

AI-Assisted Feedback, Learner Engagement, and ESL Writing Development among Malaysian University Students: A Conceptual Framework

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DOI: <https://doi.org/10.47772/IJRISS.2026.100601324>

Received: 10 June 2026; Accepted: 15 June 2026; Published: 18 July 2026

ABSTRACT

The emergence of an increasing number of writing assistance tools using artificial intelligence (AI) has transformed feedback provision, text revision, and academic writing practice by university students. In the context of English as a Second Language (ESL), AI-assisted writing tools might assist in grammatical correction, vocabulary selection, sentence construction, idea formation, and writing. However, the pedagogical value of AI-assisted writing cannot be taken for granted based on the availability of the tool alone. Existing literature has focused on issues regarding learners' perception towards the tool, its efficacy, or the writing outcome. Yet, there is less conceptual discussion that explains the development of writing skills through the mediation of learners' engagement and feedback interaction via AI-assisted writing. This conceptual paper aims to provide a theoretically informed conceptual framework that could facilitate the development of ESL writing skills via AI-assisted writing among Malaysian university students through Sociocultural Theory, Technology-Enhanced Language Learning (TELL) theory, learner engagement theory, and written corrective feedback literature. The framework argues that AI tools can contribute to ESL writing development only when students actively notice, evaluate and apply feedback in ways that promote self-regulation and writing autonomy. Given its conceptual nature, this paper does not claim empirical validation; instead, it offers theoretically informed propositions for future mixed-methods and longitudinal research. The paper contributes to TESL scholarship by integrating technological affordances with learner-centred and context-sensitive pedagogical processes in Malaysian higher education.

Keywords: artificial intelligence, ESL writing, automated writing evaluation, learner engagement, feedback literacy, Malaysian higher education, conceptual framework

INTRODUCTION

Writing remains one of the most demanding skills for ESL learners because it requires the simultaneous control of grammar, vocabulary, syntax, cohesion, coherence, organisation, argumentation, and academic style. In Malaysian higher education, writing is particularly important because students are expected to produce assignments, reports, reflections, presentations, and research-based papers in English. Although many Malaysian students have studied English for several years before entering university, difficulties in producing accurate, coherent, and academically appropriate English texts continue to be reported in the literature (Fareed et al., 2016). These issues are not only connected with grammatical correctness but also with confidence, familiarity with academic writing norms, revision, and feedback.

New directions of AI-based learning have opened up new perspectives on helping students with writing skills. Automated writing assessment tools, grammar checking programs, intelligent tutoring systems, and generative AI are capable of detecting errors, proposing alternative lexical and syntactical options, modeling writing style, and providing assistance in the process of revision. Recent reviews of research in AI in higher education reveal that AI technology is increasingly becoming connected with the concepts of adaptive learning, assessment, personalization, and learner support (Bond et al., 2024; Crompton & Burke, 2023; Zawacki-Richter et al., 2019).

In terms of language learning, generative AI was also recognized as a resource for interaction, vocabulary building, and drafting (Kohnke et al., 2023; Song & Song, 2023).

However, it is important not to consider AI-assisted writing software as an automatic solution for ESL writers' writing problems since students may accept corrections provided by the software without fully comprehending why they need to be applied, be overly dependent on the software-generated content, and use the software predominantly to perfect their text but not to become skilled in writing. This is very important because writing skill development is not merely about producing a well-written piece of writing, but is more complex.

This paper therefore responds to the need for a theoretical understanding of AI-assisted ESL writing development. This paper contends that AI writing tools can serve as digital scaffolding when the feedback provided by these tools is productively incorporated into the learning process via learner engagement and feedback interaction. Feedback, in this context, is not important due to its immediacy or automation. It gains its educational importance when learners analyze, evaluate, and utilize feedback provided during revisions. Therefore, the main emphasis in this paper will be placed not on whether AI tools work, but rather on when AI-assisted feedback can become learning.

The goal of this conceptual paper is to create a theoretical framework of the relationship between AI-assisted writing tools, learner engagement, and feedback interaction in relation to ESL writing development among Malaysian university students. The central conceptual question of this paper is as follows: What is the theoretical relationship between AI-assisted writing tools, learner engagement, and feedback interaction in relation to ESL writing development in Malaysian higher education?

Problem Statement and Conceptual Gaps

Digital technologies have diversified how students practice their writing skills and obtain feedback. Automated writing assistance through AI is especially applicable to ESL writing since AI tools can give instantaneous feedback in situations where it is lacking due to teachers' heavy workloads or other conditions. Automated feedback can help recognize issues concerning grammar, punctuation, vocabulary and sentences in general. Nonetheless, there is meta-analytic research proving that the impact of automated feedback on ESL writing depends on factors such as the mode of feedback, context, writing task, and the response of the learner (Fleckenstein et al., 2023).

The first conceptual challenge is the assumption that AI writing assistance tools are advantageous by nature. Even though these AI-assisted writing tools provide the immediacy and customization that are needed for students, they might also lead to excessive dependency on technology, superficial corrections and unthinking acceptance of AI-generated feedback. As stated by Kasneci et al. (2023), large language models create educational opportunities, but they also pose risks in terms of accuracy, integrity, and learners' dependence on the feedback.

The second problem concerns the limited conceptual integration between AI-assisted writing tools, learner engagement, and feedback interaction. Studies on automated writing evaluation suggest that learners respond to feedback in varied ways: some revise deeply, some focus only on surface-level grammar, and others ignore or misunderstand feedback. Zhang and Hyland (2018) showed that engagement mediates the ways learners use teacher and automated feedback. Similarly, Yang (2024) demonstrates that interaction with AI-programmed feedback is complex and shaped by learner interpretation, response and trust. These studies suggest that AI feedback must be examined as a learning process rather than as a simple correction mechanism.

The third issue is context-dependent. The Malaysian university students exist in particular language, institutional, and technological contexts. They might vary in terms of their English abilities, access to paying services, confidence in their writing skills, knowledge of technologies, and use of AI ethically. At the institutional level, universities may also differ in AI guidelines, lecturer preparedness, and assessment design. Therefore, a general model of AI writing support may not sufficiently explain the Malaysian ESL higher education context.

The conceptual gap addressed in this paper is the absence of a framework that links AI-assisted writing tools, learner engagement, feedback interaction, and ESL writing development in a context-sensitive way. The proposed framework conceptualises AI feedback as a mediational tool rather than a substitute for pedagogy. It also positions learner engagement and feedback interaction as the mechanisms through which AI-assisted writing support may contribute to writing development.

METHODOLOGICAL APPROACH OF THE CONCEPTUAL PAPER

This paper adopts a conceptual analysis approach to develop a theoretical framework explaining the relationship between AI-assisted writing tools, learner engagement, feedback interaction and ESL writing development. As a conceptual paper, it does not collect primary empirical data or statistically test hypotheses. Instead, it synthesises existing literature from AI in education, technology-enhanced language learning, second language writing, learner engagement and written corrective feedback.

The literature reviewed in this paper was selected based on its relevance to four main areas: AI-assisted writing support, ESL or L2 writing development, learner engagement with feedback, and technology-mediated language learning. Priority was given to peer-reviewed journal articles, particularly studies published in applied linguistics, educational technology, second language writing, and higher education journals. Policy documents were used only to support the Malaysian contextual discussion.

This approach is appropriate because the purpose of the paper is not to measure the effectiveness of AI tools empirically, but to clarify the theoretical processes through which AI-assisted feedback may support ESL writing development. The framework therefore provides conceptual propositions that can guide future empirical research, particularly mixed-methods and longitudinal studies involving Malaysian university students.

REVIEW OF KEY CONCEPTS AND THEORETICAL FOUNDATIONS

ESL Writing Development

ESL writing development refers to the gradual improvement of learners' ability to produce accurate, coherent, meaningful and purposeful texts for academic and communicative purposes. It involves grammar, lexis, syntax, cohesion, coherence, organisation, argument development, genre awareness and audience sensitivity. In higher education, writing development involves the ability to revise texts, evaluate sources, formulate critical thoughts, and adhere to academic conventions.

It is necessary to distinguish between improved writing product and writing development. AI applications may assist learners in producing a better final text, but this is not evidence of learners having developed writing skills that they would be able to apply in other writing tasks. Writing development involves the internalisation of feedback by learners, identification of error patterns, and the application of newly acquired knowledge to writing. The difference is crucial for the proposed framework since AI assistance can result in a better text without any improvement in writing skills on the part of the writer.

The L2 writing research has always stressed the importance of feedback and revision. Corrective feedback is important for helping learners identify the gap between what they do now and how they are supposed to perform in terms of language use (Ellis, 2009; Ferris, 2010). Hyland and Hyland (2006) stress that the feedback is especially useful when connected with revision and dialogue. Therefore, any framework of AI-assisted ESL writing must consider not only the availability of feedback, but also how learners interpret and use that feedback.

AI-Assisted Writing Tools in ESL Learning

AI writing helpers are technology systems that employ machine learning techniques as well as natural language processing techniques or big language models to assist learners with writing activities. Such technology includes automated writing evaluation programs, grammar checks, spelling checks, intelligent tutors, translators, paraphrasers and generative AI writing helpers. For ESL writing, such systems can provide instant feedback, suggest alternative vocabulary, demonstrate sentence structures, and help with planning and revision.

Literature about automated writing evaluation indicates that such technology systems may be complementary to teachers' feedback in that they provide instant feedback and multiple chances for revision (Chen & Cheng, 2008; Warschauer & Grimes, 2008). Recent literature on AI and generative technology is similarly suggesting benefits to writing practice and motivation of the learner (Crompton & Burke, 2023; Kohnke et al., 2023; Song & Song, 2023). However, such benefits do not come automatically and depend on task design and other factors.

Another significant problem is that the feedback provided by the AI tool may be reliable regarding surface-level features of the text but unreliable regarding its meaning, argumentation, appropriateness of genre, or originality. The AI tool can also give some suggestions that would be fluent but would not correspond to the learners' intent. Thus, the AI tools used for writing should be viewed as sources of information that need to be mediated by teachers.

Learner Engagement

Learner engagement is an effective construct that can be applied to explain how the same technologies yield different results in different learners. According to Fredricks et al. (2004), engagement is behavioral, emotional, and cognitive. Behavioral engagement is defined as participation and perseverance in learning activities, while emotional engagement is associated with learner interest, self-confidence, and motivation. Cognitive engagement implies mental efforts of learners.

Behavioral engagement can be noticed in the process of frequent drafting, revising, and reviewing the feedback provided by the AI tool in the process of ESL writing assisted by the AI. Emotional engagement is related to increased confidence, reduced writing anxiety, and experimental use of language. However, cognitive engagement plays a crucial role because it requires evaluation of the AI feedback, comparison of alternatives, reflection on errors, and assessment of the relevance of feedback for conveying the message. This construct is also useful in preventing technological determinism. AI tools may provide opportunities for practicing and receiving feedback, while the level of learner engagement defines whether the opportunities are utilized effectively. That is why learner engagement is suggested to play the role of the mediating process.

Feedback Interaction and Feedback Literacy

Feedback interaction refers to the way learners notice, interpret, evaluate, and use feedback during writing. In AI-assisted writing, interaction is not limited to receiving corrections. It includes reading explanations, comparing AI suggestions with one's intended meaning, revising drafts, asking follow-up prompts, rejecting unsuitable suggestions and reflecting on recurring errors.

Research on L2 writing feedback shows that feedback becomes effective when learners engage with it behaviourally, affectively and cognitively (Han & Hyland, 2015; Mao & Lee, 2022; Zhang & Hyland, 2018). Automated feedback introduces a new dimension because it can be immediate and repeated, but it may also lack contextual judgement. Therefore, feedback literacy is essential. Feedback-literate learners are better able to appreciate feedback, make judgements about its relevance and use it for improvement rather than simple correction (Carless & Boud, 2018). In this model, feedback interaction becomes the tool through which the use of artificial intelligence in writing is linked to development. The model presupposes that the feedback provided by artificial intelligence aids in the process of development because it is utilized by learners in noticing, revising, and self-regulating.

Sociocultural Theory and Digital Scaffolding

Sociocultural Theory is a powerful approach for developing AI-aided writing as mediated learning. According to Vygotsky (1978), in the Zone of Proximal Development, learners can operate at a higher level than independently with the help of another person who is more experienced or through mediational means. In conventional approaches to teaching writing, scaffolding can be provided by teachers, peers, writing conferences, exemplary texts, and feedback.

AI-assisted writing can also feature various forms of digital scaffolding through prompts, corrections, explanations, and examples while learners work on drafts and revisions. Nonetheless, it cannot mean that AI eliminates the need for teachers or peers as scaffolders. From the sociocultural viewpoint, AI is to be seen as a mediational means that facilitates learners in the context of pedagogically structured tasks. This way, the effectiveness of AI depends on whether it is aligned with the developmental needs of learners and makes them more autonomous in writing.

This approach reinforces the theoretical framework since it prevents AI from being viewed as an apolitical technological means. AI-aided feedback is considered to be part of the mediated learning context influenced by task design, interaction, interpretation, and guidance.

Technology-Enhanced Language Learning

TELL offers a more general understanding of how technology is used in supporting language learning. The research in the field of TELL highlights the power of technology that can be used for increasing accessibility, interactivity, multimodality, autonomy, and learner-centeredness. Nevertheless, it is important to remember that technology will work effectively only when it is linked with proper pedagogy, meaningful tasks, and learning outcomes (Shadiev & Yang, 2020).

From the viewpoint of the use of AI in the process of ESL writing, TELL means that AI technologies should not be implemented just as a technical innovation. Rather, the AI tools should be implemented with reference to the goals of writing, revising, feedback analysis, ethics, and evaluation practices.

Theoretical Integration

Inclusion of the theoretical foundations in this study takes place in relation to their contribution to the proposed theoretical framework. Instead of including them as independent background theories, they are linked to certain aspects of the framework to explain them.

Theoretical lens	Framework role	Critical connection
Sociocultural Theory	AI tools as digital scaffolding and mediational resources	Explains how AI feedback may support learners within their developmental zone, but still requires teacher guidance and learner agency.
Technology-Enhanced Language Learning	Technology as a pedagogically designed learning environment	Explains why AI tools must be connected to writing tasks, revision activities and language-learning objectives.
Learner Engagement Theory	Behavioural, emotional, and cognitive engagement	Explains why students benefit differently from the same AI tool depending on participation, motivation, and depth of processing.
Written Corrective Feedback and Feedback Literacy	Noticing, interpretation, judgement, uptake, and revision	Explains how AI feedback becomes learning only when learners understand, evaluate and apply it meaningfully.

Table 1. Theoretical integration supporting the proposed conceptual framework

Malaysian Higher Education Context and AI Readiness

The Malaysian university setting is crucial within this framework as the use of AI-assisted writing does not take place within a neutral technological setting. Students in Malaysian universities have different linguistic and

academic backgrounds; therefore, their levels of writing ability in English can be very varied. While some of them will have sufficient access to technological tools, good internet connectivity and AI tools, other students might only be able to access free versions of the tools or those that universities provide. There is a danger of a digital divide in AI-aided writing development.

Another factor that needs consideration is institutional readiness. Despite Malaysia's higher education strategy stressing the importance of graduates' employability, digital transformation, and acquisition of 21st-century skills, the implementation of AI writing depends on the university policies, lecturers' readiness, and proper assessment procedures. The National Artificial Intelligence Roadmap for Malaysia 2021-2025 also stresses the importance of building AI capacity and responsible AI implementation across all sectors, including universities (Ministry of Science, Technology and Innovation Malaysia, 2021). Lecturer preparedness is especially important in ESL writing classes. Lecturers need to know not only how AI tools work, but also how to design writing tasks that require students to show process evidence, such as drafts, feedback logs, reflection notes and explanations of revision decisions. Without this support, students may use AI mainly to produce final texts, which can weaken authorship, originality and learning accountability.

Also, students must be literate in AI. Although students might be aware of how to apply AI technologies to their writing, they might be unaware of how to discern whether AI-provided feedback is reliable, appropriate or even ethical. As far as ESL writing is concerned, this is a particularly pressing problem, because the learners are likely to take as legitimate whatever is fluently written by the AI, despite its misleading of meaning, arguments, or failing to comply with assignment criteria. Therefore, there should be a set of regulations concerning acceptable use of AI, privacy, authorship, and other issues in Malaysian universities.

Thus, in terms of methodology, the focus on the Malaysian context is viewed not as merely a geographical setting of the study, but rather as specific conditions shaping how the feedback is accessed, interpreted, and used.

CONCEPTUAL SYNTHESIS

Based on the reviewed literature, the affordances of AI-assisted writing tools can assist in developing the writing skills of ESL learners, although under certain pedagogical and learner-related contexts. Immediacy, personalization, repetition, and responsiveness are the primary affordances of AI tools, which are important as ESL learners require repeated chances to practice and to revise their writing after receiving feedback. However, affordance alone is not sufficient for development.

The first theoretical connection concerns the relationship between the use of AI-assisted writing tools and learner engagement. AI-assisted writing tools can promote learner engagement because learners can get feedback immediately, revise their work several times, and practice at their own pace. However, learner engagement will depend on the perception of feedback by learners and whether they will be able to utilize it.

The second connection involves learner engagement and feedback interaction. An engaged learner will have greater chances of reading explanations, considering alternatives, and making real revisions. This connection is crucial since AI feedback can be approved, ignored, misconstrued, or even misused. Feedback interaction will describe how AI-assisted feedback is converted into writing-based learning experiences.

The third connection involves feedback interaction and ESL writing development. Feedback interaction will allow the learners to identify repeated errors, enhance language accuracy, increase vocabulary, gain control of sentence structure, and apply revision techniques. In some cases, writing development may occur from the above processes. However, when AI is employed to compose and edit text, writing development will not be achieved.

The synthesis of concepts thus avoids the general assumption that AI technology will inherently enhance ESL writing skills. Rather, it suggests a conditional approach by which AI writing aids can aid in ESL writing acquisition under the conditions of learner engagement behaviorally, emotionally, and cognitively with the feedback interaction.

Proposed Conceptual Framework

The suggested model develops theoretical associations between AI-enabled writing tools, learner engagement, feedback interaction, and writing development in the ESL environment of Malaysian university students. AI-enabled writing tools are suggested as the enabling construct in the theoretical model under discussion. They consist of automated writing evaluation tools, grammar checker software, intelligent tutoring systems and generative AI writing assistants.

Learner engagement and feedback interaction are suggested as mediating processes. Learner engagement is responsible for explaining how the learner is engaged in AI-aided writing activities and emotionally responds to AI-provided feedback. Feedback interaction mediates understanding of how learners detect, perceive, evaluate, and implement the feedback generated by AI technology.

The development of ESL writing ability is regarded as the learning outcome. It encompasses the development of accuracy, vocabulary management, sentence construction, coherence, organization, academic language usage, and revising strategies. Mediation by teachers, digital literacy, ethical consideration, and institutional preparation are also included in the context of this framework.

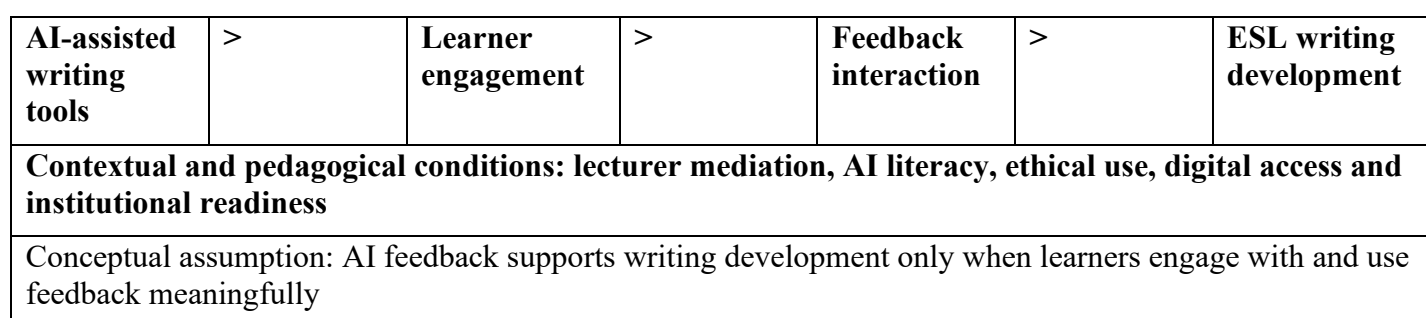


Figure 1. Proposed conceptual framework

DISCUSSION

The proposed framework contributes to TESL scholarship by moving the discussion of AI-assisted writing beyond tool effectiveness. Instead of assuming that AI feedback automatically improves writing, the framework explains how AI may support development through mediated learning, engagement and feedback interaction. This is important because students can use the same AI tool in very different ways. One learner may use it to understand recurring grammar problems, while another may use it only to produce a more polished final submission.

The framework also strengthens theoretical understanding by connecting four bodies of literature. Sociocultural Theory explains AI as a mediational scaffold, TELL explains the role of technological affordances and instructional design, learner engagement theory explains students' behavioural, emotional, and cognitive involvement, and written feedback research explains feedback literacy and uptake. All of the above approaches help create an integrated model of AI-assisted ESL writing that transcends mere technology.

An important point within the framework that should be mentioned is that of overreliance. Students can have greater opportunities for getting feedback from the software, but it is also possible that their learning will become less effective due to outsourcing all of the writing-related decision-making processes to the computer. Overreliance on ESL writing becomes hard to notice since computer-generated content can look fluent while the writer still lacks such competence.

The framework can also be applied in Malaysian higher education because it acknowledges the importance of institutional readiness and digital equity in the implementation of AI. The students who have greater access to paid software, better skills, and academic advice might receive a larger benefit from using AI for writing than those who do not have such access. Thus, AI writing should be accompanied by explicit teaching, equitable access, and assessment.

In general, the framework implies that the pedagogical value of AI-assisted writing depends on the way in which feedback is integrated into the writing process. AI feedback should be utilized to motivate drafting, revision, reflection, and self-regulated learning, but not just the correction of errors. Such a perspective ensures that the role of lecturers remains unchallenged while AI becomes one of the sources of scaffolded feedback.

IMPLICATIONS

Theoretical Implications

It has theoretical value in that it ties together AI-based learning with theories about language learning, engagement, and written feedback. The framework adds to Sociocultural Theory in that it reinterprets the concept of mediated scaffolding in terms of feedback provided through AI. Furthermore, it builds on theories of learner engagement in that it demonstrates how behavioral, emotional, and cognitive engagement influence the use of AI feedback during revision. The framework will provide the foundation for empirical research as well. Future studies might seek to prove the mediating role of learner engagement and feedback interaction in the association between AI-based writing assistance and the development of ESL writing skills.

Practical Implications

As for lecturers, it is recommended to introduce AI technology to the structured writing process as opposed to letting students use AI independently. For example, lecturers can set up process-oriented tasks where the student is supposed to write a first draft, a log of feedback by the AI, an analysis of the suggestions accepted and not accepted, and, finally, a revision of the draft and writing outcome. It is important to train the students in feedback literacy as well because not every recommendation by the AI will be appropriate. The student needs to analyze the suggestions by AI in relation to his/her own message and the lecturer's feedback. Curriculum developers can use the framework to position AI as part of the writing process. AI tools may be used for brainstorming, drafting, feedback interpretation, and revision practice, but they should not replace students' responsibility for authorship, argument development, and academic voice.

Policy Implications

Universities should formulate institutional policies regarding the use of AI in written assessments. These policies should address acceptable and unacceptable AI use, requirements for the disclosure of AI use, citing/acknowledging AI use, privacy issues, and AI limitations. Policy formulation is important in that, without it, there would be ambiguity on whether AI support is permitted, what degree it is acceptable, and how it should be reported. In addition, assessment strategies should be designed to consider the use of AI in writing assignments. As opposed to simply using the final essay, lecturers could demand process documentation, such as draft history, reflection on revisions, oral explanation of the process, statement on the use of feedback, and class-based writing tasks.

LIMITATIONS AND FUTURE RESEARCH

However, this study is conceptual and does not entail gathering any primary data for statistical analysis or testing the proposed relations. The framework is based on theoretical analysis of literature and, therefore, the hypotheses are still to be empirically tested.

Future research can test the framework employing a mixed-method approach. Quantitative studies can test whether there is mediation of learner engagement and feedback interaction in the relationship between the use of an AI tool and writing performance. Qualitative studies can analyse learners' drafts, records of AI feedback, and decisions taken during the revision process in order to determine how they perceive the feedback received.

Longitudinal research is especially recommended since writing skills develop over time. Future research might involve following the development of writing skills in Malaysian university students over the course of one semester to see if regular interaction with feedback from AI improves their writing, feedback literacy, and self-regulation of the revision process.

CONCLUSION

This conceptual paper has proposed a framework for understanding how AI-assisted writing tools may support ESL writing development among Malaysian university students. The paper argues that AI writing tools should not be understood as automatic solutions to writing difficulties. Their educational potential depends on how learners engage with writing tasks and interact with feedback.

By integrating Sociocultural Theory, TELL, learner engagement theory and written feedback research, the framework conceptualises AI-assisted writing tools as digital scaffolding resources. Learner engagement and feedback interaction are positioned as the key mediating processes that may transform AI feedback into writing development. This theoretical position helps avoid sweeping claims about AI and instead offers a more careful explanation of the conditions under which AI may support learning.

The paper also highlights the importance of the Malaysian higher education context. Institutional readiness, lecturer preparedness, AI literacy, ethical guidance and digital equity are necessary considerations if AI-assisted writing is to support students fairly and responsibly. Future empirical studies are needed to test the proposed relationships and refine the framework based on evidence from Malaysian ESL classrooms.

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