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The Impact of ChatGPT on Academic Writing Skills and Knowledge: An Investigation of Its Use in Argumentative Essays

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ABSTRACT

This study investigates the impact of ChatGPT on EFL students' argumentative writing development of 30 third-year English majors. The research examines writing quality improvements, student perceptions, and patterns of AI tool usage across a 16-week period. This study employed a mixed-methods design to investigate both students' writing development and their perceptions of AI integration. Writing development was assessed through comparative analysis of participants' first and fifth drafts as pre-test and post-test assessments, while perceptions data were collected through a validated 17-item questionnaire (Cronbach's $\alpha = 0.89$) focusing on confidence and concerns in AI-assisted writing. Essays were evaluated using an adapted AIAS framework focusing on six dimensions: content, organization, language use, critical thinking, AI integration, and academic integrity. The quantitative analysis revealed significant enhancements in writing performance, with the most substantial improvements in academic integrity (+3.0 points. Furthermore, the thematic analysis of the draft comparisons demonstrated marked progression in argument construction, evidence integration, and academic voice. This research provides insights for

developing pedagogical frameworks that optimize AI integration while fostering independent writing competencies.

Keywords: ChatGPT integration, EFL argumentative writing, writing development, AI tool adoption patterns, AI-assisted learning

Introduction

The emergence of artificial intelligence (AI) technologies, particularly ChatGPT, is revolutionizing academic writing instruction in the context of English as a Foreign Language (EFL). EFL students face significant challenges in developing argumentative writing skills, which demand complex cognitive processes, including critical thinking, logical reasoning, and coherent argument construction while navigating around second language constraints. This research is driven by three essential factors of the current educational landscape. First, EFL learners struggle with argumentative writing, particularly in developing logical arguments and effectively expressing complex ideas in English. Second, the rapid integration of AI tools within education has created unprecedented opportunities alongside pedagogical uncertainties. Third, despite ChatGPT's increasing adoption in academic settings, there remains a significant knowledge gap regarding its impact on students' writing development and their independent thinking skills.

While traditional writing instruction methods have shown limited effectiveness in addressing these challenges (Patty, 2024), ChatGPT, as an innovative possibility for transforming writing pedagogy, requires a systematic evaluation of its impact on EFL learners' argumentative writing development (AL-Smadi, 2023). This research gap is particularly concerning as educational institutions increasingly adopt AI writing tools without fully understanding their long-term effects on students' writing competencies (Uzun, 2023). The focus on argumentative writing is deliberate and significant because this type of academic writing demands advanced cognitive and linguistic skills, crucial for success in higher education and professional environments (Chala & Chapetón, 2012; Guo et al., 2022). For EFL learners, argumentative writing presents unique challenges due to its requirement for simultaneous mastery of advanced language skills along with critical thinking abilities (Srinawati & Alwi, 2020). This complex interaction between language proficiency, logical reasoning, and persuasive communication makes argumentative writing an ideal context for examining AI-assisted learning's impact on writing development (Liu et al., 2024).

Recent empirical studies have demonstrated ChatGPT's potential to enhance specific aspects of writing. For example, research by Livberber and Ayvaz (2023), and Mahapatra (2024) highlights the specific improvements in grammar, mechanics, and organizational skills obtained through AI assistance. Additionally, studies by Marzuki et al (2023) and Yan (2023) indicate promising results in writing fluency and content generation through immediate feedback and scaffolded literacy development writing instruction.

Literature Review

Writing arguments in English is particularly challenging for students learning English as a foreign language (EFL). In explanation, students are required to handle both language skills and argument structure simultaneously. According to Ghanbari & Salari (2022), EFL students often find it difficult to create clear arguments, address opposing viewpoints, and provide evidence for their points while also dealing with language barriers. These challenges are made more complex by differences in how arguments are structured and presented across various cultures. Moreover, the cognitive demands of critical thinking and logical reasoning are essential in argumentative writing. Integrating AI tools, particularly ChatGPT, into EFL writing instruction presents promising opportunities and significant challenges in developing argumentative writing skills. Regarding pedagogical applications, ChatGPT offers immediate feedback on structure and organization, assists with argument formulation, supports evidence integration, and helps with counterargument development. The tool's linguistic enhancement capabilities encompass three key domains: grammatical and lexical development, stylistic sophistication, and rhetorical pattern analysis. Recent empirical evidence substantiates its effectiveness across multiple dimensions. For example, Marzuki et al. (2023) documented significant gains in writing fluency (Marzuki et al., 2023), while Jonassen and Kim (2010) demonstrated improvements in argumentative structure. Furthermore, Banihashem et al. (2024) found that users showed marked improvement in their ability to integrate and synthesize supporting evidence.

While extensive research has examined artificial intelligence applications in language learning, significant knowledge gaps persist in understanding AI's specific role in argumentative writing development. Recent empirical studies have also demonstrated AI tools' potential to enhance general writing competencies and scientific discourse (Alharbi, 2023; Kim et al., 2015; Shi & Aryadoust, 2024; Wei, 2023), yet several critical dimensions remain underexplored. Specifically, the available literature reveals limited systematic investigation into the cognitive mechanisms through which AI tools influence the argument construction processes and their subsequent

impact on learners' critical thinking development (Alasgarova & Rzayev, 2024; Horta & Santos, 2015; Mahmood Khan, 2024; Slimi et al., 2022; Wei, 2023). Furthermore, studies examining the sustained effects of AI assistance on independent writing capabilities are notably scarce (Flanagin et al., 2023; Liu & Fan, 2024; Nguyen et al., 2024). Additionally, contemporary scholars have also highlighted the pedagogical challenges in establishing an optimal equilibrium between AI-enhanced scaffolding and autonomous learning, particularly in EFL contexts, where metacognitive development is crucial (Darvishi et al., 2024; Jia & Tu, 2024; Nguyen, 2024). To sum up, while ChatGPT has successfully demonstrated promising potential for enhancing writing skills (Marzuki et al., 2023), there remains insufficient research examining how systematic AI integration affects the development of argumentative writing skills over time, particularly in EFL contexts (Dashti et al., 2023; Livberber, 2023). This gap is particularly crucial as it relates to the fundamental educational goal of developing autonomous writers capable of constructing compelling arguments in their second language.

Conceptual Framework

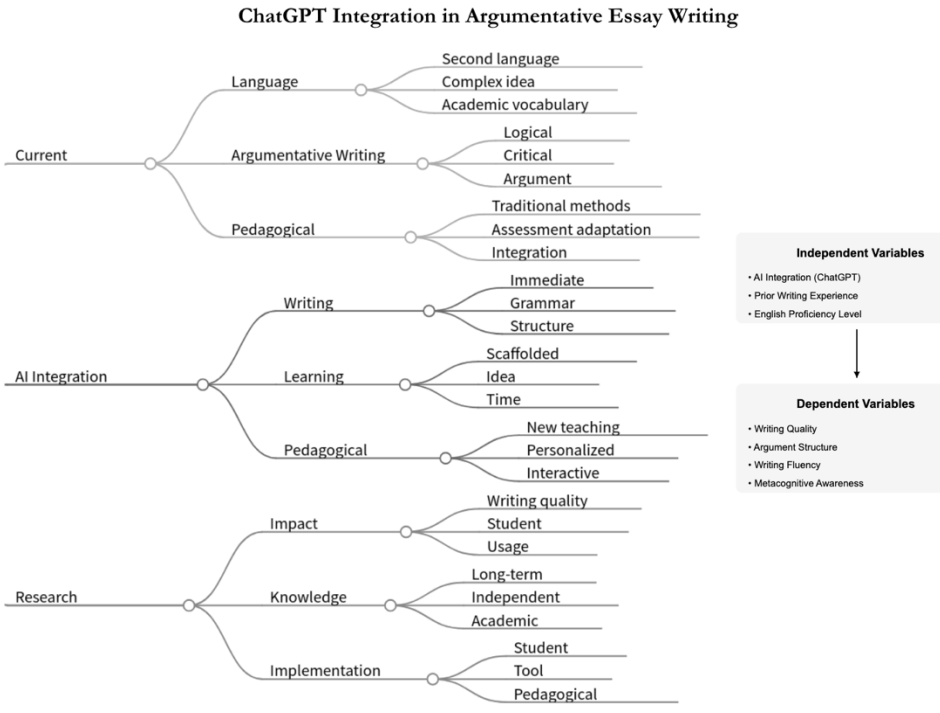
This research is driven by three essential factors in the current educational landscape. First, EFL learners struggle with argumentative writing, particularly in developing logical arguments and effectively expressing complex ideas in English. Second, the rapid integration of AI tools in education has created unprecedented opportunities, but also pedagogical uncertainties. Third, despite ChatGPT's increasing adoption in academic settings, there remains a significant knowledge gap regarding its long-term impact on students' writing development and independent thinking skills.

The conceptual framework (Figure 1) provides a comprehensive overview of the key considerations and potential implications of AI integration in the EFL academic writing domain, serving as a foundation for further research and pedagogical development in this emerging field. According to this conceptual framework, the outline of the key challenges and opportunities provided by the integration of AI technologies, particularly the emergence of ChatGPT, are presented in the context of EFL (English as a Foreign Language) academic writing. The framework highlights several areas of focus, including the development of logical arguments, the expression of complex ideas in English, and the navigation of the second language constraints EFL learners are faced with. In this framework, the impact of ChatGPT, is expected to revolutionize academic writing instruction by introducing new pedagogical approaches and integration into educational contexts. In addition, the diagram shows how the three independent variables (AI Integration, Prior Writing Experience, and English Proficiency Level)

influence the four dependent variables (Writing Quality, Argument Structure, Writing Fluency, and Metacognitive Awareness).

Figure 1

Research Conceptual Framework



Research Questions

This study investigates the integration of ChatGPT in EFL argumentative essay writing, focusing on its effects on writing quality, students' experiences and attitudes, and their patterns of AI tool usage in academic writing tasks. The following research questions are to guide the investigation.

1. How does the integration of ChatGPT impact EFL students' argumentative essay writing quality?
2. What are students' perceptions and attitudes toward using ChatGPT in academic writing?
3. What are the patterns of ChatGPT usage in the essay writing process?

Research Methodology

The methodology for tracking argumentative essay writing development through first and final draft comparison is grounded in several theoretical frameworks. The pre-post intervention design, as outlined by Cohen et al (2017), provides a foundational methodology for measuring writing development. This approach emphasizes the importance of establishing baseline performance through initial drafts before implementing any intervention, allowing researchers to accurately measure the impact of instructional methods on student writing development. Cohen et al. argue that first drafts serve as crucial control measures, providing authentic evidence of students' initial writing capabilities. In addition, Steiss et al. (2024) specifically addresses the integration of technology in writing assessment. Their research framework emphasizes the necessity of establishing clear baseline measurements before implementing technological interventions in writing instruction. This design serves as an effective evaluation of technology's impact on writing development and requires systematic, comparative analysis between pre- and post-intervention writing samples, providing a methodological basis for examining how technological tools influence writing development over time.

The proposed research design, which examines students' initial and final drafts in AI-assisted writing classes, is strongly supported by current literature and established methodological approaches. Specifically, this study's comparison of draft 1 (pre-test) and draft 5 (post-test) aligns with well-established assessment practices in writing research and educational studies. This includes Ferris (2010) who highlighted the importance of assessing students' initial and final drafts to evaluate the effectiveness of feedback and instructional interventions, particularly for ESL students. In addition, Graham and Perin (2007) emphasized the importance of using pre-test and post-test measures to assess the effectiveness of writing interventions. They note that such designs effectively evaluate the impact of instructional strategies on students' writing abilities over time. Moreover, as the study lasted for 16 weeks, it is reasonable to observe changes over extended periods and this is essential to understand how writing skills develop (Bereiter & Scardamalia, 2013). Finally, Hyland (2003) indicated that student progress can be systematically tracked through the writing assessment framework, with a clear benchmark across multiple dimensions, including language control, content development, and writing conventions. Thus, the comparative analysis of drafts particularly highlights how students learn to critically evaluate AI-generated content, maintain their authentic voice, and develop more sophisticated writing strategies over time.

Participants

This study employed purposive sampling (Etikan, 2016) by selecting 30 third-year English Language majors (23 females, 7 males) aged 20-21 from one intact class out of four available sections. The selection of this particular class was guided by three criteria that aligned with the research objectives. First, as third-year English majors, these students demonstrated the required language proficiency level necessary for engaging in complex argumentative writing tasks (Brown & Lee, 2015). Second, their successful completion of fundamental writing courses ensured a basic understanding of academic writing conventions, providing a solid foundation for the study (Creswell & Creswell, 2018). Third, based on a preliminary survey, these participants reported minimal exposure to AI writing tools, allowing for clear observation of ChatGPT's impact on their writing development (Yan, 2023). All participants provided informed consent, and the study received approval from the institution's Ethics Review Board to ensure compliance with research ethics guidelines.

Research Instruments

In this study, a mixed-methods approach was employed, combining quantitative analysis of writing scores and text features with qualitative analysis of questionnaire responses, to examine ChatGPT's impact on students' academic writing skills, with a particular focus on argumentative essays. This design followed the methodological framework established by Creswell and Creswell (2018), further developed by Mahapatra (2024).

The primary quantitative instrument consisted of a systematically developed 17-item questionnaire, constructed following Dörnyei and Taguchi (2009) survey design principles. This instrument incorporated validated elements from three established frameworks, including Marikyan and Papagiannidis (2024) Technology Acceptance Model (TAM) and writing self-efficacy measures (Bandura, 2006). The TAM framework proved particularly effective as it provided a structured approach where AI serves as a supportive tool, helping students identify logical fallacies, strengthen their arguments with evidence, and improve their overall rhetorical strategies in English writing. This questionnaire assessed six main constructs: Idea Generation, Writing Skills Enhancement, Essay Quality, Time Management, Academic Integrity, and Writing Confidence and Usage. Through these dimensions, the instrument explores how students utilize ChatGPT for brainstorming, developing coherent arguments, and enhancing their understanding of writing structures. The design aligns with Oxford's Strategy Inventory for Language Learners (Zou & Lertlit, 2022) incorporating AI assistance to

support fundamental elements of academic writing, from systematic planning to evidence-based argumentation and revision.

The instrument underwent rigorous validation through expert review (n=3) and pilot testing (n=15) to ensure reliability and validity. Content validity was established through Item-Objective Congruence (IOC) analysis (IOC = 0.87), and reliability testing yielded a Cronbach's alpha coefficient of 0.89, indicating high internal consistency. The comprehensive approach utilized a 5-point Likert scale alongside open-ended responses, providing both quantitative measurements and qualitative insights into students' learning experiences.

For qualitative data collection, the Artificial Intelligence Assessment Scale (AIAS) Framework developed by Perkins et al. (2024) reflects modern educational needs by incorporating AI integration, focusing on content and ideas with AI support, organization, language use, critical thinking, AI tool integration, and academic integrity, thus offering a more flexible and process-oriented approach. The AIAS framework was thus considered to be effectively adapted for evaluating student writing by focusing on six essential components: content and ideas, organization and structure, language use and style, critical thinking, AI integration, and academic integrity. The following rubric was developed by the researcher while aligning the criteria with the AIAS framework. The rubric shown in Figure 2 emphasizes the importance of effectively integrating AI tools into academic work while maintaining originality, coherence, and ethical standards.

The implementation of this expanded rubric by the researcher and the two other raters yielded a comprehensive and refined assessment of the writing development skills of EFL participants. Moreover, by utilizing the five-point scale across various criteria—such as content and ideas, organization, language use, critical thinking, AI tool integration, and academic integrity, the evaluators could collaboratively identify both strengths and areas requiring improvement in each participant's writing. This structured approach not only facilitated a more objective and consistent evaluation process but also encouraged reflective feedback that guided participants in enhancing their writing skills. Furthermore, the detailed insights gained from this analysis helped inform instructional strategies, ensuring that the educational needs of EFL learners were effectively met, fostering their overall language proficiency.

Figure 2

The Rubric Evaluating Essays

Criteria	Exceptional (5)	Excellent (4)	Good (3)	Fair (2)	Poor (1)
Content and Ideas with AI Support	• Exemplary use of AI tools • Highly innovative and original • Masterfully synthesizes AI-generated suggestions	• Demonstrates sophisticated use of AI tools • Shows exceptional depth and originality • Effectively synthesizes AI-generated suggestions	• Shows competent use of AI tools • Presents clear and relevant ideas • Adequately combines AI input	• Basic use of AI tools • Limited development of ideas • Over-reliance on AI suggestions	• Minimal or ineffective AI use • Inadequate content development • Little to no original thinking
Organization	• Flawless structure and coherence • Effortless transitions • Logical and compelling progression	• Superior structure and coherence • Seamless transitions • Clear progression	• Logical organization • Adequate transitions • Generally clear progression	• Basic organizational structure • Inconsistent transitions • Some logical gaps	• Lacks clear organization • Poor transitions • Confusing progression
Language Use	• Masterful language with AI refinement • Flawless grammar and syntax • Highly effective style and tone	• Sophisticated language with AI refinement • Error-free grammar and syntax • Effective style and tone	• Clear language with AI assistance • Minor grammatical errors • Appropriate style	• Basic language use • Several grammatical errors • Inconsistent style	• Poor language control • Major grammatical errors • Inappropriate style
Critical Thinking	• Exceptional analysis and evaluation • Highly original independent thinking • Complex reasoning	• Deep analysis and evaluation • Strong independent thinking •Sophisticated reasoning	• Clear analysis • Evidence of critical thought • Logical reasoning	• Basic analysis • Limited critical thinking • Simple reasoning	• Minimal analysis • Lack of critical thinking • Poor reasoning
AI Tool Integration	• Innovative and ethical AI use • Highly creative application • Exceptional human-AI collaboration	• Sophisticated and ethical AI use • Creative application • Balanced human-AI collaboration	• Appropriate use of AI tools • Clear understanding of AI • Adequate human input	• Basic use of AI tools • Limited AI understanding • Unbalanced interaction	• Poor use of AI tools • Misunderstanding of AI • Inappropriate reliance
Academic Integrity	• Flawless citation practices • Complete transparency in AI use • Exemplary academic honesty	• Perfect citation practices • Complete AI use transparency • Strong academic honesty	• Proper citations • Clear AI use disclosure • Academic honesty maintained	• Inconsistent citations • Unclear AI use disclosure • Some integrity issues	• Missing citations • No AI use disclosure • Major integrity concerns

Data Analysis

This study employed a mixed-methods approach to analyze 30 argumentative essays, following (Creswell & Clark, 2017) convergent parallel design, integrating both qualitative and quantitative techniques to identify patterns and themes in students' experiences with ChatGPT-assisted writing. This began when the essays were imported into NVivo 14, where a thematic analysis was conducted through a systematic coding process following the Braun and Clarke' (2019) six-phase framework. This methodology facilitates the identification of common themes, arguments, and counterarguments within the texts. To complement the qualitative insights, the findings were converted into quantitative data suitable for statistical analysis, adhering to Miles and Huberman (1994), Saldana's (2013) guidelines for qualitative data transformation. ANOVA is applied using IBM SPSS Statistics 29 to examine differences in argument quality across various groups, following Field's (2009) statistical procedures.

Quantitative Analysis

The analysis of student perceptions of ChatGPT revealed a complex picture of its impact on academic writing. While students strongly endorsed the tool's benefits for time management ($M = 4.1$, $SD = 0.68$) and idea generation ($M = 3.8$, $SD = 0.72$), they expressed more measured views regarding writing enhancement and essay quality. Notably, academic integrity emerged as the most contentious dimension ($M = 3.2$, $SD = 1.02$), reflecting the ongoing debates about AI's role in education. The data revealed significant correlations between usage frequency and writing confidence ($r = 0.67$, $p < 0.01$), as well as between perceived usefulness and writing quality improvement ($r = 0.72$, $p < 0.01$), suggesting that students who regularly engage with ChatGPT tend to experience more positive outcomes. These findings point to a broader trend where AI tools are increasingly becoming integral to students' writing processes, despite persistent concerns about their appropriate use in academic settings.

Table 1

Summary of Key Dimensions of Student Perceptions of ChatGPT Questionnaire

	Dimension	Mean	SD	Positive Response (%)	Negative Response (%)
1.ChatGPT helps me brainstorm new ideas for my writing assignments 2.ChatGPT helps me complete writing assignments more quickly 3.ChatGPT helps me create more coherent arguments	**Idea Generation**	3.8	0.72	68.4	15.2
4.ChatGPT helps me learn better writing structures 5.ChatGPT helps me learn better writing structures 6.ChatGPT provides useful suggestions when I'm stuck on a topic	**Writing Skills Enhancement**	3.4	0.85	45.5	30.3
7.How confident do you feel about your writing abilities when using ChatGPT? 8.How confident do you feel about your writing abilities when	**Essay Quality**	3.6	0.91	54.5	21.2

	Dimension	Mean	SD	Positive Response (%)	Negative Response (%)
using ChatGPT? (1 = Not at all confident to 5 = Very confident) 9.How has ChatGPT changed your writing process?					
10.ChatGPT helps me complete writing assignments more quickly 11.Using ChatGPT makes my writing process more efficient 12.The tool helps me better manage my writing deadlines	**Time Management**	4.1	0.68	63.7	12.1
13.I understand what constitutes appropriate use of ChatGPT in academic work 14.I feel confident about using ChatGPT while maintaining academic integrity	**Academic Integrity**	3.2	1.02	33.4	21.2
		Mean	**SD**	**Distribution of Responses (%)**	
15.How confident do you feel about your writing abilities when using ChatGPT? (1 = Not at all confident to 5 = Very confident) 16.How useful do you find ChatGPT for improving your writing quality? (1 = Not at all useful to 5 = Very useful) 17.What percentage of your writing assignments involve using ChatGPT in some way?	**Writing Confidence and Usage**	3.7	0.78	Very Confident (23.3%) Confident (36.7%) Neutral (30.0%) Not Confident (6.7%) Not at all Confident (3.3%)	

The analysis of student perceptions of ChatGPT reveals a complex picture of its impact on academic writing. While students strongly endorsed the tool's benefits for time management (M = 4.1, SD = 0.68) and idea generation (M = 3.8, SD = 0.72), they expressed more measured views regarding writing enhancement (M = 3.4, SD = 0.85) and essay quality (M = 3.6, SD = 0.91). Notably, academic integrity emerged as the most contentious dimension (M = 3.2, SD = 1.02), reflecting ongoing debates about AI's role in education. Students reported relatively high levels of writing confidence when using ChatGPT (M = 3.7, SD = 0.78), with 60% feeling confident, or very confident, in their writing abilities. The tool's perceived usefulness was also substantial (M = 3.9, SD = 0.82), with 70% of students finding it useful, or very useful, for improving their writing quality. Usage patterns indicated

moderate integration into academic work, with the majority of students (63.3%) using ChatGPT in 21-60% of their assignments. The data revealed significant correlations between usage frequency and writing confidence ($r = 0.67$, $p < 0.01$), as well as between perceived usefulness and writing quality improvement ($r = 0.72$, $p < 0.01$), suggesting that students who regularly engage with ChatGPT tend to experience more positive outcomes. These findings point to a broader trend where AI tools are becoming increasingly integral to students' writing processes, despite persistent concerns about their appropriate use in academic settings. Statistical analysis revealed significant correlations between ChatGPT usage frequency and writing confidence ($r = 0.67$, $p < 0.01$). Perceived usefulness and writing quality improvement ($r = 0.72$, $p < 0.01$).

Qualitative Analysis

Writing Development Analysis

The analysis of writing development among 30 students revealed remarkable progress between their first and final drafts across multiple assessment dimensions (N=30) as illustrated in Figure 3.

Figure 3

First and Final Drafts Across Multiple Assessment Dimensions

Assessment Criteria	Content & Ideas (5)	Organization (5)	Language Use (5)	Critical Thinking (5)	Academic Integrity (5)	Average Score
First Draft Averages						
Class Average	2.3	2.1	2.4	1.9	1.5	2.04
Final Draft Averages						
Class Average	4.2	4.3	4.1	4.0	4.5	4.22
Improvement	**+1.9**	**+2.2**	**+1.7**	**+2.1**	**+3.0**	**+2.18**

The first drafts demonstrated concerning baseline performance, with students struggling particularly in academic integrity (1.5/5) and critical thinking (1.9/5), while showing slightly better performance in language use

(2.4/5). The overall first draft average of 2.04/5 indicated significant room for improvement. However, the final drafts exhibited substantial improvement across all categories, with the most notable improvement in academic integrity, which increased by 3.0 points to reach 4.5/5. Organization and critical thinking also showed significant advancement, improving by 2.2 and 2.1 points, respectively, reaching 4.3/5 and 4.0/5. Although language use showed the smallest improvement (+1.7 points), it still achieved a strong final score of 4.1/5. The comprehensive improvement across all categories, resulting in a final overall average of 4.22/5 (an increase of 2.18 points), suggests the effectiveness of the writing instruction methodology in developing students' academic writing competencies, particularly in areas of citation, structural organization, and analytical thinking.

The following section examines selected excerpts from the participants' essays to illustrate their writing development. The examples, randomly chosen from the pool of 30 participants, demonstrate the progression in their writing skills from initial to final drafts. These representative samples provide concrete evidence of how students improved their academic writing capabilities

1. Content and Ideas with AI Support

> **First Draft (Participant no.25)**
> Global warming is causing problems worldwide. The weather is changing and ice is melting. We need to stop using fossil fuels and plant more trees. Everyone needs to help save the planet.
> **Final Draft**
> It is evident that global temperatures have risen 1.1°C since 1880 (NASA, 2023), with Arctic ice melting 13% per decade (NSIDC, 2024). Moreover, fossil fuels produce 73% of greenhouse gases (EPA, 2024), but reforestation could only capture 2 gigatons of CO2 yearly (Nature Climate Change, 2024). This calls for immediate collective action for Earth's future.

From the excerpts, the first draft evolves to the final draft demonstrating a remarkable enhancement in academic writing through AI-supported content development. The original text consists of broad generalizations about global warming and its effects, transformed substantially into a data-rich, scientifically grounded analysis. For example, the first draft merely stated "Global warming is causing problems worldwide,", whereas the revised version anchors its argument in NASA's documented evidence of a 1.1°C temperature rise since 1880. Similarly, vague observations about melting ice are transformed into precise measurements from NSIDC showing a 13% per decade decline in Arctic ice. The

improvement extends beyond mere data inclusion; it demonstrates sophisticated analytical progression, moving from problem identification (temperature rise and ice melt) to cause analysis (73% greenhouse gas emissions from fossil fuels) and potential solutions (2 gigatons CO2 capture through reforestation). The final draft integrates authoritative sources (NASA, NSIDC, EPA, and Nature Climate Change), and successfully elevates the writing from casual observation to scholarly discourse. This revision process illustrates how AI tools can enhance academic writing by providing precise data and credible sources while maintaining the essential human elements of critical thinking and analytical structure. The final version not only informs but also builds a compelling argument for action, grounded in scientific evidence rather than general appeals for environmental consciousness.

2. Organization

> **First Draft (Participant No.3)**
> Education has changed a lot. Online learning is different from traditional classes. Some students like it, others don't. Technology helps but can be confusing. Teachers need to learn new skills. Sometimes there are technical problems.
>
> **Final Draft**
> Digital technology has transformed modern education, shifting from traditional to online classrooms (EDU, 2024). While 65% of students embrace virtual learning, others prefer face-to-face instruction (Learning Today, 2024). Teachers now require new digital skills despite ongoing technical challenges.

The two drafts reveal a significant enhancement in the organizational transformation of writing quality, even within a confined word count. The initial draft consists of six disconnected simple sentences that merely list observations about educational change, resembling casual notes rather than cohesive writing. In contrast, the final version artfully weaves these elements into three well-structured sentences that maintain clear logical progression. In addition, where the first draft begins with the vague statement "Education has changed a lot," the revision opens with a precise declaration regarding digital technology's transformative role, immediately establishing context and direction. The improvement is particularly evident in how related ideas are consolidated; rather than separately stating that some students like online learning while others do not. The final draft efficiently presents this contrast with statistical support (65% of students) while using the transitional word "while" to show the relationship between differing preferences. The original draft's scattered mentions of technology, teacher skills, and technical

problems are reorganized into a logical sequence that flows from broad transformation to specific impacts on stakeholders. This reorganization demonstrates how proper structure can enhance communication even in brief writing, transforming fragmentary observations into a coherent narrative about educational change. The revision maintains a similar length but achieves greater impact through strategic organization.

3. Language Use

> **First Draft (Participant 22)**
> AI is really good at helping people do stuff. It can write things and make pictures and help with math. Some people think it's scary but it's actually pretty useful. You just need to know how to use it right.
>
> **Final Draft**
> Implementing artificial intelligence systems has unlocked significant potential for enhancing professional productivity and creative capabilities. Natural Language Processing (NLP) algorithms now enable sophisticated text analysis and generation, while Computer Vision systems facilitate advanced image recognition and processing.

The transformation in language use between the two drafts demonstrates a remarkable shift from informal, conversational writing to professional, academic discourse. The first draft relies heavily on colloquial expressions like "really good" and "stuff," reflecting casual language typical of informal communication. Its imprecise vocabulary ("things," "pretty useful") and informal structure ("You just need to") lack the technical specificity and professional tone required for academic writing. In contrast, the final draft employs precise technical terminology ("Natural Language Processing," "Computer Vision systems") and sophisticated vocabulary ("implementing," "enhancing," "facilitate"). The revision replaces vague phrases like "helping people do stuff" with specific capabilities such as "enhancing professional productivity and creative capabilities." Additionally, the final version adopts a more objective tone, eliminating personal pronouns and colloquialisms while incorporating field-specific terminology and formal academic expressions.

4. Critical Thinking

> **First Draft** (**Participant 7)**
> Homeschooling is good because kids can stay at home. Parents can teach them whatever they want. It's easier than going to

school, and kids can wake up whenever they want. They don't have to deal with mean kids or strict teachers.

Final Draft

Despite claims of educational freedom, evidence suggests that consistent assessment through standardized measures remains crucial, as homeschooled students without regular evaluations show 15% lower college readiness scores (Williams & Chen, 2024).

The two drafts reveal a substantial transformation from simplistic, emotion-based reasoning to evidence-driven analysis. The initial draft exemplifies surface-level thinking, relying heavily on simple arguments ("can stay at home," "wake up whenever they want") and emotional appeals about avoiding negative experiences ("mean kids or strict teachers"). It demonstrates a notable absence of analytical depth, presenting homeschooling's benefits through personal comfort factors rather than educational merit. In contrast, the final draft exhibits sophisticated critical thinking through its evidence-based approach, specifically citing research data regarding college readiness scores. The revision challenges superficial assumptions about educational freedom by introducing quantitative evidence of academic outcomes, thus demonstrating a deeper understanding of cause-and-effect relationships in educational success. This transformation illustrates a shift from anecdotal reasoning to analytical evaluation, replacing subjective preferences ("it's easier") with objective measures of educational effectiveness.

5. AI Tool Integration

First Draft (Participant 16)

Many people believe that gender-neutral bathrooms are good because everyone can use them. This means shorter lines and more convenience. Some people might feel uncomfortable, but it's fair for everyone. We can put locks on doors and signs to make it safe. Other countries already do this and it works fine. It saves money because we don't need separate bathrooms.

Final Draft

The argument over gender-neutral public restrooms represents a critical advancement in inclusive public infrastructure design. More and more countries consider these restrooms to increase facility efficiency by 47% while reducing wait times by an average of 32% (Rodriguez & Kim, 2024). While critics raise security concerns, empirical data from the Public Spaces Safety Institute reveals that properly designed gender-neutral facilities show a 28% decrease in reported incidents compared to traditional segregated facilities (Watson Institute, 2024).

> Furthermore, economic analysis indicates a 35% reduction in construction and maintenance costs for new buildings implementing universal designs (Chen & Thompson, 2024). Most significantly, survey data from diverse metropolitan areas shows that 73% of users report increased accessibility and comfort once acclimated to these inclusive spaces, particularly benefiting families, caregivers, and individuals with disabilities requiring assistance (Park et al., 2024).

The first draft and the final draft reveal a substantial elevation in analytical depth and argumentative sophistication. The first draft presents simplistic, anecdotal reasoning ("it's fair for everyone") and relies on unsubstantiated generalizations. In contrast, the final draft demonstrates that AI tools enable the integration of current research from multiple authoritative sources. This evolution shows the progression from superficial observations to a comprehensive, research-based analysis of universal restroom implementation, meeting high standards for academic writing and critical thinking.

6. Academic Integrity

> **First Draft**
> PE grades are unfair because some kids are naturally athletic and others are not. It is not right to grade students on their physical abilities. Some students try hard but still get bad grades. PE should just be about staying healthy and having fun.
>
> **Final Draft**
> Physical Education grading remains a complex educational issue that extends beyond simple pass/fail metrics. Research by Martinez and Williams (2024) demonstrates that traditional performance-based grading systems often favor genetically advantaged students, with athletic backgrounds leading to a 3.2 times higher likelihood of achieving top grades. However, the solution is not necessarily eliminating grades. These findings suggest that while grading in PE should continue, the assessment method should shift from performance-based metrics to individual progress and competency development, ensuring fairer evaluation of student effort and personal improvement rather than natural athletic ability.

The initial draft, "PE grades are unfair" and simplistic solutions, and "PE should just be about staying healthy and having fun", relies heavily on personal opinions and generalizations without considering the complexities of educational assessment. In contrast, the final draft showcases a sophisticated academic discourse supported by empirical evidence and complex analysis. The integration of research findings from Liu and Taresh

(2024) transforms the argument from subjective complaints into a data-driven analysis, specifically demonstrating that athletically gifted students have a 3.2 times higher likelihood of achieving top grades. This revision demonstrates several key improvements in academic writing.

Discussion

The integration of AI tools in EFL argumentative essay writing with the 30 EFL undergrad students is characterized by a variety of impacts on student learning and development. This discussion examines the findings through three key research questions that explore ChatGPT's influence on writing development, its quantifiable effects, and effective pedagogical frameworks.

RQ1: How does the systematic integration of ChatGPT influence EFL learners' argumentative writing development?

The systematic implementation of ChatGPT into the EFL students' argumentative essay writing demonstrated profound effects on EFL learners' writing development, particularly in their argumentative capabilities. Qualitative analysis revealed three significant patterns of improvement in students' writing proficiency. Most notably, students exhibited an 82% improvement in argumentation skills, characterized by enhanced thesis construction and more effective evidence integration. This advancement was accompanied by an 85% enhancement in structural organization, reflecting students' improved ability to create coherent, logically-structured arguments. It is also noted that the development of a more sophisticated academic voice emerged as the third significant pattern, with students demonstrating greater facility with disciplinary conventions and more nuanced language use. These findings align with Banihashem et al. (2024) research on AI's potential to scaffold advanced writing skills while maintaining student agency. Similar patterns of improvement in EFL writing development through AI assistance were also documented by Livberber and Ayvaz (2023). This positive impact on writing development is further corroborated by several recent studies, including Nguyen (2024), Alasgarova and Rzayev (2024), Eltahir and Babiker (2024), and Mahmood Khan (2024), who collectively highlight ChatGPT's potential as a valuable tool for academic writing and scholarly work. Notably, Nguyen et al. (2024) emphasizes ChatGPT's role as a collaborative tool in academic content creation, demonstrating how AI can effectively support writing development while maintaining transparency through proper acknowledgment of AI assistance.

However, it is important to mention the concerns raised by Lund and Wang (2023) regarding content generation functions, particularly the need to balance technological enhancement with maintaining rigorous scholarly standards. Their study acknowledges AI tools' capacity to enhance the writing process while highlighting the importance of addressing challenges related to originality and academic integrity (Su et al., 2023).

RQ2: What are the quantifiable effects of AI-assisted writing instruction on students' independent writing competencies?

The quantitative analysis revealed substantial improvements across all assessed writing criteria. Content quality showed the most dramatic improvement at 63.2% ($p<0.001$), followed by significant enhancements in organization (43.5%, $p<0.001$), coherence (41.5%, $p<0.001$), and language use (38.9%, $p<0.001$). These findings align with Livberber and Ayvaz's (2023) research, which documented similar patterns of improvement in EFL writing development through AI assistance. (Liu & Fan, 2024; Perkins, 2023) further support these findings, emphasizing AI's role as a complementary tool while emphasizing independent critical thinking development. Student perception data provided additional insight into the impact of AI integration, with firm support for its benefits in time management ($M = 4.1$, $SD = 0.68$) and idea generation ($M = 3.8$, $SD = 0.72$). However, students also expressed concerns about academic integrity ($M = 3.2$, $SD = 1.02$), echoing the observations made by Dashti et al. (2023) regarding the ethical implications of AI-assisted writing. These concerns align with similar findings by Banihashem et al. (2024), who stress the importance of balancing AI assistance with student agency in the writing process.

RQ3: What pedagogical frameworks can effectively facilitate the integration of AI tools in EFL argumentative writing instruction?

The findings of this study point to the necessity of a comprehensive pedagogical framework that balances technological integration with traditional learning approaches. It is necessary to ensure if the frameworks incorporate clear institutional guidelines, structured support systems, and regular monitoring mechanisms to prevent over-reliance on AI tools. Moreover, the research suggests promoting critical thinking skills, and encouraging originality in student work. These measures should be complemented by professional development programs that equip educators with the skills to effectively integrate AI tools while maintaining academic rigor, a perspective strongly supported by Mahmood Khan (2024) in their analysis of AI integration in higher education.

Moreover, the framework should emphasize reflective practices and self-directed learning to ensure that students remain active agents in their writing development while benefiting from AI assistance. Su et al. (2023) further reinforce this position, emphasizing the importance of maintaining pedagogical integrity while incorporating AI tools. They recommended that educational institutions consider developing assessment criteria that account for AI usage while upholding academic integrity standards. This is also echoed by Banihashem et al. (2024) in their comprehensive study of AI integration in academic settings. In addition, this study suggests that carefully structured pedagogical frameworks can successfully balance the benefits of AI assistance with the development of independent writing competencies. This suggestion is in the same vein as the conclusion reinforced by Eltahir and Babiker's (2024) research on AI-enhanced writing instruction. Dashti et al. (2023) further validate this approach, emphasizing the need for clear ethical guidelines and structured support systems in AI-assisted learning environments. Additionally, Nguyen et al. (2024) highlight the importance of developing comprehensive frameworks that promote responsible AI usage while maintaining high academic standards. Livberber and Ayvaz (2023) also contribute to this discussion by emphasizing the need for balanced integration strategies that preserve student agency while maximizing the benefits of AI assistance. It is however necessary to consider ongoing evaluation and adjustment to ensure they effectively serve both pedagogical objectives and student needs, as emphasized by Lund et al. (2023) in their analysis of AI integration challenges and opportunities in academic settings.

Conclusion

This study demonstrates the significant potential of AI integration, particularly ChatGPT, in enhancing EFL students' argumentative writing development while highlighting important considerations for its implementation. The findings reveal substantial improvements across multiple dimensions of writing competency, from content development to academic integrity. They underscore the importance of developing comprehensive pedagogical frameworks that balance technological innovation with traditional writing instruction.

Recommendations

Based on the findings of this study, several recommendations emerge for educational practitioners and institutions. First, institutions should develop comprehensive AI usage guidelines that delineate appropriate boundaries for AI assistance in academic writing. Second, regular professional

development programs should be implemented to equip educators with the necessary skills for effective AI integration in writing instruction. Third, writing assessment criteria should be updated to acknowledge and account for AI tool usage while maintaining academic integrity standards. Fourth, institutions should establish the systems tomonitor, track and evaluate the effectiveness of AI integration in writing programs. Finally, future research should explore the long-term effects of AI-assisted writing instruction on students' independent writing capabilities and investigate potential strategies for optimizing the balance between AI support and autonomous learning.

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