

Students' Self-Regulation in Learning Academic Writing with AI Mediation Tools

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A B S T R A C T

Academic writing is developed by rehearsal. It requires further practice. Therefore, this paper aimed at finding to explore the integration of self-regulated learning for university students in academic writing with AI mediation learning tools and to explore those strengths. This paper applied library research. Thus, the data were gained from scientific journal, proceeding, research articles, books, and so forth where those should be relevant with the topic discussed. The finding underscored two points. The first was that how integrate Artificial Intelligence AI with self-regulated learning a writing skills. The second, the benefits regarded on those integration. The recommendation was delivered in the pedagogic and future research aspects. For pedagogic, educators curriculum maker and AI experts should discuss together to set valuable curriculum, learning writing materials, instructions and so forth. For future researcher, further researches should be conducted with the different study level, and different language skills to analyze comprehensively toward those integrations in order to gain wider perspectives.

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INTRODUCTION

The academic writing is important for English Foreign Language (EFL) context. It trains students to evolve up their writing proficiency level. However, it is not easy to achieve proficient goals. They have to do brainstorming, drafting, revising and editing (Wirantaka, 2018). More practicing is to extend their knowledge and to receive new knowledge input. Those steps in bridging new knowledge input and prior knowledge of students lean on the essential practices of writing. Therefore, writing practice should also include such as scaffolding, continuous feedback, technology integration and reflective practices (Yulandari & Suryadi, 2025). Relegating the issues appearances in the writing process such as low writing motivation, lack of feedback, lack of translation, less references, lack of time, lack of research background, less confidence, less writing experiences, weak reading proficiency, lack critical thinking, less writing preparation and lack supporting writing environments, students could use writing strategies which are combined with the technology used, especially AI usage (Asnas et al., 2022). Writing practices, concerning on the technology integration, ease students to assist their writing progress through checking writing results within, especially through applying Artificial Intelligence (AI).

The technological exploration in the academic fields goes beyond expectation. The utilization of Artificial Intelligence (AI) tools spread quickly within the educational fields, including for learning academic writing. This remains the process of writing not only assisted and analyzed by human such as lecturers, students, or readers, but also examined further by AI tools. The process of writing with AI commonly applied and investigated by some researchers (Apriani et al., 2024; Nguyen et al., 2024; Shi et al., 2025). Apriani et al. (2024) observed the effect of AI mediation for writing skill and self-regulation. They employed 40 students. They informed the finding that implementing Chatbots indicated students writing

proficiency level improvements and their self-regulation. Further, the finding underscored that students' motivation, confidence, and engagements among them inclined did rise up. Nguyen et al. (2024) observed the gauging of self-regulated learning writing with the assisted of AI tools. They mentioned the support of AI tools not only for mechanic of writing learning, but also it fostered students' critical thinking, creativity and engagements among them. Thus, it was visionary learning tools which could be collaborated actively and deeply with human to insist and foster human cognitive level up. AI mediation tools for academic writing purposively is to strengthen either affective, psychological sides or cognitive levels. This build students comprehension be better and bridge their prior knowledge to the new knowledge. It also triggers their critical thinking skill to gain ideas, interpret those ideas and build those ideas into the whole texts. The roles of AI is to bolster and guide students writing by addressing feedback and correction. Current research explored AI tools could contribute to affective parts (Hu et al., 2025; Sui, 2025).

Students may face some challenges which are causing stuck in writing. those were caused by some problems emerge in terms of less motivation of students, less critical thinking, inappropriate writing approach, less developing ideas and so forth. Setiani et al. (2024) investigated students' problems in writing paragraph. They highlighted findings that students writing stuck rooted from linguistic problem such as grammar, vocabulary, language' usage and words choice in sentence writing. Another derived from physiology namely content. The last was cognitive problems such as spelling, punctuation, capitalization and paragraph. Those three categories shaped students problems in writing. Suriyanti et al. (2022) examined students' problems in writing descriptive. They pinned that students' needs intervention to assist their writing in content, grammar, organization, vocabulary and mechanics. Therefore the role of teachers should be stressed on how break students problem by delivering writing approach comprehensively to bridge their prior knowledge and new knowledge inputs within. Ippun et al. (2023) mentioned slightly divergence perspective toward students' problem in writing. They found that students faced hard in writing paragraphs in looking for ideas, limited vocabulary and lack confidence. Another faced chances to connect ideas, less motivation and boredom writing. They also stated that major concerns of students' problems in writing also were difficulty starting sentences, maintaining flow writing, grammar and clarity. Meanwhile, Maharani et al. (2023) mentioned students' problems in writing in difficulties writing process, lack knowledge in texts organizational, vocabulary choosing, grammar usage and motivational usage. Agustin et al. (2024) found students writing problems namely linguistic such as in grammar, and vocabulary also nonlinguistic such as organizational ideas, content, and mechanical problems

Self-regulating for learning a writing skill emerges some chances if it is combined with AI mediation learning tools. Those might be caused by lack ability of educators to operate AI tools which it demands accurate instructions. This remains that AI tools is not only about maximizing and using it features, but also it requires critical thinking skill, accuracy, and carefulness to set the instructions or prompts. Additionally, the writing process is not simply writing in academic writing. It requires strategies, skills, and motivations. Thus, it is by rehearsal to produce better writing process and outputs. Starting a writing also potentially shapes on stumbles for students where they face some chance, such a lack of ideas, lack of ability to organize ideas and lack of ability to develop ideas. Further, students' anxiety, lack of motivation and adjournment in writing could predominantly affect students. Those whole problem lead on chance for educators to solve those problems. As mentioned above, educators also should learn and follow the current development of technology which could be collaborated for the teaching and learning process. Hence, their teaching and learning competency still could foster up.

This research novelty underlined several points. The first is that how integrate AI mediation learning tools with self-regulation strategy especially for academic writing. The second stresses on the strengths of integration for those three variables. There were rare previous researches to explore the integration of AI mediation learning tools with self-regulation strategy for academic writing, and those strengths

METHOD

The research here focused on the integration between self-regulation of students in writing with AI tools. It aimed to explore collaboration between those aspects to fully maximize the potential teaching and learning a writing skills in the scope of process and outcome. Since the writing process did not simply just write the material down. It demanded particular strategy to crack students stumbles in a learning writing skills. Therefore, self-regulation was implemented where it aligned with the current teaching and learning method, students centers. Thus, it bolstered their learning inputs, motivation and enthusiast in learning writing. The research design applied qualitative research, especially library research to identify, analyze and interpret the data. Ridwan et al. (2021) shed light on the library research as to depict the data with the concept of identifying, analyzing and interpreting. The data resources were obtained through books, scientific journal and research articles to sort and conclude new paradigm (Arikunto, 2019). This process allowed students to bridge their prior knowledge to new knowledge input. The data analysis method was through descriptive analysis by observing the documents to gather, investigate and conclude the results.

FINDINGS AND DISCUSSION

Finding

The writing process is by rehearsal where it demands some times even more to achieve the writing goals. However, the process of writing could not be simplified where it should correct linguistic features (grammar), writing mechanic, punctuation, content, etc. Hence, students could not do independently. They must some partners to address suggestions, corrections and even motivation. Those partners could be among students and educators. However, in this current decade, the technological aspect spread rapidly. It affect in the education fields, including in the teaching and learning of writing. Those intervention was by Artificial Intelligence (AI). AI provides feedback for students writing. However, it also required human' touch to verify the feedback results of AI further to avoid bias answer or ambiguities. Self-regulation here gained pivotal roles to set students learning proves and achievement by their own selves. This process legitimated students to build their own learning process in terms of scheduling, learning setting, learning strategy, learning process and so forth. Graham and Harris (2022) admitted that self-regulation played important roles in writing and high level self-regulation to develop from moderate to high level of self-regulation is required to become competent writer. Those perspectives derived that self-regulation implicated to the learning degree from moderate to high level to gain more valuable inputs within. Yalçın & Karadeniz (2016) argued that the writing skill and self-regulation gained profound interconnection. Specifically, the writing composition including the writing quality and self-regulation linked comprehensively. They also asserted recommendation that self-regulation ad writing skill level could be fostered up via the writing activities. The role of AI in self-regulation learning for writing skills also is counted as the prediction to gather learning outcomes. Jin et al. (2025) observed on the usage of modelling AI-assisted writing combined with self-regulation strategy. They figured out that self -regulated learning strategy positively predicted three types of AI usage. Most advanced of AI usage enhanced students learning outcomes in terms of critical thinking, writing quality and motivation. They also pinned important point was that self-efficacy of students was to bolster self -regulation of students in AI usage. Those finding implicated that AI usage for writing skills combined with self-regulation learning lead students to rise up their affective and cognitive sectors. This process modified and bridged their writing stumbles with new writing knowledge inputs and ideas. Tian et al. (2022) proposed stages on how apply self-regulated learning a writing skills namely planning, organizing, monitoring and revising.

Planning Step

In the planning step, the students selecting writing topics, purposes and ideas. Students could gain ideas from their life experiences aligned with the writing topics. This requires

critical thinking of students' to obtain keywords or important clues of their ideas. Thus, brainstorming process are required to list the important key words related to the topics. It is learning technique where the individual and groups are stressed on the critical thinking skill to collect ideas, probably problems appearance, and solution (Owo et al., 2016). Nurhikma (2023) observed students writing skills by using brainstorming technique. She found that Brainstorming could be improving students writing skills. Students' roles in the planning section are to gain ideas based on their previous experiences and arrange the ideas into the right chronological order. Those process also could be interlinked with AI mediation for learning a writing skills where AI could do brainstorming technique. AI mediation learning tools for writing assists students to ease their writing process. Karanjakwut & Charunsri (2025) analyzed the utilization of AI Chatbots for brainstorming technique. The results confirmed that the intervention of AI Chatbots for brainstorming group outperformed the conventional group. Shifting on point of views of AI for brainstorming led to latest benefits of writing construction strategy and strengthen students' independent thinking and creativity.

Organizing Step

Organizing step is to create the outline of writing, due to the ideas were collected. Creating the outline of writing to determine the ideas into paragraphs before writing. Structuring those ideas should be followed with the right chronological order. This process also could be combined with AI mediation tools to classify those ideas into each paragraph before developing s the whole paragraphs. Then, developing those ideas into the whole paragraphs. The roles of AI here is to support students in learning including mapping ideas and evolving them into paragraphs. However, students' role here also should create their own paragraphs into the whole writing products. Thus, the students would not be over reliance into the AI intervention mediation. AI tools is just to solve and to bridge students writing stumbles in terms of listing ideas into the right chronological orders, creating more logical ideas as mapping or roadmap ideas, providing suggestions and so forth. Therefore, AI tools is companion tools of students in creating their own writing results. Students should compose and arrange their writing ideas independently while AI roles is to compare their ideas and share suggestions in the forms of logical progression ideas, improving outline and informing possibilities missing ideas (Sedita, 2025). Marzuki et al. (2023) underlined the sight research results that AI writing tools performed positively to enhance students writing quality, focusing on the writing content and organization quality. Hence, AI tools could organize ideas of students and remind students missing ideas into suggestions. Those, students are the main role of writers.

Monitoring Steps

In monitoring aspects students have to analyze and observe their writing products to track probably some mistakes regarding grammar, punctuation, mind-mapping organizational and so forth which could potentially emerge. Monitoring steps increases students' independent editing ability writing accuracy, fluency, critical thinking and time efficiency. Monitoring steps allows students to map their own writing ability by observing their writing errors. Thus, they will recognize their own writing strengths and weaknesses. Therefore it demanded the critical thinking ability of student to realize it. Ekalia et al. (2025) underscored that the critical thinking strategy was needed to be interlinked with the writing instruction. Both have significant correlation. They also asserted that students with higher critical thinking skill will produce more coherent and logical texts. Further, they recommended that mapping ideas, discussion, and peer review are inserted in the teaching and learning process to foster up students' cognitive and linguistic inputs. In this stage also, the use of AI could be inserted to analyze students writing errors either in linguistic parts such as grammar, technical parts in terms of punctuation, mechanics, so forth or content parts. Floris & Renandya (2025) mentioned that AI tools offer various benefits for writing skills, meanwhile educators need to incorporate AI tools for writing such as brainstorming, drafting, defining clarity and style, and so forth. Thus, AI tools were as friends for discussion, observing writing and addressing some solutions within. This also could not be eliminated educators roles for student to ensure the AI results and to elude bias results within. Additionally, other students'

roles also could be as partners for peer-feedback process. Nurkhamidah et al. (2024) argued that peer-feedback can shape more interactive and reflective learning environment, mainly contribute to enhance writing performance and extend educational goals. Further, students receive three correction perspectives from educators, other students and AI tools to enrich their cognitive, metacognitive, affective and perceptions toward their own writing results.

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Revising Step

In the revision section, students are to revise which parts of their writing inputs provided by teachers, other students and AI tools to be applied in their own writing results. Those will shape their writing be more logic in contents, coherent, and comprehensive. Their linguistic ability would increase because of various inputs provided to them. Those lead them be increasing their writing proficiency level and fostering their writing quality up. Therefore, students must analyze the correction parts bestowed, focusing in content, structure, and clarity, to edit every errors within. Practicing writing means improving effectively language usage and writing strategy (Annisa & Gusnawaty, 2024). They also pinned that various revision techniques to increase students writing skills ultimately applying metacognitive strategy. This embraces students on how they recognize and set their thought plots.

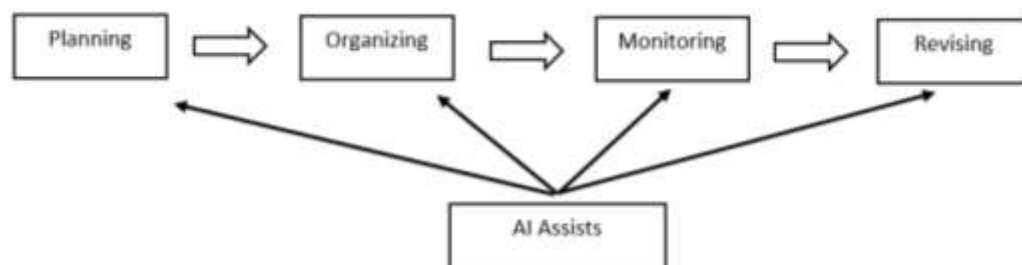


Figure 1. Structure of self-regulated writing with the assist of AI

Strengths of Self-Regulation in Writing With AI Assisted Roles

Improved Writing Proficiency Level

The writing process requires more effective strategy. Meanwhile, every students has divergence needs, time, willingness, etc in learning a writing skills. Those have to be bridged in order to ease and increase student writing achievements. Therefore the use of self-regulation with AI tools could be incorporated within. Both could improve students writing achievements. Wang et al. (2025) reported that self-regulated writing played significant roles to determine and shape writing outputs. They also mentioned student with higher affective, metacognitive and cognitive substantially were better their peers. Teng et al. (2022) also discovered that self-regulatory strategy often was used by higher grade level students. They informed that six strategy could improve student writing such as goals oriented, writing planning, evaluation, emotion control, memorization and metacognitive. Those could be as self-regulated of students to achieve better writing outcomes. Additionally AI usage tools is to strengthen the implication of students' elevation writing quality. Guo & Lee (2023) found that AI tools implicated positively to students writing achievements in terms of offering feedback, supporting in scaffolding and enhancing writing outcomes. They suggested the educators to improvise their teaching a writing skills with AI assisted.

Elevated Higher-Order Thinking

The writing skill is by rehearsal. It needs to depict the ideas logically to produce more comprehensible writing outcomes. Hence, it traits students critical thinking skill, implicationally it will assist them to boost their mind level being higher order thinking. Riwayatningsih et al. (2025) underscored that real world projects, gamification and multi resource learning could increase inclusively in engagement, motivation, writing proficiency level, critical thinking, creativity and collaboration skills. Those indicate that embedding rich learning resources and strategies lead on higher order thinking skills by empowering students

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to create their own writing self-regulation and managements. Another finding came from Patrick and Yip in 2025. They underlined points that educators applied AI to design lesson plans, meanwhile students used it as interactive and experiential learning companions. AI also facilitated interactively and enriched learning environment. AI tools could bolster up perspective analysis and idea generation which further promote higher order thinking skill (Abdelhalim, 2024; Essien et al., 2024; Fischer et al., 2024).

Reduced Anxiety

Increasing student willingness in writing emphasizes and relates on their motivation within. Motivation in learning writing is needed to decline students' anxiety and to reduce their learning boredom. Self-regulation allows student to manage their own learning scope in terms of maintaining schedule, setting ideas, developing those ideas, so forth. Wilby (2022) conducted the research the roles of motivation and self-regulation toward the writing achievement. They employed 64 participants with quasi experimental research. He found that self-regulatory strategy and motivation were in stable over time. Another finding showed that inter-connection between self-efficacy and self-regulatory. Song & Song (2023) led the study to investigate the enhancing of academic writing skill and motivation with assessing the efficacy of ChatGPT. The result underlined some points. First, in quantitative result showed significant in increasing both the writing skills and motivation for students who got AI instruction compared to the control group. Their improvements were in several aspects of writing including organization, coherence, grammar and vocabulary. Qualitatively, diverse perspectives on the contextual and over reliance emerged, due to the recognition AI instructional roles, and its influence to the writing skills and motivation. Their participants also reflected that stressing on the need of continuous development and adaptation toward AI tools should be emphasized, aligned with long term impacts and sustainability of AI tools instruction.

Eased Scaffolding

AI assisted tools enhance student writing skills by providing them with a scaffolding to ease them in creating texts. Sung & Huang (2025) argued that AI features did motivate to students based on diverse types of scaffolding. Scaffolding with the assist of AI would led students easily to do brainstorming, structuring texts patterns, and feedback where those would engage them in learning actively, boost their confident and be dauntless. Scaffolding in learning a writing skills is merely required to construct the writing pattern or strategy. Thus, it will ease students to guide in a learning writing skills. Godoy (2026) argued that AI integration in writing through demonstrating the strategy of scaffolding can corroborate human creativity and leverage the technological usage ability. Another finding was from Li and Bahari in 2025. They analyzed AI tools for scaffolding in academic writing. They yielded that AI for scaffolding reached out more targeted improvements which also were aligned with the study focus. Participants also showed increasing in writing confidence, more strategic planning and vocabulary improvements. They commented the need of expert guidance as human mentorship in exerting AI for writing.

Discussion

The writing process stresses on the students to consider the strategy to write effectively and optimally. Self-regulation learning a writing skill provides steps for students easily in gaining ideas until constructing the whole texts. Carefulness in applying self-regulation for writing skill is to maintain each steps namely planning, organizing, monitoring and revising appropriately. Thus, each step could facilitate students' ideas to be applied within. Therefore, the application of critical thinking is to obtain students' ideas deeper. After that, they have to set those ideas. Khairuddin et al. (2021) mentioned that the writing is as process of thinking and educator should concern the teaching of writing on the thinking process equally with their writing process. This is to trigger their thinking logically. Hence their writing will be written in the right chronological order. Teng et al. (2022) mentioned that students with higher grade level was frequently applying self-regulatory writing strategy. They also found female students more opted self-regulatory writing strategy than male. Additionally, the six strategy factors, composed such as writing planning, monitoring goals, evaluation, emotional control

and memorization also metacognitive gained significant effects on writing performance. Anggraeni et al. (2022) dealt with the study of self-regulated writing. Worthy finding revealed that self-regulated learning in writing enhanced students accomplishment, fostered up writing level, gathered pivotal role in writing process and assist students writing better. Those pin points that self-regulated learning in writing affected worthy in writing proficiency level, increasing critical thinking, and motivating students and easing scaffolding in writing. The spread of AI tools mediation for writing commonly spread and was used by educators and students to enhance their writing proficiency level and achievement. This deals with the progress and process of educational fields, ultimately in writing skills, are not stuck. Reaching better writing achievement is not only relying on writing strategy, but also it could be interlinked with AI tools to provide feedback, scaffolding and so forth. The stage either process of writing or writing goals would be optimally reached out. Mohebbi (2025) reported valuable finding was that AI tools enhanced language learning outcomes through leveraging engagement, addressing immediate feedback, bridging personal learning experiences and correcting grammar errors. Zhou et al. (2024) argued AI could manage conducive learning environment to evolve higher order cognitive skills, and bolster self-regulated learning. Promoting AI combined with self regulated learning guide on the student writing performances and goals better.

CONCLUSIONS

This study concludes that the integration of Artificial Intelligence (AI) with self-regulated learning positively supports academic writing development. AI can be integrated into all stages of self-regulated learning, including planning, organizing, monitoring, and revising, by providing additional feedback and learning support alongside educators and peers. The findings indicate that this integration improves writing proficiency, enhances higher-order thinking skills, reduces writing anxiety, and provides effective scaffolding for students. These benefits contribute to cognitive, metacognitive, and affective development in academic writing. The study also highlights the importance of educator supervision in verifying AI-generated feedback to avoid bias and ensure writing quality. Theoretically, this research contributes to a new perspective on AI-assisted academic writing and its role in supporting learning processes. Practically, the findings suggest that educators should consider integrating AI tools into writing instruction and curriculum development. Future research is recommended to explore AI-supported self-regulated learning across different educational levels and language skills.

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