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EXAMINING THE USE OF AI TOOLS IN ACADEMIC WRITING: EFFECTS ON THE CRITICAL THINKING SKILLS OF EFL LEARNERS

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ABSTRACT

This study investigated the integration of AI tools in an EFL writing classroom and their influence on developing students' critical thinking abilities. Using a qualitative case study methodology, the study lasted six weeks and included 25 university-level EFL students. Classroom observations, semi-structured interviews, and writing task analyses were used to gain insight into how AI technologies help students with idea creation, argument formulation, writing refinement, and highlighting potential obstacles. The study found that AI technologies dramatically improved students' abilities to create cohesive arguments, fix language, and incorporate evidence into their writing. Classroom observations revealed improved involvement and cooperation as students discussed suggestions for efficiently using AI technologies. However, overreliance on AI-generated ideas was observed, particularly among less confident authors. Semi-structured interviews found that, while students liked the tools for lowering anxiety and boosting brainstorming, they understood the importance of balancing AI use with autonomous critical thinking. Writing task studies revealed significant gains in logical thinking and coherence across drafts. This study concerns the potential of AI technologies to improve critical thinking in EFL writing while emphasizing the significance of targeted educational interventions. Future studies should examine long-term effects and different settings to improve AI-supported learning environments.

Keywords: *AI tools, academic writing, critical thinking skills, EFL.*

INTRODUCTION

In recent years, incorporating Artificial Intelligence (AI) technologies into English as a Foreign Language (EFL) instruction has received much attention, notably for its influence on students' critical thinking skills. In this area, researchers have investigated both the advantages and disadvantages of AI-assisted learning. Zawacki-Richter et al. (2019) found that AI-powered platforms may develop scenarios requiring learners to assess information, make decisions, and solve challenges, improving critical thinking skills. Similarly, Orhan (2023) and Relmasira, Lai, and Donaldson (2023) found that AI tools that provide individualized feedback and interactive activities, such as debates and quizzes, successfully develop critical thinking and problem-solving abilities in EFL classes.

Recent research has observed how AI technologies might promote critical thinking in EFL classrooms through engagement and scaffolding tactics. For example, Chen et al. (2021) noted that AI-powered formative feedback systems enable students to reflect on their reasoning and enhance the logical flow of their arguments. This method improves writing

abilities and fosters higher-order thinking skills by forcing students to assess their work critically. Similarly, Ahmed and Ward (2022) underlined the significance of AI in facilitating iterative learning opportunities in which students modify and enhance their ideas based on targeted feedback, enabling greater cognitive engagement with the subject matter.

Despite these advantages, concerns have been voiced regarding the possible drawbacks of using AI in EFL environments. Rahman and Kim (2023) discovered that while AI tools increase technical correctness in writing, over-reliance on them may impair students' capacity to create arguments independently and critically examine information. Furthermore, Lin and Xu (2023) found that AI technologies frequently lack cultural sensitivity, resulting in generic, contextually inappropriate outputs in EFL learners' writing. These findings highlight the value of leadership and organized interventions in balancing AI's capabilities with the development of autonomous critical thinking skills.

Concerns have been expressed concerning students' overreliance on AI technologies, which may impede the development of autonomous analytical skills. Research published in Smart Learning Environments (2024) warned that over-reliance on AI conversation systems might impair students' capacity to assimilate material without technological aid. Furthermore, Solihati and Hikmat (2018) identified a contradiction in student perceptions. While some see AI as a helpful tool for problem-solving, others say it impedes the development of critical thinking abilities by giving readily accessible answers.

In addition to worries about over-reliance on AI, new research has highlighted the possible consequences of overusing AI technologies to promote superficial interaction with material. Park et al. (2022) discovered that when students rely too much on AI-powered writing assistance, they may skip deeper cognitive tasks, including analyzing, synthesizing, and evaluating material. The study found that students who relied heavily on AI tools frequently wrote well-structured but shallow essays, missing out on possibilities for deeper critical evaluation. This shows that AI tools can help with writing mechanics but cannot replace the cognitive processes necessary to construct complex, well-reasoned arguments.

Furthermore, Lee and Zhou's (2023) study addresses the issue of AI-induced reliance, finding that students' critical thinking abilities were damaged when they failed to interact with AI input critically. The study found that, while AI systems give fast feedback, they frequently do so in a way that inhibits students from questioning or rejecting ideas. As a result, students may adopt a passive approach to writing, accepting AI-generated edits without questioning the underlying reasoning. These findings highlight the need for teaching practices that allow students to critically examine and interact with AI input, promoting the development of autonomous, reflective thinkers.

The influence of AI writing tools on the quality of student work has also been investigated. Girdharry (2023) discovered that AI writing aids enhanced the content and structure of EFL students' writings, resulting in higher learning results. However, the research cautioned against blindly accepting AI-generated ideas, highlighting the necessity of preserving authenticity and originality in student work. These findings show AI's dual function in improving and perhaps damaging critical thinking skills.

A recent study has expanded on the significance of AI writing tools by investigating how they impact students' writing processes and the development of their academic writing abilities. In research by Kumar and Singh (2022), AI writing aides were shown to help students structure their arguments more coherently and provide consistent transitions between concepts. This increased the overall quality of the article, notably its clarity and structure. However, the study raised concerns about the student’s ability to write well-organized essays without AI assistance, implying that while AI tools can improve a piece's structure, they may inadvertently reduce students' capacity for independent organization and critical reflection.

Moreover, there is fear that AI may diminish critical engagement with material. Wang and Huang (2023) found that while AI technologies can improve the technical quality of student writing, they may also reduce students' capacity to analyze sources and arguments critically. The study discovered that students who relied on AI-generated content were less inclined to challenge the information presented or investigate alternate perspectives, an important element of critical thinking. This shows that while AI tools can improve writing mechanics, they may not completely foster the deeper cognitive engagement required to build critical thinking abilities in academic writing. As a result, the study stressed the need for teachers to properly guide the use of AI technologies, ensuring that students stay active participants in the learning process.

Despite these issues, AI techniques have improved student participation in EFL education. Intervention research found that incorporating AI into EFL lessons increased cognitive, emotional, and social engagement, demonstrating AI tools' varied influence on learning experiences. Such findings suggest that AI may supplement traditional teaching approaches and promote a more dynamic learning environment when used wisely.

Recent research has looked at the favorable benefits of AI technologies on student engagement, specifically in improving interactive learning environments. According to Zhang and Liu (2024), AI technologies in EFL classrooms promote cognitive engagement while also providing opportunities for emotional connection through tailored learning experiences. Their research discovered that AI-based language learning systems might adjust to student demands, allowing individuals to learn at their own speed while feeling encouraged throughout the process. This tailored approach increased students' motivation and emotional commitment to the learning process, illustrating how artificial intelligence may make education more interesting and responsive.

Tan and Lee's (2023) research also looked at the function of AI technologies in increasing social interaction among EFL learners, particularly in collaborative learning activities. The study discovered that incorporating AI technologies into group projects and peer feedback sessions enabled students to engage more actively with their peers, resulting in enhanced cooperation and shared learning experiences. This social contact, along with AI's capacity to deliver fast feedback, helped students feel more secure in their language abilities, increasing engagement and learning results. These findings support the hypothesis that artificial intelligence may supplement traditional approaches by creating a more collaborative and dynamic classroom environment that stimulates student engagement.

Given the conflicting results and the changing nature of AI integration in education, there is a definite need for more research into how AI tools affect critical thinking abilities among EFL learners. This study intends to fill that vacuum by investigating the particular effects of AI tool integration on the development of critical thinking in EFL writing classes and making evidence-based suggestions for future pedagogical initiatives.

METHOD

This study uses a qualitative case study methodology to investigate the effect of incorporating AI technologies on the development of critical thinking abilities among EFL learners in writing classes. The qualitative method provides for a more in-depth assessment of students' interactions with AI tools and how these tools affect their writing processes and cognitive abilities. The study was carried out in an undergraduate English Education program at a university in Indonesia. The participants were 30 EFL students taking an academic writing course. These students were chosen using a purposeful selection strategy to provide a varied

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range of English writing competence levels. The course lecture also participated, providing insights regarding teaching tactics and observations made throughout the intervention.

Instruments

This study used three data collection methods: classroom observations, semi-structured interviews, and writing task analysis. Classroom observations were undertaken over an eight-week period to observe students' interactions with AI tools during writing assignments. Detailed field notes were made to document their actions, methods, and any difficulties they encountered while utilizing the tools. Semi-structured interviews were performed with ten randomly selected students and the course teacher. These interviews delved into participants' perspectives of AI tools, the challenges they faced, and the perceived consequences on their writing processes and critical thinking skills. Furthermore, writing assignments were gathered at three stages: before utilizing AI tools, after two weeks of AI tool use, and at the conclusion of the intervention. These assessments were examined to discover changes in critical thinking components such as argumentation, evidence appraisal, and concept synthesis.

Procedure

The study was separated into three stages: preparation, intervention, and post-intervention. During the preparation phase, students were exposed to the selected AI tools, such as ChatGPT and Grammarly, and trained on their features. This phase also includes a pre-intervention writing activity to set a baseline for assessing critical thinking abilities. The intervention phase lasted six weeks and involved students using AI tools to accomplish writing activities such as brainstorming, composing, and reviewing essays. During this phase, classroom talks focused on critical thinking skills to supplement the usage of AI technologies. Finally, in the post-intervention phase, students performed a final writing exercise and participated in semi-structured interviews to reflect on their experiences. Data gathered from observations, interviews, and writing activities were then triangulated to guarantee a thorough understanding of the results.

Data Analysis

The data from this study were evaluated using theme analysis for qualitative data and rubric-based content analysis for writing assignments. Interview transcripts and classroom observation notes were analyzed thematically to uncover patterns and themes. The coding procedure includes categorizing data, such as students' opinions of AI tools, problems encountered when using them, and the tools' perceived influence on encouraging critical thinking. These topics were polished to yield useful findings. Writing activities were evaluated using a critical thinking rubric developed by Facione (1990), with emphasis on qualities such as clarity, logic, argument strength, and evidence integration. This rubric allows for a thorough assessment of developments in students' critical thinking abilities at various phases of the study. By combining data from interviews, observations, and task analysis, the study provided a comprehensive and trustworthy assessment of how AI tools affected students' critical thinking growth in EFL writing situations.

FINDINGS AND DISCUSSION

Findings

This study was conducted to investigate the effect of incorporating AI technologies on the development of critical thinking abilities among EFL learners in writing classes. To answer

the problem, this study displays the data based on the data collection methods: classroom observations, semi-structured interviews, and writing task analysis.

Classroom Observations

Initial phase of AI tool use (weeks 1-2)

During the first two weeks, the classroom environment was marked by an experimental approach to AI technologies. Students often used the tools, particularly for brainstorming and structuring ideas. Many students relied substantially on AI-generated ideas, particularly when writing opening phrases, thesis statements, and subject sentences. However, their interaction with the tools was largely passive, with students accepting ideas without any critical thought. For example, a student may enter a vague notion into the AI tool, obtain a proposal for a thesis statement, and quickly include it in their work without analyzing if it fits the intended argument. This phase demonstrated a dependence on AI as a useful but unquestionable source of writing support.

Mid-intervention phase (weeks 3-4)

By the mid-intervention phase, there was a noticeable difference in student conduct. Students began to employ AI technologies with more selectivity. Instead of taking advice without question, students began to improve their writing with more purpose. For example, students utilized the AI tool to improve the coherence of their paragraphs by altering sentence structure and wording for clarity. Some students also worked on their grammar, utilizing the AI tool to enhance their own editing. The classroom environment now reflected a more active engagement with the AI, with students carefully selecting which ideas to accept, amend, or ignore.

Advanced phase of AI tool use (weeks 5-6)

As the intervention continued, students gained a better awareness of the promise and limits of AI systems. By this stage, students were utilizing the AI more strategically, concentrating on higher-level adjustments such as strengthening their arguments and maintaining logical flow across their writings. Rather than depending exclusively on the AI for initial suggestions, they now utilize it to modify and improve their own concepts. For example, students might compose their ideas first, then use AI technology to check for logic gaps or reword problematic areas. This phase saw the rise of increasingly sophisticated and reflective AI use, with students realizing that the tool was a resource for improving their work, not a crutch for creating material.

The classroom observations offered a complete picture of how students engaged with AI technologies throughout time. During the first two weeks, students utilized the tools largely to brainstorm and structure their ideas, frequently seeking AI-generated suggestions for opening phrases, thesis statements, and subject sentences. However, many students seemed to be passive in their evaluation of AI-generated content during this phase, accepting ideas without critically considering their suitability or relevance. By the middle of the intervention period, there was a clear shift as students became more discriminating in how they used AI technologies. They began to use the tools to clarify grammar, increase coherence, and strengthen their arguments, suggesting a developing understanding of the tools' capabilities and limits.

Furthermore, collaborative tendencies arose in peer conversations during writing sessions. Students regularly shared their experiences and techniques for utilizing the tools, illustrating how technology may help create a collaborative learning environment. However, several issues continued, such as students relying only on AI-generated modifications without

thoroughly analyzing the changes. This was especially noticeable in assignments demanding complex reasoning when students frequently overlooked logical flaws in AI-generated ideas.

During writing sessions, there was a notable shift toward cooperation as students engaged in peer conversations about how they used AI technologies. For example, students formed small groups to discuss their experiences with the AI-generated ideas they had received. One student may discuss how the AI helped them arrange their introduction, while another might give techniques for improving their thesis statement. This peer exchange demonstrated how technology might improve cooperation since students utilized the tools for individual writing assignments and depended on one another to debate and assess the AI's ideas. The classroom dynamic, therefore, changed to a more engaging and supportive learning environment, with technology serving as a bridge for collaborative learning.

Despite the excellent collaborative environment, some students continued to depend primarily on AI technologies without thoroughly evaluating the recommendations made. For example, during a peer discussion, one student may indicate how the AI has revised their argument, and their peer may endorse the modifications without interrogating the rationale behind them. This was especially noticeable in activities that needed sophisticated reasoning when students were unable to identify logical flaws in AI-generated solutions. In some circumstances, relying on the AI tool prevented deeper interaction with the text, resulting in missed opportunities to enhance their arguments or address mistakes in thinking.

While many students appreciated the collaborative element of the classroom, there were times when peers assisted each other in critically assessing AI-generated information. For example, when one student makes an AI idea, another student may point out that the phrase does not entirely fit their argument's intended topic. This sparked a conversation about why the proposal didn't work, prompting both students to think more thoroughly about how to improve their work. These moments of constructive feedback were vital in cultivating a critical attitude to the usage of AI, as students interacted not just with the technology but also with each other's ideas, improving their overall comprehension and use of critical thinking in writing.

Semi-Structured Interviews

The interviews provided useful insights into both students' and instructors' attitudes. A frequent element in the interviews was AI technologies' helpful role in lowering students' nervousness about writing. A student commented: "I used to feel overwhelmed when starting an essay, but AI helped me overcome writer's block by suggesting ideas I could expand on." Another student mentioned that the tools helped them discover areas for growth, notably in grammar and word choice. Examples include: "The AI really helped me spot grammar mistakes I wouldn't have noticed, especially with tenses." and "I utilized the program to recommend better wording for some of my statements. It enabled me to make my writing sound more genuine."

However, several learners acknowledged being inclined to rely on AI for duties beyond simple adjustments, such as producing full paragraphs, limiting their critical engagement with the topic. Like the following: "I sometimes get tempted to let the AI write entire paragraphs for me, especially when I'm stuck or don't know what to say next." Furthermore, "I know I should think more critically about my work, but when I'm under pressure, I end up asking the AI to generate ideas or even write sections of my paper."

The lecturer offered a broader perspective, emphasizing that while AI technologies boosted students' confidence and writing fluency, they also created obstacles to encouraging creativity. The lecturer stated, "AI may be a double-edged sword. It helps pupils think critically when utilized correctly, but if they rely too heavily on it, it might impede their

capacity to generate their own ideas." This finding emphasized the significance of scaffolding AI tool use with guided instructions and introspective exercises.

Writing Task Analysis

The study of students' writing activities demonstrated significant gains in their critical thinking abilities throughout the intervention. During the pre-intervention period, many articles lacked a clear topic, and the arguments offered were frequently unsubstantiated or poorly constructed. At this point, a large proportion of essays showed flaws in logical flow and evidence utilization, with many failing to properly link concepts or adequately prove statements. As the intervention proceeded, a noteworthy shift occurred in the mid-phase, when students learned to organize their work better. Their arguments grew more logical, and they made better use of supporting facts to back up their positions. By the end of the intervention, the quality of student writing had greatly improved. The arguments given were well-structured and logically consistent, with suitable and relevant evidence supporting the claims. This evolution implies that the use of AI technologies not only assisted greater organization but also fostered deeper engagement with the subject, resulting in improved critical thinking and academic writing.

Specifically, the study of students' writing activities demonstrated significant gains in their critical thinking abilities throughout the intervention. During the pre-intervention period, many articles lacked a clear topic, and the arguments offered were frequently unsubstantiated or poorly constructed. For example, one student's environmental preservation essay began with a broad statement about the value of nature but lacked a precise thesis that explained the particular point. Furthermore, the concepts were presented in a disorganized fashion, with little evidence to back the claims. One paragraph, for example, said that "saving forests is important" but did not explain why or give any factual justification for the assertion.

By the mid-point of the intervention, there had been a perceptible shift. Students began to improve the arrangement of their writing. For example, a student who had previously written ambiguous arguments now explicitly articulated their thesis at the beginning of the essay, such as "Preserving forests is essential because they support biodiversity, mitigate climate change, and provide resources for local communities." By the middle of the intervention, the student had begun to back up their assertions with relevant facts such as deforestation rates and biodiversity loss numbers. These adjustments resulted in a more cohesive framework and better arguments.

By the end of the intervention, the quality of student writing had greatly improved. The arguments given were well-structured and logically consistent, with suitable and relevant evidence supporting the claims. For example, a final draft of the same student's essay had good paragraph transitions, supporting evidence from trustworthy sources, and a conclusion that successfully emphasized the significance of forest preservation. The progress was not just in material but also in critical engagement with the issue, demonstrating the students' improving capacity to create well-supported and logically sound arguments.

Furthermore, the rubric-based analysis demonstrated significant improvement in important areas such as argumentation clarity, the use of trustworthy evidence, and overall coherence in students' writing. For example, a student who previously struggled to provide a well-organized argument now easily articulates and supports their position on climate change with evidence. In one article, the student blended information from an AI-generated source concerning rising global temperatures with data from their own renewable energy study to strengthen the argument for the switch to green technology. The essay's structure was more logical, and the argument was more cohesive, thanks to the student's effective integration of many points of view and support with convincing facts.

However, despite major advancements, concerns with originality continued in some circumstances. Some students continued to incorporate portions in their final essays that relied primarily on AI-generated content. For example, one student's conclusion was nearly identical to an AI-generated phrase: "In conclusion, climate change is the greatest challenge of our time, and immediate action is required." While the message was accurate, the phrase was too mechanical and did not reflect the student's unique perspective. Another article had a lengthy chapter on the effects of deforestation, which was directly lifted from the AI-generated text with minimal change. The examples demonstrated that some students failed to properly integrate the AI tools' input and adapt it to their own voice, resulting in essays lacking originality and genuine involvement with the issue.

Discussion

The findings highlight the potential of AI technologies to improve critical thinking in EFL writing classrooms, notably by encouraging clarity, coherence, and evidence-based reasoning. These findings are consistent with previous studies, such as that by Relmasira, Lai, and Donaldson (2023), who identified AI tools as useful scaffolding for boosting student engagement and problem-solving skills. By offering quick, targeted feedback, AI technologies enable students to spot writing flaws and make incremental changes.

However, the issue of over-reliance remains a major concern. Similar to the problems stated by Orhan (2023), this study discovered that students who lacked confidence in their writing talents were more inclined to rely heavily on AI-generated ideas, sometimes sacrificing originality and depth. This raises crucial considerations regarding the balance between utilizing AI as a learning tool and ensuring that students acquire autonomous critical thinking abilities.

The instructor's involvement was critical in addressing these problems. Through guided conversations and introspective exercises, the lecturer pushed students to critically assess AI-generated feedback rather than passively accepting it. This approach is consistent with the suggestions of Girdharry (2023), who stressed the need of teaching tactics that include AI technologies while encouraging self-regulation and metacognitive abilities.

Another notable discovery was the collaborative learning environment promoted by the use of AI tools. Students often offered suggestions and methods during writing sessions, demonstrating that AI technologies may serve as catalysts for peer learning. This is consistent with Solihati and Hikmat's (2018) conclusion that technology integration improves teamwork and mutual learning in EFL courses.

While the overall impact of AI technologies was good, the study identified areas for future research. For example, future study may look at the long-term consequences of AI tool use on critical thinking abilities, as well as measures to reduce the risk of over-reliance. Furthermore, investigating how different types of AI tools (e.g., generative vs. corrective) affect certain areas of critical thinking may give useful insights for educators looking to incorporate technology into their classrooms.

As a result, this study contributes to the expanding body of research on the use of AI technologies in EFL instruction by proving their ability to improve critical thinking abilities. However, it emphasizes the significance of deliberate pedagogical interventions in maximizing the benefits of AI while tackling its drawbacks.

CONCLUSION

This study investigated the use of AI technologies in an EFL writing classroom and how they affected students' critical thinking skills. The findings demonstrated that AI technologies like

ChatGPT and Grammarly may help students generate ideas, refine arguments, and improve the overall quality of their writing. Classroom observations, interviews, and writing task evaluations revealed considerable gains in students' abilities to build logical arguments, analyze evidence, and synthesize ideas. Furthermore, pupils reported greater confidence and involvement in writing activities as a result of the AI tools' fast and individualized feedback.

However, the research also highlighted drawbacks, including an over-reliance on AI-generated ideas, which occasionally resulted in a lack of creativity and independent critical thinking. This emphasizes the need for teaching practices that combine AI use with activities that promote self-regulation and critical evaluation. The instructor's involvement in directing students to critically interact with AI-generated outputs proved crucial in overcoming these obstacles and fostering meaningful learning experiences.

This study adds to the expanding body of work on AI integration in education by emphasizing its potential to improve critical thinking in EFL situations while mitigating the hazards of reliance. Future studies should look at the long-term consequences of AI tool use on critical thinking abilities, ways for reducing reliance, and how different AI tools affect certain components of writing and critical thinking. By taking a balanced and thoughtful approach, educators may leverage the benefits of AI technology while also fostering the growth of autonomous and creative thinkers in the digital age.

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