce students' cognitive engagement during writing tasks. The difference may be linked to the structured and supervised manner in which AI tools were used in this study. This suggests that AI technologies may produce positive educational outcomes when integrated responsibly into instructional activities rather than used as replacements for independent learning.

The findings also revealed that AI-assisted writing significantly improved students' grammar performance. As shown in Table 3, students in the experimental group recorded a higher mean gain score than those in the control group, while the ANCOVA result presented in Table 8 confirmed a significant group effect. The improvement may be associated with the real-time

grammar correction and language suggestions provided by AI systems, which enable students to identify and correct errors immediately during writing tasks.

This finding supports James and Wilson (2022), who found that AI-supported grammar applications significantly improved grammatical accuracy among students. Brown and Yusuf (2023) also observed that students who used intelligent writing systems produced fewer grammatical errors than those taught through traditional methods. Musa and Okeke (2022) similarly reported that AI technologies positively influenced language competence among undergraduates. Nevertheless, Johnson and Williams (2024) cautioned that automated correction systems may improve surface-level writing accuracy without necessarily promoting deeper grammatical understanding. Despite this concern, the present study indicates that AI technologies can effectively complement grammar instruction when properly integrated into teaching and learning activities.

Moreover, the findings showed that AI-assisted writing significantly improved students' essay organization and coherence. As presented in Table 4, students exposed to AI-assisted writing demonstrated greater improvement in the organization and logical presentation of ideas compared with those in the control group. The ANCOVA result in Table 9 also confirmed a statistically significant group effect. This finding may be linked to the organizational support features embedded within AI systems, including suggestions relating to paragraph structure, sequencing of ideas, transitions, and essay flow.

The finding agrees with Thompson and Richards (2023), who found that AI-assisted writing technologies enhanced students' organizational skills and coherence in academic writing. Wilson and Ahmed (2021) similarly reported that intelligent writing systems improved clarity and logical expression among learners. Brown et al. (2024) also found that AI-supported revision systems positively influenced writing structure and organization. However, Johnson and Williams (2024) argued that excessive reliance on AI-generated structures may reduce students' creativity and independent composition skills. This implies that while AI can improve structural quality, lecturers should ensure that students remain active participants in the writing process.

The study additionally revealed that AI-assisted writing positively influenced students' vocabulary development. As shown in Table 5, students exposed to AI-assisted writing demonstrated higher mean gains in vocabulary performance than students taught through conventional instruction, while the ANCOVA result in Table 10 confirmed a statistically significant difference between the groups. This improvement may be associated with vocabulary enhancement features available within AI systems, such as synonym suggestions, contextual expressions, and alternative sentence structures that expose learners to broader lexical usage.

This finding supports Brown and Yusuf (2023), who found that AI-assisted paraphrasing technologies improved students' vocabulary usage and language expression. Ahmed and Lee (2022) similarly reported that intelligent writing systems positively influenced lexical competence among learners. Adebisi and Mensah (2023) also found that students considered AI tools useful for vocabulary development and language improvement. However, James and Carter (2023) warned that overdependence on AI-generated lexical suggestions may

encourage memorization without contextual understanding. This suggests the need for guided AI usage that encourages students to critically evaluate vocabulary suggestions. The findings revealed that students generally demonstrated positive perceptions toward AI-assisted writing technologies. As presented in Table 6, respondents agreed that AI tools improved writing confidence, grammar accuracy, productivity, and reduced writing anxiety. The one-sample t-test result in Table 11 further confirmed that the perception was statistically significant. This finding aligns with Ogunleye and Bello (2024), Eze and Yusuf (2023), and Musa and Okeke (2022), who reported favorable attitudes toward AI-supported learning technologies among university students.

Despite these positive perceptions, students also expressed concerns that excessive use of AI could reduce originality in writing. This observation corresponds with Johnson and Williams (2024), who highlighted ethical concerns relating to plagiarism, academic authenticity, and dependence on AI systems. The implication is that educational institutions should promote ethical AI literacy and responsible usage practices while integrating AI technologies into academic instruction.

6. Conclusion

This study investigated the impact of Artificial Intelligence-assisted writing on academic performance among English Education undergraduates using a descriptive experimental pretest-posttest control group design. The findings revealed that students exposed to AI-assisted writing instruction performed significantly better than students taught through conventional instructional methods across major writing dimensions. Specifically, the study found that Artificial Intelligence-assisted writing positively impacted students' essay writing performance, grammar competence, essay organization and coherence, and vocabulary development. Students in the experimental group consistently recorded higher mean gain scores than their counterparts in the control group, while the hypotheses tested further confirmed statistically significant differences in favour of the AI-assisted writing group.

The study also revealed that students generally held positive perceptions toward the use of AI-assisted writing tools in academic writing. Respondents agreed that AI technologies improved writing confidence, enhanced grammar accuracy, reduced writing anxiety, and promoted academic productivity. However, students also acknowledged concerns relating to excessive dependence on AI systems and the possibility of reduced originality in academic writing.

The study concludes that Artificial Intelligence-assisted writing possesses substantial potential for improving academic performance among English Education undergraduates when used within structured and guided instructional environments. The findings suggest that AI technologies can serve as valuable instructional support tools capable of enhancing writing competence and learning experiences. However, their educational effectiveness depends on responsible implementation and ethical usage practices that ensure students continue to develop independent writing skills, originality, and critical thinking abilities alongside technological engagement.

7. Recommendations

Based on the findings of this study, the following recommendations are made:

1. **Integrate AI literacy into English Education curricula:** Universities and curriculum developers should incorporate AI literacy into undergraduate English Education programmes to equip students with relevant digital competencies and knowledge of the educational applications, benefits, and limitations of AI-assisted writing technologies.
2. **Train students on ethical AI use:** Educational institutions should organize regular training programmes on responsible AI usage, plagiarism prevention, academic integrity, and proper citation practices to ensure that students use AI technologies appropriately in academic writing.
3. **Encourage critical evaluation of AI-generated content:** Lecturers should guide students to critically assess and verify AI-generated information before using it in academic work, since AI systems may occasionally produce inaccurate, misleading, or fabricated content.
4. **Develop institutional AI-use policies:** Higher institutions should establish clear guidelines and policies regulating acceptable and unacceptable uses of AI technologies in assignments, assessments, and academic writing activities to promote originality and maintain academic standards.
5. **Promote balanced instructional approaches:** Educational stakeholders should combine AI-assisted learning with conventional teaching methods to ensure that students develop creativity, independent writing competence, and critical thinking skills alongside technological proficiency.

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