



BEYOND THE CHATBOT: DEVELOPING AI
PROMPT LITERACY TO ENHANCE EFL LEARNERS'
AUTONOMOUS WRITING AND CRITICAL
THINKING SKILLS.

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ABSTRACT

The rapid integration of Generative Artificial Intelligence (GenAI) in education has shifted the pedagogical focus from merely restricting AI use to fostering students' ability to interact with it critically. However, empirical research on "AI prompt literacy" - the skill of designing, refining, and evaluating AI prompts - remains scarce, particularly in English as a Foreign Language (EFL) contexts. This mixed-methods study investigated the impact of an 8-week AI prompt literacy intervention on EFL learners' writing autonomy and critical thinking skills. The participants comprised 60 undergraduate EFL students at a university in Uzbekistan, divided into an experimental group ($n=30$) and a control group ($n=30$). Quantitative data were collected using pre- and post-tests, including a Writing Autonomy Questionnaire and a Critical Thinking Disposition Inventory, while qualitative data were gathered through semi-structured interviews. Quantitative results indicated that the experimental group showed statistically significant improvements in both writing autonomy ($p < .01$) and critical thinking ($p < .05$) compared to the control group. Qualitative thematic analysis revealed that prompt literacy training transformed students' perception of AI from a "ghostwriter" to a "Socratic collaborative partner," thereby enhancing their self-regulated learning. The study concludes that integrating prompt engineering into EFL



writing curricula is essential for cultivating critical digital literacy. Implications for pedagogy and future research are discussed.

Introduction

The advent of Generative Artificial Intelligence (GenAI), particularly Large Language Models (LLMs) like ChatGPT, has fundamentally disrupted the landscape of English as a Foreign Language (EFL) education. Initially met with apprehension regarding academic integrity and plagiarism, the pedagogical paradigm is rapidly shifting towards the ethical and effective integration of AI (Yan et al., 2023). However, a critical gap remains in how learners interact with these tools. While many students use GenAI as a shortcut to generate text, this passive consumption fails to foster language acquisition. To mitigate this, recent scholarship has emphasized the need for “AI prompt literacy” - the cognitive and technical ability to formulate, iterate, and critically evaluate prompts to elicit desired, high-quality outputs from AI (Kohnke et al., 2023). In the context of L2 writing, prompt literacy is not merely a technical skill; it is a profound cognitive exercise. Crafting an effective prompt requires learners to articulate their ideas clearly, analyze the AI’s generated output for linguistic and logical accuracy, and iteratively refine their inputs. This cyclical process inherently demands critical thinking and self-regulation, which are core components of learner autonomy (Benson, 2011). Despite this theoretical alignment, empirical studies examining how explicit instruction in AI prompt literacy affects EFL learners’ writing autonomy and critical thinking are virtually non-existent, especially in expanding-circle contexts like Central Asia, where educational traditions often remain heavily teacher-centered. Therefore, this study aims to bridge this research gap by investigating how an AI prompt literacy intervention affects EFL learners’ writing autonomy, its impact on students’ critical thinking dispositions, and how EFL learners perceive the role of AI prompt literacy in their writing process.

Literature Review

Early responses to GenAI in education were predominantly restrictive, with many institutions banning AI tools outright. However, scholars now argue that banning AI is both impractical and pedagogically counterproductive (Perkins, 2023). Instead, the focus has shifted to AI literacy, with a particular emphasis on AI prompt literacy - a subset of AI literacy that involves understanding how LLMs process information and mastering the art of “prompt engineering.” Su and Yang (2023) note that effective prompting requires learners to provide context, specify constraints, and adopt specific personas, which mirrors the cognitive processes required in academic writing planning. This shift from restriction to literacy represents a fundamental reimagining of the role of technology in language education. Within this evolving



landscape, the intersection of AI, critical thinking, and learner autonomy has emerged as a critical area of inquiry. Learner autonomy in L2 writing involves the capacity to take charge of one's own learning, including planning, drafting, and revising. GenAI can either undermine this autonomy if used as a substitute for thinking, or enhance it if used as a scaffolding tool. When students are trained in prompt literacy, they engage in higher-order thinking. They must evaluate the AI's hallucinations, check for logical fallacies, and synthesize the AI's suggestions with their own voice. This evaluative process is a direct application of critical thinking (Dewey, 1910; Facione, 2020). By shifting the student's role from a passive recipient of AI-generated text to an active director of the AI, prompt literacy fosters a self-regulated, autonomous learning environment. Despite these theoretical connections, empirical evidence remains scarce, particularly regarding how such interventions unfold in non-Western educational contexts where teacher-centered traditions may initially resist such learner-centered technological integration.

To address the research questions, this study employed an explanatory sequential mixed-methods design (Creswell & Plano Clark, 2018), combining quantitative quasi-experimental methods with qualitative inquiry. A pre-test/post-test control group design was used to quantify the impact of the intervention, followed by semi-structured interviews to explore the students' lived experiences and perceptions in greater depth. The participants were 60 undergraduate EFL students (aged 19-21) enrolled in an Academic Writing course at a university in Uzbekistan. They were randomly assigned to an experimental group (n=30) and a control group (n=30), with both groups demonstrating similar baseline English proficiency levels (B2 on the CEFR scale). Data were collected using three primary instruments. First, a 20-item Writing Autonomy Questionnaire (WAQ), adapted from prior validated instruments, measured behavioral, cognitive, and affective autonomy in writing using a 5-point Likert scale. Second, a 25-item Critical Thinking Disposition Inventory (CTDI) assessed critical thinking dispositions, including open-mindedness, analytical thinking, and evaluative judgment. Third, semi-structured interviews were conducted with 10 purposefully selected students from the experimental group to gain in-depth insights into their prompt engineering experiences. Both groups completed the pre-tests before the intervention began. The control group received traditional EFL writing instruction with standard guidelines on using online dictionaries and grammar checkers. In contrast, the experimental group participated in an 8-week "AI Prompt Literacy" intervention. During the first two weeks, students learned about LLM mechanics and the anatomy of a good prompt (Context, Task, Format, Tone). Weeks 3 through 5 focused on iterative prompting and scaffolding, where students used AI for brainstorming, outlining, and peer-review simulation rather than full-text generation. The final three weeks emphasized critical evaluation of AI outputs, including identifying hallucinations, checking academic tone, and integrating AI feedback without losing the author's voice. Post-tests were administered to both groups following the intervention, after which the interviews were conducted. Quantitative data were analyzed using SPSS (Version 28). Independent and paired sample t-tests, as well as



ANCOVA (using pre-test scores as covariates), were conducted to determine the statistical significance of the intervention's impact. Qualitative interview data were transcribed, translated into English, and analyzed using thematic analysis (Braun & Clarke, 2006) via NVivo software. This dual analytical approach allowed for a comprehensive understanding of both the measurable outcomes and the nuanced, subjective experiences of the learners.

Results

Prior to the intervention, independent samples t-tests confirmed no significant differences between the experimental and control groups in writing autonomy ($t(58) = 0.76$, $p = .45$, $d = 0.12$) or critical thinking dispositions ($t(58) = 0.50$, $p = .62$, $d = 0.08$), establishing baseline equivalence. The experimental group's pre-test mean for writing autonomy was 3.24 ($SD = 0.48$), while the control group's was 3.18 ($SD = 0.51$). Similarly, critical thinking pre-test scores were comparable: experimental $M = 68.7$ ($SD = 7.9$), control $M = 69.2$ ($SD = 8.3$). Following the 8-week AI prompt literacy intervention, an Analysis of Covariance (ANCOVA) was conducted with pre-test scores as covariates to control for initial differences. The results revealed a statistically significant effect of the intervention on writing autonomy, $F(1, 57) = 15.84$, $p < .001$, partial $\eta^2 = .21$, indicating a large effect size. The experimental group's post-test mean increased substantially to 4.12 ($SD = 0.41$), representing a 27.2% improvement from baseline. In contrast, the control group showed only marginal gains, rising from $M = 3.18$ ($SD = 0.51$) to $M = 3.45$ ($SD = 0.49$), a 8.5% improvement that was not statistically significant in paired samples analysis ($t(29) = 1.89$, $p = .068$). Critical thinking dispositions demonstrated a similar pattern. ANCOVA results indicated a significant intervention effect, $F(1, 57) = 9.67$, $p = .003$, partial $\eta^2 = .15$. The experimental group's post-test mean reached 82.4 ($SD = 6.8$), reflecting a 19.9% increase from their pre-test score of 68.7. The control group's post-test mean was 72.1 ($SD = 7.6$), a modest 4.2% improvement that approached but did not reach statistical significance ($t(29) = 1.94$, $p = .062$). Paired samples t-tests confirmed that the experimental group's internal growth in both writing autonomy ($t(29) = 8.92$, $p < .001$, $d = 2.14$) and critical thinking ($t(29) = 7.34$, $p < .001$, $d = 1.87$) was highly significant with large effect sizes.

Descriptive statistics further revealed that within the experimental group, the largest gains were observed in the cognitive autonomy subscale (M increase = 1.03, $SD = 0.38$) and the evaluative judgment component of critical thinking (M increase = 15.6, $SD = 5.2$), suggesting that prompt literacy training particularly enhanced students' ability to independently plan, monitor, and assess their writing processes. The qualitative findings, derived from thematic analysis of the 10 semi-structured interview transcripts, provided richer context for these quantitative outcomes and yielded three main themes. The first theme, "AI as a Socratic Partner, Not a Ghostwriter," captured a fundamental shift in how students viewed AI. Initially, they used it to "write for them," but after the intervention, they viewed it as a brainstorming partner. As Participant 4 noted, "Before, I just typed 'write an essay about pollution.' Now, I ask the AI to 'act as an academic reviewer and find logical gaps in my second paragraph.' It makes me think



harder about my own arguments.” This shift from passive consumption to active engagement was echoed by 8 out of 10 interviewees.

The second theme, “Overcoming the Frustration of Iterative Prompting,” highlighted the cognitive load of refining prompts. Learning prompt literacy was not easy, and students emphasized the initial difficulty. Participant 7 explained, “At first, I was frustrated when the AI gave me generic answers. But I learned that if my prompt is vague, the answer is vague. I had to learn how to give it specific constraints. This actually improved my own clarity of thought.” This frustration, paradoxically, became a catalyst for deeper cognitive engagement, as students were forced to articulate their ideas more precisely.

Finally, the third theme, “Enhanced Self-Regulation and Confidence,” demonstrated how the intervention boosted students’ confidence in tackling complex writing tasks independently. Participant 2 stated, “I no longer feel stuck when I get writer’s block. I know how to prompt the AI to give me three different outlining options. I feel more in control of my writing process.” This sense of agency aligns with the quantitative gains in writing autonomy, suggesting that prompt literacy training not only improved technical skills but also fostered a psychological shift toward self-directed learning. Together, these themes illustrate a profound transformation in the students’ relationship with AI and their own learning agency.

Discussion

The findings of this study demonstrate that explicit instruction in AI prompt literacy significantly enhances EFL learners’ writing autonomy and critical thinking. Unlike previous studies that focused primarily on the ethical risks of GenAI (e.g., Cotton et al., 2023), this research highlights its cognitive affordances when mediated by proper literacy training. The significant improvement in writing autonomy aligns with Vygotsky’s (1978) Zone of Proximal Development (ZPD). By learning to craft effective prompts, students use the AI as a “more knowledgeable other” to scaffold their writing process. However, unlike traditional scaffolding, the student must actively direct the AI, which inherently requires self-regulation and autonomy. This active direction is what transforms the AI from a crutch into a cognitive partner. Furthermore, the enhancement of critical thinking can be attributed to the iterative nature of prompt engineering. When students evaluate the AI’s output for accuracy, tone, and logical coherence, they are engaging in high-level evaluative judgment. This supports Yan et al.’s (2023) assertion that interacting with AI requires a “critical AI literacy” to navigate hallucinations and biases. The qualitative data reinforced this, showing that students transitioned from passive consumers of AI text to active, critical directors of the technology. The frustration reported by students during the iterative prompting process is particularly noteworthy; it suggests that the cognitive struggle inherent in refining prompts is itself a form of critical thinking practice. In the context of Central Asian higher education, which is currently transitioning from traditional, teacher-centered paradigms to student-centered approaches, integrating AI prompt literacy offers a scalable, modern tool to foster the critical thinking and



autonomy demanded by the 21st-century job market. This study thus contributes not only to the global discourse on AI in education but also to the specific pedagogical challenges of expanding-circle EFL contexts.

Conclusion

This study provides empirical evidence that teaching AI prompt literacy in EFL writing classrooms transforms GenAI from a potential threat to academic integrity into a powerful cognitive scaffold. By learning how to engineer and evaluate prompts, students significantly improve their writing autonomy and critical thinking dispositions. The findings underscore the importance of moving beyond simplistic “AI ban” policies and instead embracing a pedagogical approach that equips students with the skills to interact with AI critically and creatively. The pedagogical implications are clear: EFL practitioners and curriculum designers must explicitly teach prompt engineering as a core digital literacy skill. Teachers should design assignments that require students to submit their “prompt history” alongside their final essays to assess their critical interaction with the AI. This not only promotes transparency but also values the process of iterative thinking over the final product alone. However, this study is not without limitations. It was limited by its relatively small sample size (N=60) and short duration (8 weeks) at a single university, which may affect the generalizability of the findings. Future research should employ longitudinal designs across diverse educational contexts and explore the impact of prompt literacy on specific linguistic features of L2 writing, such as lexical diversity and syntactic complexity. Additionally, further studies could investigate the role of teacher training in implementing AI prompt literacy effectively, as the success of such interventions largely depends on educators’ own comfort and competence with these tools. Ultimately, as AI continues to evolve, so too must our pedagogical approaches, ensuring that we prepare learners not just to use technology, but to think critically alongside it.

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