

The future of EFL students' creativity in English writing: thinking, acting, and learning in higher education in the age of AI

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Abstract

Applying Artificial Intelligence (AI) writing tools in language classrooms in universities is becoming increasingly popular since they simplify instructional tasks for English as a Foreign Language (EFL) teachers and offer the ability to enhance writing accuracy and support quality writing for EFL students (Baron, 2023; Roe et al., 2023). However, teachers' concerns about using these sophisticated AI writing tools highlight a re-evaluation of integrating these technologies into teaching and learning of EFL writing, particularly with regard to ethical issues and cognitive-linguistic challenges. The former includes students' plagiarism and academic integrity in writing assignments, whereas the latter refers to discouraging their thinking and creativity in writing (Lund & Wang, 2023; Roe et al., 2023). In contrast, the process writing approach can minimise these concerns as it emphasises the importance of linguistic writing skills, and encourages students' cognitive functions, including creativity in writing (Bailey, 2015; Hyland, 2019; 2021; Johnson, 2024). This paper examines the transformative potential of language education, especially writing, in higher education settings by integrating insights from the human-driven writing approach with the neuroscience perspective. It also contributes to the discourse on innovative language education practices that are replicable across diverse learning contexts, coupled with the recognition that language education remains both influential and prepared for the future. Moreover, this article argues for adopting the process writing approach as a potential solution to support students' creativity and writing skills development over AI writing tools by promoting critical thinking, fostering effective communication, strengthening students' active engagement in English writing activities, and preserving the human dimensions that ultimately lead to meaningful learning within higher education contexts.

Keywords: *AI writing tools, cognitive-linguistic challenges, creativity, EFL students, ethical issues, neuroscience, the process writing approach, writing skills*

Introduction

English writing skills are crucial for English as a Foreign Language (EFL) students for several reasons. Firstly, proficiency in English writing facilitates effective communication in various academic and professional settings. As English is widely used as a global lingua franca, possessing strong writing skills enables EFL students to convey their thoughts, ideas, and research findings proficiently to a broader audience (Hyland, 2021; Johnson, 2024; Rianti, 2023; Young & Ferguson, 2020). Whether composing academic essays, reports, or emails, the ability to express one's self clearly and coherently in written English is indispensable. Moreover, mastering English writing enhances EFL students' academic performance. Many academic assessments, especially in higher education, heavily rely on written assignments. Students who excel in writing are better equipped to articulate their knowledge and understanding of course materials, leading to higher grades and academic success. Additionally, proficient writing skills empower EFL students to engage more actively in scholarly discussions, contribute to academic debates, and produce well-structured arguments supported by evidence (Hyland, 2021; Young & Ferguson, 2020). Furthermore, English writing proficiency opens opportunities for EFL students in the global job market. In today's interconnected world, employers value candidates who can communicate effectively in written English, regardless of their native language. Lee and Schmidgall (2020) declared that strong writing skills enable EFL students to create compelling resumes, cover letters, and professional documents, thereby increasing their employability and career prospects.

While mastering English writing skills is important, creativity in English writing is equally essential for EFL students as it fosters critical thinking, innovation, and self-expression. By encouraging creativity, students can break away from conventional language patterns and explore alternative ways of expressing themselves. This

not only enhances their linguistic fluency but also encourages them to develop their unique voice and style in writing (Godwin-Jones, 2018; Hyland, 2021; Johnson, 2024). Creative writing assignments allow them to unleash their imagination, experiment with language, and cultivate a deeper appreciation for English literature and culture.

Hence, acquiring English writing skills plays a pivotal role in the academic, professional, and personal development of EFL students as the proficiency in writing enables effective communication, enhances academic performance, expands career opportunities, and fosters creativity and critical thinking. Therefore, teachers should emphasise the development of English writing skills and provide ample opportunities for students to explore their creative potential in writing.

Although EFL teachers and students acknowledge the significance of attaining proficiency and nurturing creativity in English writing, the proliferation of AI writing tools within academic settings has increased noticeably following their introduction in 2022. This trend has significantly influenced EFL teaching and learning, particularly in the field of writing (The Stanford school, The Stanford Institute for Human-centred Artificial Intelligence [HAI], and The Stanford Accelerator for Learning, 2023). Students often turn to these tools to generate texts for their assignments when they encounter difficulties in getting started or organising their ideas. According to HAI et al. (2023) and Lund and Wang (2023), while this practice can help students overcome initial hurdles, it may lead to excessive reliance on AI writing tools, potentially hindering their creativity, since the writing process fosters originality, critical thinking, and expression of individual ideas while encouraging students to explore language nuances, experiment with different writing styles, and develop their unique voice.

Several researchers advocate an alternative approach to teaching writing, which is known as *process writing* (Hyland, 2019, 2021; Johnson, 2024; Rianti, 2023), which conveys numerous advantages in fostering students' creativity while enhancing their English writing skills. The author explored the discourse surrounding the utilisation of AI writing tools, juxtaposed with the human-driven approach of *process writing* in this article, which follows Hyland's (2019, 2021) five stages of process writing — pre-writing, drafting, editing, revising, and publishing. While Hyland's framework seems to be influenced by Graves' (1983) foundational research on writing, Graves (1983) originally viewed writing as a recursive process and notes common processes among all writers, highlighting the importance of planning, writing and revising stages without defining fixed stages. All in all, *the process writing approach* seems to be a promising solution, as it ensures students' active engagement in the writing process and develop essential critical thinking and composition skills in writing.

In the following sections, the author will present an exploration of writing as a cognitive and creative process, which is followed by an analysis of the challenges faced by EFL students today. The discussion continues with the emergence of AI writing tools and their implications as well as three approaches to teaching writing. Later, it delves into the cognitive and metacognitive benefits of *process writing*, supported by empirical evidence, and highlights the ethical and pedagogical risks associated with AI-generated writing in foreign language acquisition. Finally, key insights and implications of how AI writing tools and the process writing approach influences students' long-term creativity in English writing will be scrutinised.

Writing as a cognitive process

Second language (L2) writing denotes the process of articulating thoughts and ideas through written communication in a language distinct from one's native language. Within the realm of second language acquisition (SLA), mastering writing skills in a new language is widely acknowledged as a formidable challenge for EFL students due to the inherent complexity of the task (Godwin-Jones, 2018). Writing entails intricate cognitive procedures, encompassing the formulation of conceptual frameworks, the translation of mental constructs into tangible linguistic expressions, and the synthesis of personal experiences and acquired knowledge on diverse subjects. According to Hyland (2019, 2021) and Rianti (2023), writing entails a series of cognitive processes, such as pre-writing activities, drafting, editing, revising, and publishing, each constituting integral stages in the overarching writing process. Therefore, several researchers from various disciplines, including cognitive psychology, stylistics, rhetoric, text linguistics, critical library theory, hypertext theory,

second language acquisition, and writing pedagogy, have also extensively investigated the nuanced dynamics involved in the writing processes of both novice and proficient writers (József, 2001).

As mentioned above, writing is fundamentally a cognitive process that engages various mental faculties and cognitive mechanisms. At its core, writing involves the intricate interplay of cognitive functions, such as memory, attention, language processing, and executive functions (József, 2001). During the initial phase of writing, known as pre-writing, students generate ideas, organise thoughts, and plan the structure of their composition. Subsequently, the drafting stage entails translating these mental representations into written language, requiring the integration of linguistic rules, vocabulary, and syntactic structures. As the writing progresses, writers engage in processes of editing and revision, wherein they critically evaluate and refine their text to enhance clarity, coherence, and effectiveness (Hyland, 2021; Johnson, 2024; Rianti, 2023). Throughout this iterative process, second language students draw upon their metacognitive skills to monitor and regulate their cognitive activities, ensuring alignment with their communicative goals. Ultimately, writing serves as a dynamic means through which individuals express, refine, and communicate their thoughts, contributing to the development of complex cognitive abilities.

Writing as a creative process

Botella et al. (2018) claim that writing is inherently a creative process, requiring students to tap into their imaginative faculties and draw upon their reservoir of prior knowledge and experiences. As students engage in writing tasks, they are tasked with the challenge of articulating their unique perspectives, insights, and interpretations through the written medium. This necessitates the synthesis and integration of their existing knowledge with newfound ideas, fostering intellectual growth and deeper understanding. By expressing their ideas in writing, students not only demonstrate comprehension of subject matter but also exercise autonomy and self-expression, thereby cultivating their individual voice and identity as writers (Godwin-Jones, 2018; Hyland, 2019, 2021; Johnson, 2024; Yeung, 2015). Through this dynamic interplay between personal reflection and scholarly inquiry, students imbue their writing with authenticity and originality (Botella et al., 2018; Roe et al., 2023), thereby enriching the discourse and contributing to the broader landscape of knowledge acquisition and dissemination.

On the other hand, according to Archer (2017), writing is a creative endeavour that involves several stages requiring effort, artistry, technique, imagination, knowledge, and skill to ensure effectiveness. Thus, to produce quality writing, it is essential for students to not only follow these stages but also to value their uniqueness by employing their imagination and creative abilities. For them, an understanding of the writing processes can assist in translating their creative ideas into written form. Besides, a creative mindset enables students to develop imaginative writing based on their knowledge and creativity. According to Botella et al. (2018), creativity involves the ability to generate novel experiences characterised by originality, uniqueness, and extraordinariness, thus introducing fresh ideas and perspectives into a work. This implies that to produce high-quality writing, writers must integrate these various elements. As asserted by Smith (2013), embracing risk is inherent in creativity, prompting individuals to venture beyond established boundaries into uncharted territory. Consequently, writers must boldly express their ideas and thoughts in their writing, employing captivating language to underscore the inherent creativity of their work. By doing so, students enhance their understanding and appreciation of their creative writing. Moreover, fostering creativity in English writing empowers students to engage more deeply with the language, leading to richer and more nuanced written communication.

Why writing is a difficult skill to master for EFL students

While it is acknowledged that mastering English writing serves as a means for EFL students to unleash their creativity, broaden their knowledge, and enhance their language proficiency, many students encounter difficulties in achieving proficiency due to various reasons. These challenges include a lack of confidence in their writing abilities (Hyland, 2021; Johnson, 2024; Rianti, 2023; Young & Ferguson, 2020), struggles with initiating a text, organising the following paragraphs, concluding the final text, and a deficiency in technical

writing skills such as pre-writing, drafting, editing, and revising (Godwin-Jones, 2018; Hyland, 2021; Johnson, 2024). Furthermore, many encounter inadequate instructional support from teachers and a pervasive lack of motivation among them, which, unfortunately, leads to their poor writing performance. It is essential for EFL teachers to develop effective strategies that not only address these challenges but also foster a more motivating learning environment to facilitate students' improvement in English writing skills by encouraging their creativity in writing (Hyland, 2021; Wallace & Ruegg, 2020).

The emergence of AI writing tools: its effectiveness and limitations in the acquisition of EFL writing

Since late 2022, an unprecedented technological explosion in the field of artificial intelligence (AI) has been observed across various sectors. One significant outcome of this technological advancement has been the emergence of AI writing tools such as Chat Generative Pre-Trained Transformer (ChatGPT), QuillBot, Copy.ai, Writesonic, SurferSEO, and DeepSeek. These tools leverage cutting-edge natural language processing algorithms to generate human-like text autonomously, offering a wide array of applications across industries, including education (Gustilo et al., 2024; Lund & Wang, 2023; Roe et al., 2023).

In the realm of second language acquisition (SLA), AI writing tools have garnered considerable attention for their potential to enhance the writing skills of language students to some extent. By providing students with immediate feedback on grammar, spelling, punctuation, and style, these tools offer invaluable support in the writing process (HAI et al., 2023; Roe et al., 2023). Moreover, AI writing tools can assist students in generating coherent and grammatically correct sentences, thereby alleviating some of the challenges associated with expressing themselves in a new language. Through consistent practice and interaction with AI writing tools, students can refine their writing abilities and gain confidence in expressing their ideas effectively in a second language.

Furthermore, the effectiveness of AI writing tools in second language writing acquisition extends beyond mere grammar correction. These tools often provide language students with access to vast repositories of writing prompts, vocabulary suggestions, and model texts, facilitating independent learning and promoting language fluency (HAI et al., 2023; Lund & Wang, 2023). Overall, the emergence of AI writing tools represents a promising development in language education, offering innovative solutions to the challenges faced by second language students in developing their writing skills.

Despite their numerous benefits, AI writing tools also pose several disadvantages to students' acquisition of writing skills. Firstly, overreliance on AI tools may hinder the development of students' critical thinking and creativity (Lund & Wang, 2023; Roe et al., 2023; Zhai et al., 2024). By providing instant corrections and suggestions, these tools may discourage students from engaging in the cognitive processes (Escorcia, 2024; Wen et al., 2023) necessary for independent writing, such as brainstorming, problem-solving, and self-editing. Consequently, students may become dependent on AI assistance, resulting in a passive approach to writing rather than active engagement with the content.

Secondly, AI writing tools may perpetuate a one-size-fits-all approach to writing, overlooking the individualised needs and learning styles of students. These tools often prioritise standardised grammar and style conventions, neglecting the nuances of language and expression. As a result, students may feel constrained by rigid writing norms imposed by AI algorithms, stifling their ability to develop a unique voice and writing style (HAI et al., 2023; Lund & Wang, 2023; Roe et al., 2023). According to the researchers, AI writing tools may inadvertently reinforce errors or biases present in their training data. While these tools are designed to improve writing accuracy, they are not immune to errors or biases inherent in their programming or dataset. Students may unknowingly adopt incorrect grammar or biased language patterns suggested by AI tools, thereby perpetuating inaccuracies or reinforcing stereotypes in their writing.

Furthermore, the use of AI writing tools may contribute to ethical concerns, particularly regarding plagiarism and academic integrity (Gustilo et al., 2024; Roe et al., 2023). Students may misuse AI-generated content, either intentionally or unintentionally, leading to instances of plagiarism. Additionally, the automated nature of AI writing tools may make it challenging for educators to detect instances of academic dishonesty, undermining the integrity of assessment processes.

While AI writing tools offer valuable support in the writing process, their use in educational settings must be approached with caution. Educators should encourage students to balance the benefits of AI assistance with the development of essential writing skills, critical thinking, and ethical awareness. Moreover, ongoing research and interviews are needed to address the limitations and challenges associated with the integration of AI writing tools in students' acquisition of writing skills.

Approaches to teaching writing

According to Bailey (2015), Caplan and Johns (2022), and Hyland (2019, 2021), teaching writing in academic contexts encompasses three approaches, each with distinct focuses and methodologies. These approaches are *the product approach*, *the process approach*, and *the genre approach*.

The product approach in writing instruction emphasises the final written output as the primary objective, prioritising the result over the process itself (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021). Under this approach, students are typically guided through a structured process focusing on discrete components such as grammar, syntax, and organisation. Teachers often model well-written pieces and deconstruct their structure and language to aid students in producing similar work, providing detailed feedback and revision guidance (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021). However, *the product approach* tends to neglect pre-writing activities essential for idea development and effective organisation, potentially limiting students' creativity and inducing pressure to produce flawless final products (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021).

Conversely, *the process writing approach* centres on the writing process itself rather than the finished product, advocating for a student-centred methodology (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021; Johnson, 2024; Young & Ferguson, 2020). This approach guides students through cognitive stages such as brainstorming, drafting, editing, revising, and publishing, following Hyland's five-stage framework, and viewing writing as a recursive process that involves multiple revisions (Bailey, 2015; Caplan and Johns, 2022; Graves, 1983; Hyland, 2019, 2021; Johnson, 2024; Young & Ferguson, 2020). In this approach, students are encouraged to write freely, receive peer feedback, and make revisions, promoting skill development and ownership of their writing (Hyland, 2021; Young & Ferguson, 2020).

Additionally, *the genre approach* builds upon *the product approach* by instructing students in specific writing genres such as narratives, persuasive essays, and research papers, aiming to develop versatile writing skills applicable across various contexts (Caplan & Johns, 2022; Hyland, 2021). However, this approach primarily emphasises the final product and may not adequately address the writing process, potentially hindering students' skill development (Caplan & Johns, 2022; Hyland, 2021).

In comparison, while *the product approach* prioritises the final product meeting predefined criteria, *the process approach* focuses on students' skill development and creativity, making it more suitable for novice writers who are still developing their writing proficiency, regardless of their age or educational level (Bailey, 2015; Caplan & Johns, 2022; Hyland, 2021; Johnson, 2024; Young & Ferguson, 2020). Thus, higher education students may be considered novice writers in this sense. Since AI writing tools are increasingly utilised in higher education contexts, this theoretical study focuses on higher education students as the process writing approach is likely to play a stronger role in enhancing their creativity in writing compared to AI writing tools. Moreover, plagiarism and ethical concerns in writing assignments as essential considerations in higher education further justify the focus on them.

However, *the process writing approach* is not without its limitations. One significant drawback is its time-consuming nature. Implementing this approach in classroom settings may require a considerable investment of time, particularly if students are unfamiliar with its principles. Research suggests that while *the process writing approach* may be more suitable for higher education students compared to young learners, its complexity can pose challenges for the latter group. Young learners may encounter difficulties with tasks such as editing their texts and engaging in pre-writing activities. Additionally, while some teachers may already incorporate elements of *process writing* in their teaching practices, they may not explicitly recognise it as such due to its technical and academic terminology (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021).

Moreover, successful implementation of *the process writing approach* necessitates adequate teacher training to ensure proper application in the classroom, as teacher expertise plays a crucial role in enhancing students' writing performance through this approach (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021; Rianti, 2023; Young & Ferguson, 2020).

The cognitive and metacognitive benefits of process writing over AI-assisted writing

Writing is fundamentally regarded as a cognitive and metacognitive process that involves several mental faculties such as memory, problem-solving, linguistic processing, and creativity of language learners (Escorcia, 2024; Hyland, 2021; Johnson, 2024; Li, 2023). As discussed above, *the process writing approach* strengthens these abilities through its structured stages of pre-writing, drafting, revising, editing, and publishing, which allow learners to establish logical thinking, refine ideas, and explore linguistic creativity through iterative engagement with their texts. The essence of *the process writing*, more importantly, is that it supports students to develop deeper cognitive pathways by letting them actively generate, evaluate, and reformulate their ideas rather than passively absorbing pre-defined structures or patterns (Hyland, 2021; Johnson, 2024; Wen et al., 2023; Xu et al., 2021).

On the other hand, AI-assisted writing significantly discourages those essential cognitive processes of students. When students rely on AI-writing tools such as ChatGPT, QuillBot, or Grammarly to generate sentences for their essays, they unintentionally skip the fundamental engagement necessary for their writing skills development. Applied linguistics and cognitive psychology research throughout history claim that students' deep engagement is essential for promoting their writing performance (Hyland, 2021; Johnson, 2024; Reschly & Christenson, 2022; Rianti, 2023; Wen et al., 2023), whilst a ready-made output is produced by AI-writing tools in which students do not engage in problem solving and linguistic practices which are needed to acquire effective writing skills. Consequently, the opportunity to remain in correspondence with enhancing grammatical precision, lexical diversity, and overall linguistic creativity becomes less, ultimately leading to superficial language development, especially in writing (Hyland, 2021; Rianti, 2023).

Furthermore, *the process writing approach* encourages students to elicit a higher degree of cognitive investment in the composition process in written texts since writing involves brainstorming, decision-making, planning, and conceptual organisation, rather than simply producing grammatically correct sentences (Bailey, 2015; Hyland, 2021; Teng, 2022; Wallace & Ruegg, 2020). While AI tools provide syntactical corrections, the above integral aspects of writing development are not guaranteed. In other words, relying on AI-generated texts represents a cognitive shortcut that significantly diminishes the pedagogical value of writing as an intellectual exercise, which may result in weakened critical thinking skills and linguistic autonomy, lessening students' ability to articulate complex ideas independently in creating texts in the long term (Johnson, 2024; Kemmerer, 2023; Li, 2023; Wen et al., 2023; Zhai et al., 2024).

Metacognition and self-regulation in writing

Several researchers have acknowledged that metacognitive skills, including self-monitoring, planning, and evaluating one's writing, are indispensable in promoting students' writing proficiency (Escorcia, 2024; Teng, 2022; Wen et al., 2023). *The process writing approach* inherently fosters these skills by encouraging students to reflect on their own decisions, make structural and lexical choices in their writing, and revise their work based on their critical self-assessment (Bailey, 2015; Caplan and Johns, 2022; Hyland, 2021; Johnson, 2024; Young & Ferguson, 2020). By doing so, students may receive an opportunity to enhance their ability to regulate writing strategies, while the teacher is fostering an autonomous learning environment. This may allow students to strengthen their self-regulated learning strategies, increase their willingness to write well, and enable them to identify and correct errors, refine arguments, and develop unique writing styles by themselves.

Conversely, relying on AI-generated written texts weakens these metacognitive processes because students transfer decision-making responsibilities to the algorithm when they apply AI tools to generate ready-made texts, resulting in diminishing the ability to express original ideas in writing and critically assess

their writing (Baron, 2023; Escorcia, 2024; Wang, 2024; Zhai et al., 2024). This may lessen their reflective practice, critical thinking, and questioning skills due to the fact that they cannot simply deny AI-generated ideas, failing to question the relevancy of those ideas in autogenerated text. As a result, the ability to develop metacognition and transfer skills to a new and unfamiliar context becomes weakened, decreasing their ability to write academically.

In addition, the process of writing allows students to experience the iterative nature of writing in a self-directed manner since the practice of revising and editing drafts fosters a deeper engagement with the target language (Escorcia, 2024; Hyland, 2021; Teng, 2022) while relying on AI-generated texts provides limited opportunities to refine their texts when needed. Over-reliance on AI written products may discourage students' confidence in creating their own texts and promote their dependence on ready-made texts rather than implementing real linguistic competence.

The role of cognitive load in AI-generated writing

Cognitive load theory claims that students ensure meaningful learning when they are provided an opportunity to actively process and disseminate information to others rather than passively absorb it (Garnett, 2020; Lovell, 2020; Sweller, 2019). Various researchers viewed that writing is a form of cognitively demanding task as it requires students to handle diverse forms of cognitive load, include intrinsic load (understanding grammar and syntax), extraneous load (navigating formatting and structure of a written task), and germane load (integrating ideas to produce a coherent text) (Kormos, 2023; Li, 2023; Xu et al., 2021). When students incorporate these cognitive demands in the writing process, they will be able to gradually develop the necessary skills, which are required to improve their writing quality by repeatedly practicing and actively engaging with the second language.

AI-generated texts decrease demands of those cognitive loads, since the use of AI tools reduces germane cognitive load by pre-emptively producing full sentences and paragraphs (Kormos, 2023; Wang, 2024; Zhai et al., 2024). As a result, students become unmotivated to engage in the language learning process in-depth, which may lead to shallow linguistic retention and weaker overall writing proficiency. Recent empirical studies indicate that students who frequently rely on AI-generated texts struggle with applying the cognitive loads in writing, such as internalising syntactic and lexical structures, which weakens their ability to independently produce unique and better writing (Baron, 2023; Wang, 2024, Zhai et al., 2024). Ultimately, when students engage less in creativity, critical thinking, and problem-solving, cognitive engagement in their learning writing is reduced (Baron, 2023). This reduced engagement could negatively affect multiple areas of their life, like their academic performance, effectiveness at work when they start their career in future, and their communication in real-world scenarios (Kormos, 2023; Xu et al., 2021). In the long run, reduction in cognitive load brings several undesirable consequences that extend beyond second language learning, potentially dimming overall academic and intellectual development.

The neuroscientific perspective: brain engagement in writing vs. AI-assisted writing

Recent neuroscientific research announced that cognitive engagement is essential in learning writing (Clark, 2023; Kemmerer, 2023; Sweller, 2019). According to the studies on brain activity, the writing process encourages complex cognitive functions including creativity, brainstorming, problem-solving, semantic retrieval, and syntactic structuring, as well as engaging the prefrontal cortex (PFC), which means the front part of the frontal lobe of the brain, located just behind the forehead, which is responsible for higher-order cognitive functions mentioned earlier (Costa, 2021; Gkintoni et al., 2025). When students produce text, their brain starts working. In medical terms, they activate their neural pathways, which are associated with executive function, working memory, and linguistic creativity (Kormos, 2023; Li, 2023). By repeatedly practicing the brain functions, they will develop the writing skills needed to achieve proficiency in academic writing (Costa, 2021; Sweller, 2019).

In contrast, AI-assisted writing neglects the importance of those cognitive responsibilities by focusing only on the algorithm, and reducing the engagement of the prefrontal cortex, which may significantly lead to a

negative impact on students' long-term writing development (Gkintoni et al., 2025; Gustilo et al., 2024; Li, 2023; Zhai et al., 2024). From this phenomenon, it can be observed that AI writing tools have limitations such as not being able to contribute to the deep cognitive processing necessary for sustainable writing skills acquisition, including creativity, while they may provide immediate, fluent and grammatically accurate texts.

Empirical evidence: the effect of process writing on students' creativity

Case studies in EFL contexts

According to diverse second language acquisition studies with a special focus on writing, *the process writing* has significant benefits in developing students' writing performance, particularly in implementing students' creativity and engagement. Hyland (2019, 2021) and Young and Ferguson's (2020) empirical studies explored the impact of *process writing* on students' creativity, narrative, and argumentative writing skills. Their findings showed that applying *the process writing approach* enhanced the participants' ability to create intricate and compelling narratives, use greater lexical diversity in their texts, and construct stronger argumentative sentences. Moreover, students were able to refine their ideas and develop more cohesive and logical texts by using drafts and self-reflecting while writing. The findings also claim that the participants exhibited higher levels of engagement since they were intrinsically motivated by a true enjoyment of writing as opposed to perceiving writing as a task to be accomplished assigned by the teacher.

Similarly, research by Yeung (2015) noted that the participants, who were EFL students, acknowledged a sense of autonomy during writing, which is particularly important for students who write better when allowed to express their ideas freely and independently. As a cognitively demanding process, the participants enjoyed conceptualising ideas, organising arguments, and refining linguistic concepts, which strengthened their creativity in writing. These findings suggest that the *process writing* should be implemented in writing classes where students can actively engage with their writings in order to promote creativity in second language acquisition.

The ethical and pedagogical risks of ai-generated writing in second language acquisition

Plagiarism and the loss of student agency

Second language teachers, especially in higher education, demonstrate concerns about students using AI writing tools as a heightened risk of plagiarism and the erosion of academic integrity (Baron, 2023; Gustilo et al., 2024; Pecorari, 2024; Roe et al., 2023). They are concerned that these AI tools may even make it easier for students to accidentally copy someone else's work without providing proper citations, leading them to believe they can use the information as their own. This can lead to plagiarism and, consequently, academic integrity is obviously questionable, which results in violating ethical writing standards and students' creativity in writing. According to Gustilo et al. (2024) and Pecorari (2024), consequently, their ability to think critically, develop original ideas, express those ideas freely and independently, construct well-supported arguments, and ultimately, the role of academic and intellectual development will be neglected.

Moreover, AI-assisted writing can lead to a loss of student agency since they become passive learners rather than engaging themselves in developing writing (Baron, 2023; Cardon et al., 2023). On the one hand, *process writing* improves students' voices and critical thinking skills, elevate unique opinions, and engage with the subject matter in-depth, but on the other hand, AI tools allow students to depend on ready-made and immediate sentences or paragraphs, neglecting the role of cognitive loads which are essential for academic success and lifelong learning.

The role of universities in regulating AI use in teaching writing

Since AI tools have become increasingly integrated into academic settings, several researchers recommend that universities develop clear policies to regulate their use in teaching writing (Baron, 2023; Cardon et al., 2023). Numerous universities across worldwide have already implemented strict guidelines, banning AI generated writing in students' assignments, due to ethical concerns discussed above such as originality, academic integrity and plagiarism issues (Baron, 2023; Lund & Wang, 2023). Although it may not be possible

to eliminate the use of AI in education settings, especially in higher education, EFL teachers and policymakers should mainly emphasise the fundamental cognitive processes engaged in writing. For instance, they can identify students' grammatical errors, sentence patterns, and organisation of paragraphs in their assignments, as well as providing constructive feedback to support student creativity in writing (Clark, 2023; Kormos, 2023).

Simultaneously, recent studies pointed out that it is important to maintain a balance between encouraging students' creativity in writing and addressing ethical concerns in teaching writing as the creativity and ethics seem to be two ends of the same continuum in this AI age for the reason that the former allows students to think freely and explore new ideas, while the latter can enhance creativity by generating ideas especially when students feel exhausted in brainstorming or thought-blocked (Baron, 2023; Zhai et al., 2024). The researchers also added that universities should develop their present curricula by integrating AI literacy programmes to educate students on how to ethically and effectively use AI while encouraging their own creative and intellectual development on the other hand. It is recommended that teachers focus on guiding students in using AI as a learning tool for reviewing and giving feedback on their written products rather than relying on it to think critically and generate ideas (Cardon et al., 2023; Gustilo et al., 2024; Wang, 2024). By doing so, universities may be able to help students cultivate responsible writing practices while ensuring the integrity of their academic writing. While teachers may not be able to prevent students' use of AI tools outside of class, they can guide students to use the tools correctly and ethically in classrooms.

Conclusion

Several questions remain regarding the advancement of AI writing tools in academic contexts. What further improvements can be made to these technical tools? To what extent can the AI explosion continue? Should the focus be on writing texts quickly or devoting the time needed to write texts created by students? What impact will the increasing use of AI- writing tools have on students' learning and growth? How will universities measure ethical considerations regarding students' written texts, such as originality, plagiarism, and proper source attribution given that certain AI detection tools, such as QuillBot and Turnitin, exhibit several disadvantages, such as being costly and having limited accuracy identifying more advanced or nuanced forms of AI-generated content. Finally, would it be best practice for EFL students and teachers to eliminate the use of AI writing tools in the future?

These questions persist as formidable challenges within the realm of teaching L2 writing, but the adoption of *the process writing approach* emerges as a potential solution to ease some of the problems related to the complex issue of AI-generated texts in higher education. By emphasising the iterative nature of writing and fostering students' creativity throughout the writing process, regardless of the presence of AI writing tools, *the process writing approach* seems to be a promising option for enhancing students' writing proficiency. Furthermore, this approach prioritises student engagement and ownership of their writing, aligning with the broader goals of education in promoting critical thinking and independent learning (Hyland, 2021). In proposing the implementation of *the process writing approach*, teachers aim to cultivate students' ability to generate and articulate ideas effectively while navigating ethical considerations and technological advancements in writing instruction.

By positioning language education as a catalyst for interdisciplinary learning in increasingly digital and diverse educational contexts, this paper bridges theory and practice to strengthen students' engagement and cognitive development as well as to improve their writing skills development, while maintaining ethical guidelines, focusing on an innovative writing approach grounded in neuroscience perspective, regardless of linguistic and cultural boundaries. Implementing *the process writing approach* in EFL writing classes within higher education is universally beneficial because writing remains a fundamental skill that surpasses different linguistic and cultural contexts. Teachers can foster students' creativity and active engagement through *process writing* by equipping them to think critically and independently and be given the opportunity to develop their unique voices by refining their ideas over multiple drafts. By prioritising student-centred writing instruction through this human-driven writing approach, second and foreign language teachers worldwide can support students to become independent and confident writers who can creatively express their ideas in

their writings, and who can communicate effectively through writing in both academic and professional contexts, without concerns over ethical issues coupled with AI writing tools. Ultimately, this may lead the students to desired outcomes and success in their educational and career pursuits in the long term.

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