

The Effectiveness of AI-Integrated Genre-Based Materials in Enhancing Creative Thinking in EFL Procedural Text Writing

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Abstract

This study responds to the growing need for pedagogically grounded integration of artificial intelligence in EFL writing instruction, particularly in fostering students' creative thinking in procedure text writing. While AI has been increasingly utilized in language learning, its systematic integration with Genre-Based Instruction remains insufficiently explored. Therefore, this study aims to develop and evaluate AI-integrated genre-based instructional materials, namely GRAMCHAT-QUIZ, to enhance students' creative thinking. This study employed a Research and Development (R&D) design utilizing the ADDIE model, which consists of analysis, design, development, implementation, and evaluation stages. The participants involved tenth-grade students and an English teacher at a senior high school in Central Java, Indonesia. Data were collected through questionnaires, interviews, classroom observation, expert validation, and students' writing products. The data were analyzed qualitatively to examine students' creative thinking in terms of fluency, flexibility, and elaboration. The findings reveal that the developed materials are valid and feasible based on expert validation results. Classroom implementation indicates that the integration of AI supports students in generating ideas, employing varied language expressions, and elaborating their writing more effectively. In addition, students demonstrate positive responses and increased engagement during the learning process. In conclusion, AI-integrated genre-based materials show potential in enhancing students' creative thinking in EFL procedure text writing. The study implies that teachers can meaningfully integrate AI within structured genre-based instruction to support students' creativity, engagement, and writing development.

Keywords: AI-integrated learning; Creative thinking; Genre-based instruction; Procedure text writing

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INTRODUCTION

Writing is a fundamental component of English language learning because it enables learners to communicate ideas, organize information, and construct meaning coherently. In English as a Foreign Language (EFL) contexts, writing is especially important because students often have limited opportunities to use English beyond the classroom. Therefore, writing instruction should not only help learners produce grammatically acceptable texts but also support their ability to think, plan, revise, and express ideas independently. Recent studies emphasize that effective writing pedagogy needs to promote active engagement, learner autonomy, and higher-order thinking rather than focus solely on linguistic accuracy (Woo et al., n.d.; Călinescu, 2024; Wulyani et al., 2024). Within the senior high school curriculum, procedure texts are a significant genre because they require students to explain how something is done through clear goals, materials, and ordered steps. This genre appears simple, yet it demands logical sequencing, precise language, audience

awareness, and detailed explanation. Thus, procedure text writing provides a meaningful context for examining how students develop genre knowledge and creative thinking.

Despite its pedagogical value, procedure text writing remains challenging for many EFL students. Classroom practices frequently emphasize imitation of model texts, memorization of generic structures, and mechanical writing tasks. Such practices may help students recognize the formal organization of procedure texts, but they can also restrict opportunities to generate original ideas and elaborate writing (Hetu Hidayah, 2021; Wulyani et al., 2024). As a result, students may produce texts that are structurally correct but limited in depth, variation, and communicative effectiveness. These difficulties are often related to three dimensions of creative thinking: fluency, flexibility, and elaboration. Fluency refers to generating sufficient ideas or procedural steps; flexibility concerns using varied expressions, strategies, and perspectives; and elaboration involves developing steps with details that make the procedure clear and useful. These dimensions are essential because a good procedure text is not merely a sequence of commands but a reader-oriented explanation that guides action effectively (Haggag, 2023; Wulyani et al., 2024).

Creative thinking is therefore central to effective writing instruction. In procedure text writing, creativity does not mean ignoring genre conventions; rather, it means using those conventions to produce clear, purposeful, and engaging instructions. Students demonstrate creativity when they select relevant content, arrange steps logically, adapt language to the audience, provide alternatives or cautions, and elaborate instructions with meaningful details. However, EFL writing instruction often gives greater attention to grammar, spelling, and text structure than to idea development. This imbalance can make learners dependent on examples and hesitant to explore their own ideas. A more balanced approach is needed, one that maintains genre guidance while encouraging learners to think independently, revise meaningfully, and expand procedural reasoning.

One established approach that offers systematic support for writing is Genre-Based Instruction (GBI). GBI guides students through stages such as building knowledge of the field, modeling the target text, joint construction, and independent construction. Through these stages, students learn the social purpose, organization, and linguistic features of particular genres (Ode et al., 2021; Qoura, 2021; Al-Raimi et al., 2024). Empirical studies have shown that GBI can improve students' ability to write procedure texts because it provides explicit scaffolding and repeated practice (Hardiningsih et al., 2024). Nevertheless, the strength of GBI can also become a limitation when implementation focuses too heavily on reproducing model texts. If students are encouraged mainly to follow patterns, they may understand the genre but still struggle to generate diverse ideas, use flexible expressions, or elaborate steps independently. Thus, GBI needs to be enriched with instructional support that stimulates creativity while preserving genre awareness.

At the same time, the rapid development of artificial intelligence (AI) in education has created new possibilities for writing instruction. AI-based tools can provide immediate feedback, suggest alternative expressions, support brainstorming, and guide students through revision. These features are relevant to EFL writing because they can reduce anxiety, increase engagement, and create opportunities for autonomous learning (Kasneci et al., 2023; Mun, 2024; Sharifuddin & Hashim, 2024). In addition, AI-supported learning environments can facilitate iterative writing processes and support higher-order thinking when integrated with clear pedagogical guidance (Li & Wilson, 2025; Xu & Jumaat, 2025; Yang et al., 2025). However, AI should not be treated as a stand-alone solution. Without careful instructional design, students may use AI passively, rely on generated answers, or focus only on surface-level corrections. Therefore, the value of AI depends on how it is embedded within a structured framework that promotes reflection, selection, adaptation, and revision.

Recent research has begun to explore the integration of digital tools with genre-based pedagogy. Technology-supported genre instruction has been reported to enhance writing performance, motivation, and engagement (Aprilia & Farida, 2025; Jiang & Lai, 2025). Similarly, studies on AI-assisted writing indicate that AI can support creativity and autonomy when learners receive appropriate scaffolding from teachers (Li & Wilson, 2025; Sharifuddin & Hashim, 2024; Yang et al., 2025). However, most previous studies have examined AI tools and GBI separately, or they have focused on general writing achievement rather than creative thinking in procedure text writing. This gap is important because procedure texts require both adherence to genre conventions and creative elaboration of procedural content. There is still limited research on instructional materials that systematically combine AI-supported scaffolding with GBI stages to improve fluency, flexibility, and elaboration in this genre.

To address this gap, the present study focuses on the development and evaluation of GRAMCHAT-QUIZ, an AI-integrated genre-based instructional material for teaching procedure text writing. The novelty of this study lies in combining the structured stages of GBI with interactive AI-supported features in a coherent instructional design. Unlike studies that position AI merely as an additional tool or examine genre pedagogy without digital scaffolding, this study frames AI as part of the learning process that supports idea generation, language flexibility, guided revision, and reflective writing. In this design, GBI provides the pedagogical sequence and genre foundation, while AI supports brainstorming, feedback, and iterative refinement. This integration is expected to create a learning environment that helps students understand procedure text conventions while also developing creative thinking.

Accordingly, this study aims to develop AI-integrated genre-based instructional material through GRAMCHAT-QUIZ and to evaluate how it supports students' creative thinking in procedure text writing, particularly in terms of fluency, flexibility, and elaboration. The study is guided by the following research questions: (1) How is GRAMCHAT-QUIZ developed based on AI-integrated genre-based instructional principles? (2) How does GRAMCHAT-QUIZ support students' creative thinking in terms of fluency, flexibility, and elaboration in procedure text writing?

METHOD

Research Design

This study employed a Research and Development (R&D) design aimed at developing and evaluating the effectiveness of AI-integrated genre-based learning materials, namely GRAMCHAT-QUIZ, in enhancing students' creative thinking in writing procedure texts. Research and development are commonly used in educational research to produce and evaluate instructional materials through systematic procedures, particularly in technology-supported learning contexts. This development process followed the ADDIE model, which consists of five stages; analysis, design, development, implementation, and evaluation. This model provides a structured framework for integrating pedagogical approaches with Digital technologies, especially in AI-supported learning environments. The use of this model ensures alignment between learning objectives, instructional strategies, and evaluation of effectiveness. The study integrates Genre-Based Instruction and AI-supported tools in developing GRAMCHAT-QUIZ. Genre-Based Instruction provides structured learning stages, while AI tools facilitate idea generation, feedback, and engagement (Li & Wilson, 2025).

This study employed a mixed-method approach combining qualitative and quantitative descriptive data. Qualitative data were used to explore students' creative thinking and learning experiences, while quantitative data, including expert validation scores and pre-test-post-test results, were used to support the findings. This approach

enabled a comprehensive evaluation of both the development process and the effectiveness of the instructional materials.

Research Procedures

The research procedures in this study were conducted systematically following the ADDIE model, which consists of five stages; analysis, design, development, implementation, and evaluation. This structured procedure ensures that the development and evaluation processes are carried out in a logical and coherent sequence. First, in the analysis stage, the researcher identified students' needs and learning problems through classroom observations, questionnaires, and interviews. This stage focused on examining students' difficulties in generating ideas in writing procedure texts, particularly in terms of fluency, flexibility, and elaboration (Hardiningsih et al., 2024). Second, in the design stage, the instructional materials were systematically planned based on Genre-Based Instruction and aligned with creative thinking indicators. The materials incorporated stages such as building knowledge of the field, modeling, joint construction, and independent construction, while AI-supported features were designed to facilitate idea generation and feedback. Third, in the development stage, the initial version of GRAMCHAT-QUIZ was produced and refined through iterative revisions. The development focused on integrating instructional content with AI-supported tools to enhance student engagement and creativity. Fourth, in the implementation stage, the developed materials were applied in classroom learning involving tenth-grade students. Students engaged in writing activities using GRAMCHAT-QUIZ, and pre-test and post-test were administered to measure students' creative thinking before and after the implementation, while observations were conducted to examine their participation and creative thinking during the learning process. Finally, in the evaluation stage, data were collected through questionnaires, interviews, and analysis of students' writing to assess the effectiveness of the materials in enhancing creative thinking. The evaluation focused on identifying improvements in fluency, flexibility, and elaboration, as well as students' responses to the learning materials, supported by descriptive analysis of the collected data.

Research Context and Participants

This study was conducted in a senior high school in Central Java, Indonesia, involving tenth-grade students in an EFL classroom context. The participants were selected purposively based on their experience in learning procedure texts and their writing proficiency levels. A total of 30 students participated in the implementation stage. In addition, one English teacher was involved to facilitate the classroom learning process. Preliminary observations indicated that students experienced difficulties in generating and elaborating ideas in writing procedure texts, particularly in terms of fluency, flexibility, and elaboration. These findings are consistent with previous studies highlighting challenges in developing creative thinking in EFL writing (Hidayah et al., 2021; Nurdianingsih et al., 2025).

Development Procedures

The development of GRAMCHAT-QUIZ was carried out through a systematic process based on the ADDIE model to ensure the effectiveness of the instructional materials (Almelhi, 2021). In the analysis stage, students' needs and learning problems were identified through classroom observations and questionnaires, revealing limitations in idea generation and text elaboration. In the stage of designing, the materials were structured using Genre-Based Instruction principles, including building knowledge of the field, modeling, joint construction, and independent construction (Emilia, 2014). In the development stage, the materials were created by integrating AI-supported tools to facilitate interactive learning and support creative thinking. In the implementation stage,

the materials were applied in classroom activities, allowing students to engage in structured and guided writing processes. Finally, in the evaluation stage, the effectiveness of the materials was assessed through students' responses and writing performance (Xu & Jumaat, 2025).

AI Integration in Genre-Based Instruction

The integration of AI-supported tools was embedded within each stage of Genre-Based Instruction to support students' creative thinking in writing. In the building knowledge of the field stage, AI tools were used to generate ideas and activate students' prior knowledge, supporting fluency in idea generation. In the modeling stage, AI-generated texts were used to illustrate the structure and language features of procedure texts, helping students develop flexibility in language use. In the joint construction stage, students collaboratively developed texts with AI support, enabling them to explore alternative expressions and enhance elaboration. In the independent construction stage, students produced their own texts and used AI tools for feedback and revision, improving the quality and depth of their writing (Petrova & Rychkova, 2024).

Research Instruments

This study used multiple instruments to collect data, including questionnaires, interviews, observation sheets, and document analysis. The use of multiple instruments aims to ensure data triangulation and provide comprehensive insights into the learning process. The questionnaires were designed using a Likert scale to measure students' perceptions of the materials in terms of clarity, usefulness, and engagement. Interviews were conducted to obtain deeper insights into students' and teachers' experiences during the learning process. Observation sheets were used to record students' participation and behaviors during classroom activities, particularly those related to creative thinking. In addition, students' writing products were analyzed as part of document analysis to examine their creative performance (Li & Wilson, 2025).

Data Analysis Techniques

The data were analyzed qualitatively to identify patterns related to students' creative thinking and learning experiences. This approach allows for in-depth analysis of students' responses and writing performance in authentic classroom contexts. Students' writing was analyzed based on three dimensions of creative thinking: fluency, flexibility, and elaboration. These indicators were used to evaluate the effectiveness of the developed materials in enhancing students' creative thinking. Quantitative data were analyzed using descriptive statistics, including mean scores and percentage improvement, to support the qualitative findings. The effectiveness of the developed materials was evaluated based on improvements in students' creative thinking, particularly in terms of fluency, flexibility, and elaboration. Fluency refers to the ability to generate multiple ideas, flexibility indicates the use of varied expressions, and elaboration reflects the level of detail in writing (Li & Wilson, 2025). The materials were considered effective if students demonstrated improvement in these dimensions and showed positive responses toward the learning process.

To ensure the trustworthiness of the data, this study applied data triangulation by using multiple sources, including questionnaires, interviews, observations, and students' writing products. This approach enhances the credibility and reliability of the findings. Ethical considerations were addressed by informing participants about the purpose of the study and ensuring their voluntary participation. Confidentiality and anonymity were maintained throughout the research process. The use of AI tools was designed to support students' learning while maintaining their active role in the writing process (Zhai & Razali, 2023).

RESULTS AND DISCUSSION

Results

Development of AI-Integrated Genre-Based Materials

The GRAMCHAT-QUIZ was successfully developed by integrating artificial intelligence within the structured framework of Genre-Based Instruction (GBI) following the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The needs analysis revealed that students struggled with generating ideas, structuring procedure texts, and elaborating content. Teachers reported that traditional methods led to low engagement and limited creativity. AI integration was proposed to provide scaffolding, prompts, and instant feedback. In the design stage, learning objectives, activities, and evaluation rubrics were aligned with the curriculum standards and cognitive levels targeted. AI tools were embedded to facilitate idea generation, modeling, collaborative construction, and independent revision.

Instructional materials, included interactive quizzes, AI-generated prompts, and exemplar texts for modeling, were developed in the development stage. For example, students could input a topic like "Making a Paper Plane," and AI would provide five to ten alternative steps and sentence structures to explore. In the implementation stage, the materials were tested in a real classroom setting with 30 tenth-grade EFL students. All prompts were integrated into group discussions, joint construction tasks, and independent writing. In the evaluation stage, continuous formative assessment and feedback loops were implemented using AI-assisted scoring and peer review. Students received immediate suggestions for vocabulary, sentence variety, and procedural clarity.

From a cognitive perspective, AI reduced the mental load of generating ideas and structuring sentences simultaneously. This allowed students to focus on refining and elaborating their ideas. The staged approach of GBI ensured gradual internalization of both text structure and purpose, critical in EFL contexts where students face simultaneous challenges in language and content (Hardiningsih et al., 2024).

Expert Validation and Instructional Quality

Expert validation confirmed the materials' high validity and feasibility. Scores across content, language, presentation, and instructional design ranged from 4.5 to 5.0 out of 5, demonstrating strong pedagogical and academic quality. Experts highlighted that AI integration was pedagogically meaningful, enhancing instructional goals rather than being a superficial addition. The coherence between activities, objectives, and technological features ensured alignment and relevance, which is a key principle of effective instructional design.

Table 1. Expert Validation Scores of GRAMCHAT-QUIZ

Aspect	Score (1-5)	Comments
Content Accuracy	4.8	Covers all procedural steps with clear learning objectives.
Language Clarity	4.7	Language is accessible to EFL learners; AI prompts support comprehension
Presentation	4.6	Interactive and visually engaging; scaffolding is clearly presented.
Instructional Design	4.9	Activities aligned with objectives; AI enhances engagement and cognitive support.

Systematic role of AI in Enhancing Creative Thinking

AI played a systematic role across all stages of GBI, promoting fluency, flexibility, and elaboration in students' writing. In the stage of knowledge building, AI provided

multiple prompts, questions, and contextual information. Students could explore various possibilities, enhancing fluency. For example, one student generated 12 alternative steps for "Making a Sandwich." whereas previously they could only list 5. In the modeling stage, AI suggested alternative phrases during collaborative tasks, which promoting elaboration. Students discussed all suggestions, revised steps, and combined ideas. In the Independent Construction stage, immediate AI feedback guided revision, enabling students to expand and refine their texts independently. This step strengthened Critical thinking and elaboration (Xu & Jumat, 2025; Nurdianingsih et al., 2025).

Student Engagement and Behavioral Transformation

The implementation of GRAMCHAT-QUIZ led to notable behavioral changes, including increased motivation and active participation in writing tasks, greater confidence in expressing ideas and experimenting with language, and reduced fear of making mistakes due to immediate and non-judgmental AI feedback. Observations indicated that students became more collaborative, frequently discussing ideas generated by AI and reflecting on alternative solutions. This aligns with constructivist principles, where learning is interactive and student-centered (Kohnke et al., 2023).

Deep Analysis of Creative Thinking Improvement

Fluency, flexibility, and elaboration showed substantial improvements. Fluency: AI prompts stimulated idea generation, overcoming writer's block. The average number of ideas generated increased from 4.2 in the pre-test to 10.3 in the post-test. Flexibility: Students used varied sentence structures and vocabulary, moving from rigid formulaic writing to adaptive language use. Elaboration: AI feedback guided students to develop ideas in detail, improving coherence and completeness of procedure texts.

Table 2. Pre-Test and Post-Test Creative Thinking Scores (n = 30)

Dimension	Pre-test Mean (SD)	Post-test Mean (SD)	Improvement (%)
Fluency	4.2 (1.1)	10.3 (1.8)	+145%
Flexibility	3.8 (1.0)	8.6 (1.5)	+126%
Elaboration	3.5 (1.2)	9.5 (1.6)	+171%

The combination of structured pedagogy through Genre-Based Instruction (GBI) and technological support through artificial intelligence (AI) created an optimal learning environment. Students received clear guidance while retaining the freedom to explore ideas, balancing instructional scaffolding with creativity.

Table 3. Summary of Emperical Interpretation and Implications

Aspect	Findings	Theoretical / Empirical Interpretation	Pedagogical Implications
Development of AI-Integrated Materials	GRAMCHAT-QUIZ successfully integrates AI in GBI using ADDIE; AI applied in all stages.	AI transforms writing into an iterative, interactive process; it reduces cognitive load (Xu & Jumaat, 2025).	Ready for classroom use; supports creativity and efficiency.
Expert Validation and Quality	High validity scores; AI integration is pedagogically meaningful.	AI effectiveness depends on pedagogical integration(Almelhi, 2021).	Teachers can implement materials confidently.
AI Role in Creative Thinking	Supports fluency, flexibility, and	Provides a systematic pathway for	AI facilitates idea generation, varied

	elaboration across GBI stages.	developing creativity (Xu & Jumaat, 2025).	expression, and elaboration.
Student Engagement & Behavior	Increased motivation, confidence, collaboration, and willingness to experiment.	A safe environment fosters risk-taking and creativity (Kohnke et al., 2023)	AI boosts participation and engagement in EFL classrooms.
Improvement in Creative Skills	Fluency, flexibility, and elaboration all significantly improved.	AI prompts and feedback stimulate idea generation and text development (Heti Hidayah, 2021; Lukmawardani & Badriyah, 2022).	AI + GBI strategies improve writing quality and creativity.
Effectiveness of AI-GBI	Structured pedagogy + AI creates an optimal learning environment.	Scaffolding + interactive tech promotes cognitive engagement and creativity (Li & Wilson, 2025).	Balance between guidance and exploration; AI supports thinking.
General Pedagogical Implications	AI-integrated GBI enhances creative thinking in procedure text writing.	Aligns with constructivist principles: active, interactive, critical learning (Kohnke et al., 2023).	Teachers guide AI use critically while stimulating ideas, engagement, and writing quality.

The study highlights several practical implications for EFL writing instruction. First, artificial intelligence can be meaningfully integrated into Genre-Based Instruction to support idea generation, text modeling, and revision processes, thereby enhancing students' creative thinking in writing. Second, teachers play a crucial role in guiding students' use of AI critically and responsibly to ensure active engagement in the learning process rather than passive dependence on AI-generated outputs. Third, the combination of structured instructional scaffolding and interactive AI-supported activities promotes active learning, collaboration, and students' willingness to experiment with language and ideas in procedural text writing.

Discussion

The findings of this study indicate that GRAMCHAT-QUIZ, as an AI-integrated genre-based instructional material, was effective in supporting students' creative thinking in writing procedure texts. The effectiveness was reflected in the development process, expert validation, classroom implementation, and improvement of students' writing performance across fluency, flexibility, and elaboration. The results showed that the material was pedagogically feasible, with expert validation scores ranging from 4.5 to 5.0 across content accuracy, language clarity, presentation, and instructional design. This finding confirms Almelhi's (2021) argument that systematic instructional design, particularly through the ADDIE model, can strengthen the quality and effectiveness of technology-supported learning materials. In the present study, ADDIE provided a clear developmental sequence from needs analysis to evaluation, ensuring that AI was not inserted randomly but was aligned with learning objectives, genre-based stages, and creative-thinking indicators. Thus, the study extends previous instructional design research by demonstrating that ADDIE can serve not only as a general material-

development framework but also as a practical model for integrating AI into EFL writing pedagogy.

The findings also confirm previous studies on Genre-Based Instruction (GBI), which show that genre pedagogy helps learners understand text organization, language features, and communicative purpose. Hardiningsih et al. (2024) found that a genre-based approach improved students' achievement in writing procedure texts because it provided explicit scaffolding and guided practice. Similarly, Lukmawardani and Badriyah (2022) reported that GBI enhanced students' writing ability by helping them recognize and apply appropriate text structures. The present study supports these findings because GRAMCHAT-QUIZ guided students through building knowledge of the field, modeling, joint construction, and independent construction. However, this study also extends earlier GBI research by showing that genre scaffolding becomes more powerful when combined with AI-supported prompts, feedback, and interactive quizzes. While conventional GBI often relies on teacher explanations and model texts, GRAMCHAT-QUIZ offered additional support through AI-generated ideas, alternative expressions, and immediate revision suggestions. This integration helped students move beyond simply imitating model texts and encouraged them to explore more varied procedural steps and language forms.

The improvement in students' fluency is one of the most important findings of the study. The average fluency score increased from 4.2 in the pre-test to 10.3 in the post-test, indicating that students became more capable of generating ideas and procedural steps after using GRAMCHAT-QUIZ. This result is consistent with Hidayah (2021), who found that students often experience difficulties in writing procedure texts because they struggle to generate and organize ideas. In the present study, AI prompts helped reduce writer's block by offering guiding questions, contextual information, and possible procedural sequences. The improvement also aligns with Kasneci et al. (2023), who argued that large language models can support learning by providing interactive assistance and expanding learners' access to ideas. However, the present findings extend this claim by showing that AI support is most productive when situated within a structured pedagogical cycle. Students did not merely copy AI-generated suggestions; rather, they discussed, selected, revised, and adapted ideas through teacher-guided activities. This shows that AI can promote fluency when it functions as a scaffold for thinking rather than as a replacement for students' own writing process.

The findings regarding flexibility also confirm and extend previous studies on AI-assisted language learning. Students' flexibility score increased from 3.8 to 8.6, showing that they used more varied sentence structures, vocabulary, and expressions after the implementation. This supports Kohnke et al. (2023), who emphasized that ChatGPT and related AI tools can support language learning by offering alternative expressions and interactive input. It also supports Petrova and Rychkova's (2024) view that AI-powered genre-based writing tasks can help learners experiment with genre features and linguistic choices. In this study, AI helped students compare different ways of expressing instructions, such as using imperative verbs, sequence markers, cautions, and explanatory clauses. This result extends previous work by connecting flexibility not only with language variation but also with creative thinking in procedure text writing. The students' ability to move from rigid and formulaic sentences to more adaptive expressions suggests that AI-supported GBI can help learners develop greater control over both genre conventions and linguistic creativity.

The most substantial improvement appeared in elaboration, which increased from 3.5 to 9.5. This finding suggests that GRAMCHAT-QUIZ was especially effective in helping students develop procedural steps with more detail, coherence, and completeness. The result supports Li and Wilson (2025), who argued that AI-integrated scaffolding can

enhance creativity and agency among English language learners by supporting drafting, revision, and reflection. It also aligns with Xu and Jumaat (2025), who found that AI-supported blended learning can enhance critical thinking in EFL writing. In the present study, elaboration improved because AI feedback encouraged students to clarify vague steps, add necessary details, and consider the reader's needs. For example, instead of writing short commands, students were encouraged to explain the purpose of each step, include safety or quality considerations, and organize information more logically. This extends previous studies by showing that AI does not only improve surface-level accuracy but can also support deeper content development when students are guided to evaluate and refine AI suggestions critically.

The study's findings also highlight increased student engagement, confidence, and collaboration during the writing process. Students became more willing to participate, discuss AI-generated ideas, and experiment with language. This finding confirms Kohnke et al. (2023), who emphasized that AI tools can create interactive and student-centered learning experiences. It also supports the constructivist view that learning becomes more meaningful when students actively construct knowledge through interaction, reflection, and collaboration. In this study, AI created a less threatening environment because students could receive immediate suggestions without feeling judged. This reduced anxiety and encouraged risk-taking in writing. Nevertheless, the findings also qualify previous claims about AI in education. While Kasneci et al. (2023) noted the opportunities of AI for education, they also warned about challenges such as overreliance and uncritical use. The present study does not contradict this caution; instead, it shows that such risks can be minimized when AI use is mediated by teachers and embedded in clear pedagogical stages.

Compared with previous studies that examined digital tools in genre-based learning, the present study offers a more specific contribution. Aprilia and Farida (2025) found that digital tools across the genre-based approach cycle can enhance EFL learning through technology integration. Similarly, Zhai and Razali (2023) emphasized the importance of systematic approaches in developing genre-based writing instruction. The present study confirms these findings but extends them by focusing specifically on AI integration, procedure text writing, and creative-thinking dimensions. Rather than measuring writing improvement in general, this study examined fluency, flexibility, and elaboration as indicators of creativity. This focus is important because procedure text writing is often perceived as a rigid genre, yet the findings show that it can become a productive space for creative thinking when students are supported to generate varied ideas, use flexible language, and elaborate instructions meaningfully.

The findings demonstrate that the effectiveness of GRAMCHAT-QUIZ lies in the synergy between structured pedagogy and intelligent technological support. GBI provided the instructional sequence, genre awareness, and gradual scaffolding, while AI offered prompts, feedback, models, and revision support. This combination confirms earlier claims that AI is more effective when it is pedagogically integrated rather than used as a stand-alone tool (Kasneci et al., 2023; Li & Wilson, 2025; Xu & Jumaat, 2025). The findings do not contradict previous research; rather, they refine it by showing that AI-supported writing instruction requires teacher mediation, ethical guidance, and purposeful task design. Therefore, this study contributes to the growing body of knowledge on AI in EFL education by offering an instructional model that balances creativity, genre structure, and responsible technology use. It also provides empirical evidence that AI-integrated GBI can address common difficulties in procedure text writing, particularly limited idea generation, repetitive language use, and insufficient elaboration.

CONCLUSION

This study concludes that GRAMCHAT-QUIZ, developed through the ADDIE model and grounded in Genre-Based Instruction, is a valid and effective instructional material for enhancing students' creative thinking in EFL procedure text writing. The expert validation results confirmed that the material had strong quality in terms of content, language, presentation, and instructional design. The classroom implementation further showed that AI-supported features could be meaningfully integrated into each stage of genre-based learning, including building knowledge of the field, modeling, joint construction, and independent construction. Through this integration, students received structured guidance while also gaining opportunities to explore ideas, compare language choices, and revise their writing. The improvement in fluency, flexibility, and elaboration demonstrates that students were not only able to produce more complete procedure texts but also became more creative in generating ideas, using varied expressions, and developing detailed procedural explanations.

The study also concludes that the effectiveness of AI integration depends strongly on pedagogical design and teacher mediation. AI tools alone cannot guarantee meaningful learning; they need to be embedded within clear instructional objectives, guided activities, and reflective writing practices. In GRAMCHAT-QUIZ, AI functioned as a scaffold that supported brainstorming, feedback, language variation, and revision, while the teacher ensured that students used AI critically and responsibly. This balance prevented passive dependence on AI-generated outputs and encouraged students to remain active authors of their own texts. Although the study was conducted with a limited number of tenth-grade students in one EFL classroom, the findings provide useful evidence that AI-integrated genre-based materials can support creative thinking and writing development. Future research may involve larger samples, longer implementation periods, and comparative designs to examine the broader applicability and long-term impact of AI-integrated Genre-Based Instruction.

RECOMMENDATION

Based on the study's outcomes, several recommendations are proposed to advance practice, institutional support, and future research in AI-enhanced Genre-Based Instruction. For Classroom Practice, teachers are encouraged to implement AI tools as integral components of structured instructional stages rather than as standalone utilities. AI should be used to scaffold idea generation, language variation, collaborative construction, and revision, while teachers ensure students' critical engagement and reflective thinking. Continuous monitoring and guidance are essential to prevent passive reliance on AI outputs and to promote active, creative learning. For Institutional Support, schools should provide adequate technological infrastructure, including high-speed internet, AI-enabled platforms, and access to educational software. Professional development programs should be conducted to enhance teachers' AI literacy, Digital pedagogy, and ethical integration practices. Clear institutional policies on ethical AI use and academic integrity are necessary to mitigate potential misuse. Future Research can expand research designs to include experimental, quasi-experimental, or mixed-method approaches with larger and more diverse populations. Investigate the long-term effects of AI-integrated GBI on students' writing proficiency, creative thinking, and other language skills (speaking, reading, and critical literacy). Examine the differential impact of specific AI features, such as prompt generation, automated feedback, and interactive quizzes, on distinct dimensions of creativity. Explore students' cognitive and affective responses to AI-assisted learning, including motivation, confidence, anxiety, and self-regulated learning. Address barriers such as Digital accessibility, technological literacy, and time constraints to enhance the scalability and generalizability of AI-supported instruction.

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AI TOOL DECLARATION

AI-supported tools were used to assist in the development of GRAMCHAT-QUIZ and in refining the language and organization of this manuscript. All AI-generated suggestions were critically reviewed, selected, revised, and validated by the author. The interpretation of data, discussion of findings, conclusions, and final responsibility for the manuscript remain entirely with the author.

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