Scaffold ED AI: Harnessing AI Platforms for Scaffolding Academic Writing in Secondary and Tertiary ESL Classroom

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ABSTRACT

The rapid integration of Artificial Intelligence (AI) in education has created opportunities to reimagine language learning and academic writing support. This study introduces ScaffoldED AI, an innovative teaching strategy integrating scaffolding steps into AI-assisted writing. Unlike general-purpose AI applications, ScaffoldED AI is grounded in Vygotsky's Sociocultural Theory and the Flower and Hayes Cognitive Process Model, positioning AI as both a mediational aid within the Zone of Proximal Development and a cognitive partner in managing the complex processes of planning, translating, and reviewing ideas. ScaffoldED AI supports learners through structured prompts, adaptive feedback, and guided planning strategies, implemented via platforms such as ChatGPT, Gamma, and Canva. These features help reduce cognitive load, generate ideas, and sustain writing momentum. Its relevance to language education lies in addressing common challenges in academic writing, such as organisation, linguistic confidence, and writing-related anxiety, while fostering long-term development of academic literacy skills. The study was conducted with both tertiary and secondary ESL students, capturing perspectives across different stages of language learning. A Google Form survey revealed that learners reported significant benefits, including reduced writing anxiety, enhanced efficiency and increased confidence in producing written work. At the same time, concerns were raised regarding over-reliance and ethical use, highlighting the importance of responsible integration and clear guidelines. The study concludes that ScaffoldED AI can serve as a pedagogical ally in secondary and higher education, empowering learners with greater autonomy, reducing barriers to effective writing, and enriching teaching practices

Keywords: Artificial Intelligence (AI); Academic Writing; Cognitive Load; Zone of Proximal Development (ZPD)

INTRODUCTION

The rise of generative AI tools such as ChatGPT, Gemini, and Microsoft Copilot has reshaped the educational landscape by offering instant access to information and writing support. While these tools enhance accessibility and efficiency, they also raise concerns about over-reliance and diminished student critical thinking. ESL learners in particular struggle with writing anxiety, cognitive overload, and lack of personal voice, which hinder performance and motivation.

This project introduces ScaffoldED AI, an AI-based approach designed to address these challenges while aligning with established learning theories. Grounded in process-based instruction (Hyland, 2019), the Cognitive Process Model of Writing (Flower & Hayes, 1981), and Vygotsky's Sociocultural Theory, ScaffoldED AI rethinks AI not as a replacement for human thought, but as a thinking partner and scaffold for improving clarity, reasoning, and autonomy.

Problem Statement

Educators face pressing challenges in integrating AI into pedagogy while safeguarding learner agency and creativity. Without appropriate scaffolding, the use of AI in writing classrooms can lead to several issues. First, AI-generated content may limit students' self-expression and personal connection in writing, as learners risk becoming passive recipients of text rather than active creators (Jo, 2024). Second, ESL learners often experience cognitive overload when navigating multiple linguistic demands simultaneously, which can hinder their ability to plan, translate, and review ideas effectively (Flower & Hayes, 1981; Zou et al., 2023). Third, students frequently suffer from writing anxiety, where fear of making mistakes or producing substandard work reduces creativity and motivation (Hyland, 2019).

These concerns highlight the urgent need for innovations that embed structured scaffolding into AI-assisted writing. By integrating scaffolding strategies, AI can be reframed as a thinking partner that supports learner autonomy, reduces cognitive barriers, and promotes ethical and effective classroom integration (Vygotsky, 1978; Lantolf & Poehner, 2019; Luckin et al., 2023).

Objectives

1. To explore how ChatGPT can function as a thinking partner in helping students improve clarity, reasoning, and personal voice in writing.
2. To examine the effects of teacher guidance and structured prompts in shaping students' written work, focusing on organisation, coherence, and confidence.

PRODUCT DESCRIPTION & METHODOLOGY

ScaffoldED AI operationalises scaffolding by embedding structured learning supports into AI-assisted writing. The model incorporates structured prompts that guide students in brainstorming, planning, and revising their work, ensuring that AI is used purposefully rather than as a shortcut. In addition, teacher checkpoints are embedded at various stages to moderate student use of AI and to ensure that ethical engagement is maintained. Learners also participate in collaborative activities, such as peer critique sessions and the maintenance of reflection logs, which help them critically evaluate AI feedback and develop greater self-awareness in their writing processes.

The implementation of ScaffoldED AI was carried out in three phases. During the induction phase, students were introduced to AI tools and given explicit guidelines on ethical and effective use. In the intervention phase, students engaged in guided writing tasks supported by structured prompts and ChatGPT integration. Finally, in the post-intervention phase, learners engaged in reflection, peer feedback, and the production of finalised writing outputs.

The study involved two groups of participants: 32 tertiary STEM students from a public university in Malaysia and 21 secondary school students from a secondary school in Malaysia, who were purposively selected as they had been identified as struggling with English proficiency. A mixed-methods research design was employed to capture both quantitative and qualitative insights. The quantitative strand utilised a questionnaire consisting of eight Likert-scale items, which were analysed using descriptive statistics. The qualitative strand involved open-ended survey questions and reflection logs, which were analysed thematically to capture learner perceptions in greater depth. The qualitative data from open-ended survey questions and reflection logs were analysed using thematic analysis. Responses were first read repeatedly to gain familiarity with the data. Initial codes were generated inductively, and these codes were then grouped into broader themes through iterative discussions among the researchers. This process ensured transparency and intersubjective validation of the emergent themes.

POTENTIAL FINDINGS AND COMMERCIALISATION

To capture learner perspectives, a survey was conducted with both tertiary and secondary ESL students. Table 1 presents the comparative results across key areas, including comprehension, efficiency, collaboration, and language development, highlighting how ScaffoldED AI supported learners in different educational contexts.

Table 1 Perceptions of Tertiary and Secondary ESL Students on the Use of ScaffoldED AI

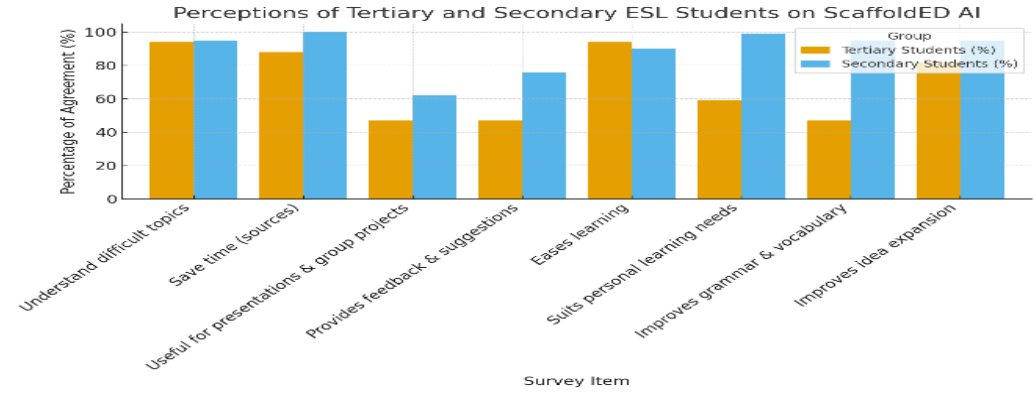
Theme	Tertiary	Secondary
AI helps to understand difficult topics better	94%	95%
AI saves time for analysing and finding sources	88%	100%
AI is useful for presentations & group projects	47%	62%
AI provides great feedback & suggestions	47%	76%
AI eases learning	94%	90%
AI usage in learning suits my personal needs	59%	99%
AI improves grammar and vocabulary	47%	95%
AI improves idea expansion	82%	95%

The findings from both groups of participants demonstrate that ScaffoldED AI was highly effective in supporting ESL learners at different educational levels. A large majority of tertiary students (94%) and secondary students (95%) reported that AI helped them to better understand difficult topics, suggesting that AI-assisted scaffolding can reduce cognitive barriers to comprehension. Similarly, 88% of tertiary learners and 100% of secondary learners indicated that AI significantly saved them time in analysing large amounts of information and locating relevant sources, highlighting the efficiency gains associated with structured AI use.

The study also revealed benefits in collaborative and creative aspects of writing. While 47% of tertiary students and 62% of secondary students found AI useful for presentations and group projects, higher proportions noted gains in the quality of feedback and suggestions: 47% for tertiary and 76% for secondary learners. This indicates that ScaffoldED AI can be effectively extended beyond individual writing tasks to enhance teamwork and idea refinement.

In addition, learners reported marked improvements in confidence and self-expression. Almost all tertiary students (94%) and secondary students (90%) agreed that AI made learning easier overall, while 59% of tertiary learners and 99% of secondary learners stated that AI use suited their personal learning needs. Importantly, ScaffoldED AI appeared to strengthen core language skills, with 47% of tertiary learners and 95% of secondary learners recognising improvements in grammar and vocabulary, and 82% and 95% respectively acknowledging its role in expanding ideas.

Figure 1 Perceptions of Tertiary and Secondary ESL Students on the Use of ScaffoldED AI



To complement these quantitative findings, the qualitative responses offered valuable insight into how learners perceived the role of AI in their writing. A recurring theme was the view of AI as a supportive partner in idea generation and expansion. Several students described how AI gave them a starting point when they struggled to begin a task, with one noting that "AI is good for expanding our ideas, especially when brainstorming." Another student highlighted its motivational effect, explaining that "ChatGPT is less intimidating than starting with a blank page," which illustrates how AI can help reduce writing anxiety and encourage learners to engage with the task more confidently.

At the same time, students also identified limitations and risks associated with AI use. Some learners expressed concern about over-reliance, with one remarking that *"I'm afraid future students can't do any task without relying on AI."* This perspective signals a fear that students might become too dependent on AI for even simple tasks, thereby weakening their own critical thinking and creativity. Others emphasised issues of accuracy and reliability, as reflected in the comment, *"AI sometimes gives the right steps but the wrong explanation."* Such observations underscore the importance of teacher mediation in helping learners critically evaluate AI outputs rather than accepting them at face value.

In addition, there was a strong recognition that while AI can provide technical support, it cannot replace the human dimensions of teaching and mentorship. One participant noted, "AI could not replace human aspects of *teaching, like empathy and mentorship,"* highlighting that the relational and affective roles of teachers remain central to the learning process. These qualitative findings reveal that students are not only aware of the benefits AI can bring but are also critically reflective of its limitations, pointing to the necessity of responsible and scaffolded integration.

These findings highlight the dual role of AI as both a cognitive partner and a sociocultural tool. On the cognitive level, AI reduced the burden of planning and translating, allowing students to focus more on clarity and reasoning, consistent with Flower and Hayes' (1981) writing model. From a sociocultural perspective, the structured prompts and teacher mediation ensured that AI became a form of guided interaction within the Zone of Proximal Development (Vygotsky, 1978; Lantolf & Poehner, 2019). The improvements in confidence, grammar, and idea expansion also support Hyland's (2019) emphasis on process-based instruction, where drafting, feedback, and reflection foster deeper engagement. At the same time, the different response rates between tertiary and secondary learners suggest that younger students may benefit more quickly from AI scaffolding in foundational skills, whereas tertiary learners require support for higher-order tasks such as critical reasoning and synthesis. Taken together, these results underscore the potential of ScaffoldED AI to improve both cognitive and affective dimensions of ESL learning, while adapting effectively across educational contexts.

In relation to the research objectives, the findings suggest that ChatGPT was successfully positioned as a thinking partner, helping students generate ideas, improve clarity, and gain confidence in their writing. The combination of reduced writing anxiety and increased ability to expand ideas provided conditions for learners to express their personal voice more effectively. At the same time, the role of teacher guidance and structured prompts proved essential in shaping students' written outcomes. The scaffolding strategies ensured that AI use contributed to better organisation and coherence, while also safeguarding learner autonomy and creativity. Together, these results confirm that both research objectives were achieved, offering evidence of ScaffoldED AI's potential to enhance clarity, reasoning, personal voice, and confidence in ESL writing. While this study employed descriptive statistics to capture key trends, future research should incorporate inferential statistical analyses to establish the significance of observed differences across groups and to allow for broader generalisation.

In terms of commercialisation, ScaffoldED AI has the potential to be developed into a modular training kit for institutions, incorporating prompt cards, peer checklist templates, and digital reflection tools. Its integration with learning management systems (LMS) or mobile applications could provide real-time analytics, learner dashboards, and even micro-credentials or badges to recognise writing progress. The innovation is also highly scalable, with potential applications in universities, secondary schools, and corporate training environments, thereby broadening its market reach.

For institutional implementation, ScaffoldED AI could be introduced through phased professional development programmes that train educators to integrate structured prompts into their teaching practice. Institutions may adopt licensing models to embed AI platforms within existing learning management systems, enabling streamlined access and analytics. Pilot implementations across multiple faculties or schools could then inform broader rollouts, ensuring scalability and sustainability.

NOVELTY AND RECOMMENDATIONS

The novelty of ScaffoldED AI lies in its ability to fuse AI platforms with structured pedagogical scaffolding, thereby bridging the gap between theory and practice. Unlike conventional AI tools, which often function as stand-alone applications, ScaffoldED AI operationalises process-based, cognitive, and sociocultural approaches. This integration ensures that writing support remains not only efficient but also meaningful, fostering learner autonomy rather than dependency. Beyond technical integration, ethical and pedagogical considerations are critical for sustaining learner autonomy. Teachers play a pivotal role in modelling critical engagement with AI outputs and designing tasks that balance AI support with opportunities for independent reasoning and creativity. Structured prompts and checkpoints should be complemented with explicit discussions around bias, accuracy, and responsible use, ensuring that students remain active agents in their learning process.

Based on the findings of this study, several recommendations can be made. First, future research should conduct longitudinal studies to evaluate the sustained impact of ScaffoldED AI on writing development across different educational levels. Second, it is crucial to strengthen teacher AI literacy, equipping educators with the knowledge and skills to integrate AI responsibly into their teaching practices. Third, the development of ethical frameworks is necessary to address concerns of transparency, bias, and equity in AI use. Finally, efforts should be made to expand the implementation of ScaffoldED AI across institutions, ensuring its broader adoption in ESL contexts and its adaptability to diverse learner needs.

CONCLUSION

This study set out to introduce and evaluate ScaffoldED AI as an innovative approach to scaffolding academic writing through AI platforms. The findings demonstrate that both tertiary and secondary ESL learners benefitted from the intervention, reporting improved comprehension of difficult topics, greater efficiency in handling information, and enhanced confidence in their writing abilities. These outcomes were reinforced by qualitative feedback, which highlighted AI's role in reducing writing anxiety and supporting idea expansion, while also drawing attention to concerns of over-reliance and the irreplaceable role of teachers.

The integration of structured prompts, teacher guidance, and collaborative reflection ensured that AI functioned not as a substitute but as a thinking partner, aligning with both cognitive and sociocultural theories of learning. In doing so, the study addressed its objectives by showing that ChatGPT can enhance clarity, reasoning, and personal voice in writing, while teacher mediation safeguards organisation, coherence, and autonomy.

Equity and access remain important considerations in the adoption of AI tools. Disparities in digital access, language support, and institutional infrastructure may affect how different learners engage with AI. Furthermore, biases embedded in AI models can shape the kind of feedback and content generated, potentially disadvantaging certain learner groups. Addressing these concerns through policy, training, and tool development is essential for ensuring equitable implementation across ESL contexts.

Taken together, the results affirm that ScaffoldED AI can serve as a pedagogical ally across educational levels. By reducing barriers to effective writing and enriching teaching practices, this innovation holds significant potential for wider adoption in ESL contexts and beyond. This study was conducted with participants from two institutions, which may limit the generalisability of the findings. Future studies should include a larger and more diverse sample to strengthen external validity.

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