INTEGRATING GENAI, TECHNOLOGY, AND COOPERATIVE LEARNING IN ESL WRITING COURSES IN EMI UNIVERSITIES IN CHINA

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ABSTRACT

This study explores integrating cooperative learning strategies, technology, and General Artificial Intelligence (GenAI) feedback to enhance writing support for ESL students in Chinese English Medium Instruction (EMI) universities. Given ESL students' language proficiency challenges, traditional pedagogical methods often fail to address these needs. This research employs a socio-constructivist framework, utilizing group discussions, peer editing workshops, and collaborative writing projects supplemented by GenAI tools such as GPT-4Omni, Soro, and Claude. These tools provide immediate, personalized grammar, vocabulary, coherence, and organization feedback. The study aims to understand how these integrated approaches impact ESL students' writing skills and academic performance. Key findings indicate that combining cooperative learning and GenAI feedback significantly improves students' writing proficiency, fosters autonomous learning, and enhances engagement. Furthermore, the study underscores the need for policy initiatives to support technology integration and teacher training to implement these innovative approaches effectively. These findings offer valuable insights for educators and policymakers seeking to enhance ESL education in China and beyond, suggesting that the strategic use of GenAI can transform traditional ESL pedagogy and better prepare students for academic and professional success in a globalized context.

Keywords: Chinese ESL, English Medium Instruction (EMI), Cooperative Learning, Technology Integration, Generative AI (GenAI) feedback, innovative ESL teaching.

INTRODUCTION

The English Medium Instruction (EMI) university demographic in China predominantly comprises Chinese students seeking to enhance their English proficiency for academic and professional advancement in an increasingly globalized world. With globalization, technological advancements, and evolving educational paradigms, the demand for English language education in China has intensified (Gao, 2020). This demographic encompasses diverse learners, each with unique linguistic backgrounds, learning approaches, and educational aspirations. Understanding the specific needs and challenges Chinese ESL students face within the EMI context is crucial for developing effective teaching and learning strategies tailored to their requirements.

The idea to integrate cooperative learning strategies, technology, and Generative Artificial Intelligence (GenAI) feedback into ESL student writing support within Chinese EMI universities emerged from recognizing the need to adapt ESL pedagogy to meet the evolving demands of the educational landscape (Li & Lalani, 2020). As English proficiency becomes increasingly essential for academic and professional success, educators are exploring innovative approaches to enhance language learning experiences and outcomes for ESL students. This integration represents a paradigm shift in ESL pedagogy, moving beyond traditional teaching methods to embrace collaborative, technology-enabled, and AI-powered learning environments (Carlson, 2024; Hill & Hargis, 2024; Johnson & Johnson, 1999).

The implications of this research extend beyond the Chinese EMI context, offering valuable insights and strategies that can be adapted and implemented to support ESL students globally. Educators and researchers in other countries facing similar challenges in ESL instruction can draw inspiration from the cooperative learning, technology integration, and GenAI-powered writing support model proposed in the study. By adopting and adapting these innovative approaches, educators can create dynamic and immersive learning experiences that cater to ESL students' diverse needs and approaches to learning worldwide. For instance, cooperative learning fosters a supportive and interactive classroom environment, promoting peer interaction, collaboration, and knowledge construction (Yang & Atkinson, 2016). Similarly, technology integration amplifies learning opportunities by providing access to authentic language experiences, interactive learning tools, and vast resources (Li & Lalani, 2020). The use of GenAI-powered writing support offers personalized feedback, diagnostic assessment, and adaptive learning pathways, enhancing students' writing skills and academic performance (Wang & Xie, 2017).

Implementing these innovative approaches involves incorporating group discussions, peer editing workshops, collaborative writing projects, and digital writing platforms into ESL instruction. These activities enhance language skills and improve ESL students' critical thinking, communication, and problem-solving abilities (Chang & Ren, 2019). Moreover, policy implications underscore the need for investments in technology infrastructure, teacher training, and research initiatives to effectively implement innovative ESL pedagogy (Li & Lalani, 2020; Hargis, 2024). Hence, educators can create inclusive, dynamic, and future-ready learning environments that prepare ESL students to thrive in a globalized society by embracing innovative approaches and leveraging collaborative learning, digital technology, and AI. The research conducted in the Chinese EMI context serves as a springboard for advancing ESL pedagogy worldwide, facilitating the development of effective strategies to support ESL students in achieving academic and professional success.

The Problem Statement

The problem is that ESL students in Chinese EMI universities face numerous challenges despite the growing importance of English proficiency for their academic and professional goals. These challenges arise from factors specific to the EMI context and the diverse backgrounds of ESL students in China. Firstly, ESL students often struggle to communicate and excel in English-medium academic environments due to varying levels of language proficiency. While some students have a strong foundation in English, others grapple with language fluency, comprehension, and academic writing conventions (Chang & Ren, 2019). This linguistic diversity within the student body poses a significant challenge for educators aiming to meet the diverse learning needs of ESL students.

Secondly, the traditional ESL teaching methods commonly used in Chinese EMI universities may not adequately address the evolving needs of these students. Traditional approaches often rely on teacher-centered instruction, rote memorization, and grammar-focused exercises, which may not effectively develop students' language skills or prepare them for the demands of English-medium academic discourse (Wang & Xie, 2017). As a result, ESL students may experience frustration, disengagement, and limited progress in their language learning journey.

Furthermore, ESL students in Chinese EMI universities face the challenge of adapting to academic expectations and conventions in English-medium instruction. This includes mastering academic writing genres, synthesizing complex ideas, and articulating arguments effectively in English. ESL students may struggle to meet these expectations without adequate support and guidance, hindering their academic success and overall learning experience.

Given these challenges, there is a clear need for innovative approaches that leverage cooperative learning, technology, and GenAI feedback to enhance writing support for ESL students in Chinese EMI universities (Hargis, 2024). Despite promising findings, several gaps remain in the existing literature. Firstly, there is limited research on integrating GenAI specifically into ESL writing instruction within EMI university courses. Most studies have focused on general language learning or other language skills, leaving a gap in understanding the unique challenges and opportunities associated with using GenAI for writing support (Chang & Ren, 2019). Secondly, while the benefits of cooperative learning and technology integration are well-documented, there is a lack of comprehensive studies that combine these approaches with GenAI technology. This gap highlights the need for research exploring how GenAI can be integrated into cooperative learning frameworks to enhance ESL writing proficiency (Zhang & Li, 2020). Finally, existing research often lacks a focus on the specific context of Chinese university students. The unique linguistic and cultural challenges Chinese ESL students face in EMI courses are not sufficiently addressed in the current literature.

This study aims to fill these gaps by investigating the integration of cooperative learning, technology, and GenAI in ESL writing instruction within EMI university composition courses in China. Educators can create dynamic and immersive learning environments that cater to ESL students' diverse needs and approaches to learning by incorporating collaborative learning activities, digital writing platforms, and AI-powered feedback mechanisms into ESL instruction. These innovative approaches have the potential to address the limitations of traditional ESL pedagogy and empower ESL students to develop the language skills and academic competencies necessary for success in English-medium academic environments.

Research Question:

- How can integrating cooperative learning strategies, technology, and Generative Artificial Intelligence (GenAI) feedback enhance ESL student writing support within English Medium Instruction (EMI) universities in China?

The hypothesis is that integrating cooperative learning strategies, technology, and GenAI feedback into ESL student writing support within Chinese EMI universities will lead to improved writing skills, increased engagement, and enhanced academic performance among ESL students compared to traditional teaching methods.

LITERATURE REVIEW

This study integrates the socio-constructivist theory, emphasizing the importance of social interaction and collaboration in learning (Vygotsky, 1978). Cooperative learning, supported by technology and General Artificial Intelligence (GenAI), aligns with this framework by fostering peer interaction and personalized feedback. The theory underscores that learning is a social process, and students construct knowledge through interactions within their cultural and social contexts. Integrating cooperative learning, technology, and GenAI feedback facilitates these interactions, enhancing ESL students' writing proficiency in EMI contexts.

Writing Challenges for Chinese ESL Students

Chinese ESL students in EMI universities often struggle with language proficiency, including vocabulary, grammar, and academic writing conventions (Chang & Ren, 2019). These difficulties stem from limited exposure to English and the differences between English and Chinese linguistic structures. Traditional ESL pedagogical approaches, which often emphasize rote memorization and grammar drills, may not effectively address these challenges (Wang & Xie, 2017). Consequently, there is a need for innovative pedagogical strategies that can provide more comprehensive and contextualized language support.

Cooperative Learning and Technology Integration

Cooperative learning, which involves group work and peer interactions, has improved language acquisition and academic performance (Johnson & Johnson, 1999). Johnson and Johnson (1999) emphasized the benefits of cooperative learning, which promotes peer interaction, collaboration, and knowledge construction. The study explored the dynamics of different learning structures, explicitly focusing on cooperative, competitive, and individualistic learning environments. This study presents a compelling case for the benefits of cooperative learning over competitive and individualistic approaches. The researchers suggest that cooperative learning enhances academic performance and fosters positive social interactions and emotional well-being. The study advocates for educators to adopt cooperative learning strategies to create more inclusive, supportive, and effective learning environments. By engaging students in collaborative writing activities, educators can foster a supportive learning environment and facilitate peer feedback, leading to improved writing skills and academic performance. These methods have enhanced language acquisition and skill development by promoting interaction and peer feedback (Kessler, 2018).

Additionally, integrating technology into cooperative learning can enhance these benefits by providing access to digital tools and resources that facilitate collaboration and communication (Yang & Atkinson, 2016). Yang and Atkinson (2016) reviewed technology-enhanced collaborative learning and emphasized the potential of AI-powered tools to support collaborative problem-solving and knowledge construction. The study provided a comprehensive overview of the benefits and best practices of technology-enhanced collaborative learning (TECL). The researchers' review highlighted the positive impact of TECL on academic achievement, critical thinking, motivation, and social skills. By leveraging technology, educators can create more engaging, interactive, and effective collaborative learning environments. The study also emphasizes the importance of structured activities, instructor facilitation, and continuous assessment in successfully implementing TECL (Yang & Atkinson, 2016).

Furthermore, technology integration offers opportunities to augment ESL instruction and provide personalized learning experiences. Kessler (2018) discussed the role of technology in teaching ESL reading and writing, highlighting the use of digital tools to enhance language learning and facilitate authentic writing tasks. Kessler (2018) offers a thorough and practical guide for teaching ESL/EFL reading and writing. By combining foundational principles with innovative strategies and technologies, the book provides educators with the tools to enhance their students' literacy skills effectively. The emphasis on integrating reading and writing, leveraging technology, and addressing learner diversity ensures a holistic and inclusive approach to language instruction. In the same view, Wang and Xie (2017) conducted a systematic review on technology-supported cooperative learning in mathematics education, demonstrating the efficacy of technology in promoting collaborative learning and academic achievement. According to Wang and Xie (2017), integrating technology into cooperative learning in middle school mathematics classrooms can significantly enhance educational outcomes. The study highlights the benefits of using interactive tools to promote student engagement, academic achievement, and the development of social skills. By leveraging technology, educators can create more dynamic and effective cooperative learning environments that cater to the diverse needs of students.

GenAI in Language Learning

Other studies have found that AI-driven tools can enhance language proficiency by providing tailored feedback and adaptive learning pathways (Wang & Xie, 2017). Wang and Xie (2017) concluded that technology-supported cooperative learning has the potential to enhance learning significantly. Technological tools can make cooperative learning more effective by increasing engagement, improving academic performance, and developing social skills. However, successful implementation requires adequate resources, teacher support, and thoughtful technology integration into the curriculum. This systematic review highlighted the importance of leveraging technology to create dynamic and interactive learning environments that foster students' academic and social development.

In addition, Li and Lalani (2020) discussed the transformative impact of AI in education, emphasizing the importance of leveraging AI-powered tools to enhance learning outcomes and adapt to changing educational paradigms. The study emphasizes the rapid adoption of digital technologies, mainly on personalized learning, and the emergence of hybrid learning models as key trends that will shape the future of education. Addressing the digital divide and supporting teachers through this transition is essential to ensuring equitable and effective learning for all students. They also suggested that GenAI can provide immediate, personalized feedback on students' writing, helping them identify and correct grammar errors, vocabulary usage, coherence, and organization (Li & Lalani, 2020). This real-time feedback is invaluable for ESL students, who often struggle with these aspects of writing.

Other recent studies offer examples of integrating GenAI into higher education teaching and learning, suggesting potential applications for ESL instruction. Hargis et al. (2024) conducted a comprehensive study examining the integration of General Artificial Intelligence (GenAI) into higher education teaching and learning. The study focused on the potential applications and benefits of using GenAI tools to enhance instructional practices and student outcomes. Key findings suggest that GenAI can significantly personalize the learning experience by providing tailored feedback and adaptive learning paths. Students receiving real-time suggestions on their assignments helped them understand their mistakes and improve their work incrementally. Also, using GenAI tools increased student engagement and motivation. The immediacy and relevance of the feedback provided by GenAI kept students more involved in the learning process and encouraged a more proactive approach to their studies. Most importantly, these researchers found that educators reported that GenAI tools made it easier to manage large classes by automating routine grading and feedback tasks. This allowed teachers to focus more on interactive and higher-order teaching activities (Hargis et al., 2024). For ESL students, this suggests that GenAI can provide immediate feedback on grammar, vocabulary, and syntax, helping them to learn and correct their language use in real-time. Moreover, tailored feedback can assist ESL students in developing their writing skills more effectively by addressing specific linguistic challenges and offering examples of correct usage.

Moreover, Carlson (2024) explored the broader implications of integrating GenAI into various aspects of higher education. The study provided a detailed analysis of how GenAI technologies can support not only instructional practices but also administrative and support services within universities. The researcher found that GenAI tools can offer robust academic support services like virtual tutoring and personalized study plans. These services can significantly benefit ESL students needing additional help outside of class. Not to mention the least, GenAI can streamline administrative processes by automating tasks like student advising, scheduling, and resource allocation. This creates a more efficient and responsive educational environment. Hence, GenAI can create personalized learning plans for ESL students, focusing on their unique language learning needs and offering targeted exercises and resources. Students can also use GenAI-powered chatbots for instant answers to queries about language usage, assignments, and other academic matters, promoting continuous learning (Carlson, 2024). By analyzing large datasets, GenAI can provide valuable insights into student performance and learning patterns, helping educators tailor their teaching strategies to meet the needs of diverse student populations.

Additionally, Hill and Hargis (2024) examined the ethical implications of using GenAI in higher education, highlighting the importance of academic integrity and responsible AI usage. The study emphasized the

importance of designing GenAI systems that promote academic integrity. It is crucial to ensure that AI tools support learning rather than replace students' efforts. The researchers recommended transparency in how GenAI tools operate and how their feedback is generated. Hence, students and educators must understand the algorithms and data sources behind the AI's recommendations. This study also highlighted the need to address potential biases in GenAI systems. It recommended that AI tools be trained on diverse datasets to avoid reinforcing existing biases and regularly audited for fairness (Hill & Hargis, 2024). This suggests that when integrating GenAI into ESL instruction, it is vital to use the technology ethically. This means using AI to enhance student learning while ensuring students remain actively engaged in their educational journey. Educators should be vigilant about potential biases in AI feedback, ensuring that the tools support all students equitably, regardless of their linguistic and cultural backgrounds.

Advances in GenAI for Educational Support

GenAI represents a significant advancement in educational technology, offering personalized, immediate feedback on students' writing. Platforms like GPT-4Omni, Soro, Claude, Perplexity, and Pi have made substantial strides in language processing capabilities, providing nuanced feedback on grammar, vocabulary, coherence, and organization (Li & Lalani, 2020). These platforms utilize large language models to understand and generate human-like text, making them valuable tools for language education. Recent advancements, such as GPT-4Omni's enhanced contextual understanding and Soro's adaptive learning algorithms, highlight the potential of GenAI to transform ESL instruction by offering tailored support that addresses individual learning needs.

Some Common GenAI Platforms include GPT-4Omni: Known for its advanced contextual understanding and ability to generate coherent and contextually appropriate text, GPT-4Omni provides detailed feedback on various aspects of writing, including structure, coherence, and style (Carlson, 2024). **Soro and Soras**: These platforms are designed to offer adaptive learning experiences, adjusting the difficulty and nature of tasks based on the learner's progress and needs. This adaptive approach ensures that students receive personalized support that is both challenging and achievable (Hill & Hargis, 2024). **Claude**: Focuses on providing conversational feedback, allowing students to engage in a dialogue with the AI to understand better and apply the feedback given. This interactive approach can help students understand their writing strengths and weaknesses (Anthropic, 2023). **Perplexity**: Known for its ability to handle complex queries and provide detailed explanations, Perplexity can help students with more advanced writing tasks, such as developing arguments and synthesizing information from multiple sources (Perplexity AI, 2023). **Pi**: A platform that provides intuitive and user-friendly interfaces, making it accessible for students with varying levels of technical proficiency. Pi's design emphasizes ease of use, ensuring students can quickly and easily receive feedback and make revisions (Inflection AI, 2023). These GenAI platforms, with their unique features and capabilities, offer valuable tools for enhancing ESL instruction. By providing immediate, personalized feedback, they can help students identify and correct errors, refine their writing skills, and develop a deeper understanding of English language conventions.

INNOVATIVE TEACHING STRATEGIES

At the core of the integrated approach to teaching lies a pedagogical framework that emphasizes collaborative learning, student engagement, and personalized feedback (Johnson & Johnson, 1999). Within the context of the EMI university ESL courses, diverse teaching methods could be employed to cultivate these principles and facilitate practical ESL student writing support. In the meantime, cooperative learning techniques form the foundation of the instructional design, providing students with opportunities for active participation, peer interaction, and mutual support (Kessler, 2018). Group online discussions, for instance, encourage students to engage in dialogue, share ideas, and collaborate on various writing tasks (Yang & Atkinson, 2016). In addition, these discussions serve as platforms for students to explore different perspectives, brainstorm ideas, and co-construct knowledge collectively. Hence, cooperative learning promotes learning, reduces attrition, and makes learning fun and rewarding.

On the other hand, peer writing and editing workshops using technology constitute another integral component of the teaching methodology, enabling students to provide constructive feedback on their peers' writing (Chang & Ren, 2019). Notably, through peer editing, students refine their writing skills and develop critical thinking and analytical abilities as they evaluate and assess their peers' work (Zhang & Li, 2020). For this reason, the collaborative nature of peer editing fosters a culture of peer learning and mutual support, enhancing students' understanding of writing conventions and language usage (Wang & Xie, 2017). The importance of small group collaborative writing projects is another essential aspect of the teaching methodology often overlooked. However, students collaborating on joint writing tasks, such as essays or research papers promote students' motivation and self-correction (Yang & Atkinson, 2016). Moreover, these group projects encourage students to work collectively, pool their resources, and synthesize their ideas into cohesive written pieces (Chang & Ren, 2019). Ultimately, by engaging in collaborative writing projects, students develop teamwork skills, enhance their communication abilities, and deepen their understanding of course content (Kessler, 2018; Wang & Xie, 2017).

Despite these promising findings, several gaps remain in the existing literature. Firstly, there is limited research on integrating GenAI specifically in ESL writing instruction within EMI university courses. Most studies have focused on general language learning or other language skills, leaving a gap in understanding the unique challenges and opportunities associated with using GenAI for writing support (Chang & Ren, 2019). Secondly, while the benefits of cooperative learning and technology integration are well-documented, there is a lack of comprehensive studies that combine these approaches with GenAI technology. This gap highlights the need for research that explores how GenAI can be integrated into cooperative learning frameworks to enhance ESL writing proficiency (Zhang & Li, 2020). Finally, existing research often lacks a focus on the specific context of Chinese university students. The unique linguistic and cultural challenges Chinese ESL students face in EMI courses are not sufficiently addressed in the current literature.

This study aims to fill these gaps by investigating the integration of cooperative learning, technology, and GenAI in ESL writing instruction within EMI university composition courses in China. Educators can create dynamic and immersive learning environments that cater to ESL students' diverse needs and approaches to learning by incorporating collaborative learning activities, digital writing platforms, and AI-powered feedback mechanisms into ESL instruction. These innovative approaches have the potential to address the limitations of traditional ESL pedagogy and empower ESL students to develop the language skills and academic competencies necessary for success in English-medium academic environments. While cooperative learning and technology are effective in ESL education, and GenAI holds promise for providing personalized writing support, there is a need for more research that integrates these approaches. This study addresses these gaps by exploring how cooperative learning, technology, and GenAI can enhance ESL writing instruction in the context of EMI university courses in China.

COOPERATIVE WRITING ACTIVITIES IN ESL CLASSROOMS

The first thing to remember is that cooperative writing activities are integral to the ESL student writing support framework. As such, cooperative writing activities should be meticulously crafted to harness students' collective intelligence and creativity while accommodating individual learning needs (Johnson & Johnson, 1999). For these reasons, these activities should be designed to promote collaboration, critical thinking, and practical communication skills among students to facilitate the development of their writing proficiency in English (Kessler, 2018).

For example, group brainstorming sessions are the initial stage of cooperative writing activities, where students come together to generate ideas, share insights, and collectively outline writing tasks (Yang & Atkinson, 2016). In these sessions, students engage in dynamic discussions, exploring various perspectives and brainstorming creative approaches to the writing task (Chang & Ren, 2019). Remarkably, through this collaborative brainstorming, students generate many ideas, gain exposure to diverse viewpoints, and learn to negotiate and compromise effectively.

Similarly, another cooperative writing activity following the brainstorming sessions is the writing and peer editing workshops. These peer-editing workshops allow students to write together and refine their writing

skills through constructive feedback and revision (Zhang & Li, 2020). In these workshops, students can work collaboratively (in real-time or after-hours using Google Documents via a Learning Management System, LMS such as Blackboard or Canvas) to exchange drafts of their writing assignments, carefully review each other's work, and offer suggestions for improvement (Wang & Xie, 2017). With this in mind, we note that peer editing fosters a culture of collaboration and mutual support as students learn to provide feedback respectfully and constructively (Li & Lalani, 2020). Moreover, peer editing encourages students to evaluate their writing critically and consider alternative perspectives, ultimately enhancing their writing proficiency and critical thinking skills.

Furthermore, it is worth noting that collaborative writing projects represent the culmination of cooperative writing activities and enable students to collaborate on a shared writing task, such as group essays or research papers (Kessler, 2018). These projects require students to collaborate, synthesize information, and integrate diverse perspectives into a cohesive written piece (Johnson & Johnson, 1999). Students learn to negotiate ideas, resolve conflicts, and communicate effectively with their peers (Yang & Atkinson, 2016). Moreover, collaborative writing projects promote teamwork, time management, and project coordination skills, preparing students for real-world writing tasks and collaborative work environments. Cooperative writing activities are vital in ESL student writing support, providing students with valuable opportunities for collaboration, feedback, and skill development (Chang & Ren, 2019; Li & Lalani, 2020).
Students enhance their writing proficiency by engaging in group brainstorming sessions, peer editing workshops, and collaborative writing projects and develop essential communication, critical thinking, and teamwork skills necessary for academic and professional success in English-medium environments.

USING GENAI FEEDBACK AND INTERPRETATIONS IN ESL CLASSROOMS

Initially, integrating GenAI into an ESL writing classroom might seem counterintuitive, especially considering these students need to master English language conventions, which are crucial for success in China's English Medium Instruction (EMI) learning contexts. However, adult ESL students often encounter persistent language challenges, particularly in environments like EMI universities, where they struggle to receive timely and effective instructor feedback to enhance their writing skills. In this context, incorporating GenAI technology into the ESL student writing support framework signifies a significant advancement.

GenAI technology addresses the issues surrounding effective and prompt feedback by providing students with personalized assistance. It enhances the existing writing support infrastructure and facilitates continuous improvement in students' writing proficiency. For example, students submitting writing assignments to the GenAI platform receive instant feedback on various aspects such as grammar, vocabulary usage, coherence, and organization (Li & Lalani, 2020). Similarly, when ESL students encounter GenAI prompts designed to address common ESL linguistic challenges, they can utilize these prompts to request GenAI feedback, thus refining their writing.

Moreover, providing students with specific writing prompts for input into an AI chatbot helps enhance the quality of their writing. Instructors can guide students through this process, starting with mastering academic writing conventions and progressing to writing drafts independently before utilizing teacher and peer feedback. Subsequently, students can input set writing prompts into the GenAI chatbox to revise each essay section. These prompts enable students to utilize GenAI as writing support, providing immediate feedback that allows them to pinpoint errors and areas for improvement in their writing, thereby fostering continuous learning and skill development (Zhang & Li, 2020). Personalized feedback aligned with individual learning needs promotes more efficient and effective learning outcomes (Chang & Ren, 2019).

Furthermore, feedback from GenAI triggers student reflection and self-assessment, prompting them to critically evaluate their writing and consider suggested revisions (Kessler, 2018). Through this iterative process, students cultivate metacognitive awareness and self-regulated learning strategies, discerning patterns in their writing and implementing revisions accordingly (Hargis, 2024). This reflective practice enhances writing skills and deepens understanding of writing conventions and language usage (Li & Lalani, 2020), fostering a culture of continuous improvement and lifelong learning (Hargis, 2024; Hill et al., 2023; Wang & Xie, 2017).

In summary, by offering timely, personalized feedback and fostering reflection and self-assessment, GenAI technology continually enhances students' writing proficiency, metacognitive awareness, and self-regulated learning strategies. Ultimately, GenAI feedback empowers students to become autonomous, proficient writers with the skills and knowledge necessary for success in English-medium academic and professional environments.

GEN-AI AS A LEARNING SUPPORT IN ESL CLASSROOMS

Generative AI is a valuable tool in the ESL writing classroom, offering numerous benefits to students. Firstly, it provides immediate and specific feedback, helping students identify their weaknesses and improve their writing skills step by step. GenAI offers suggestions on grammar, vocabulary, coherence, and organization in real-time, which helps students focus on areas needing improvement and speeds up their progress in writing proficiency (Wang & Xie, 2017; Yang & Atkinson, 2016).

Additionally, GenAI encourages students to become independent writers, allowing them to take charge of their learning and make informed decisions. By giving personalized feedback and resources, GenAI promotes self-directed learning and self-assessment, enabling students to recognize areas for enhancement and make revisions. This autonomy in writing cultivates critical thinking, problem-solving, and self-regulated learning skills, preparing students for success beyond the classroom (Li & Lalani, 2020).

Finally, GenAI ensures inclusivity and equity in ESL education by providing customized support to students with diverse learning needs and linguistic backgrounds. It offers tailored assistance regardless of proficiency levels or linguistic backgrounds, ensuring all students have equal access to resources and support. This inclusive approach levels the playing field and creates a supportive and fair learning environment where every student can thrive (Zhang & Li, 2020).

POLICY IMPLICATIONS AND BEST PRACTICES

Integrating cooperative learning, technology, and GenAI to support ESL student writing presents profound policy implications for ESL education in China (Li & Lalani, 2020). Policymakers are urged to prioritize strategic investments in teacher training and professional development (PD) programs to equip educators with the skills and knowledge necessary to effectively integrate GenAI technology into ESL writing instruction (Yang & Atkinson, 2016). On the positive side, by providing educators with comprehensive training on utilizing GenAI tools and platforms, policymakers can ensure that educators can leverage these technologies to enhance ESL student writing support (Hill et al., 2023; Hargis, 2024; Chang & Ren, 2019).

Likewise, policymakers should advocate for equitable access to GenAI resources and support services for ESL students across diverse socioeconomic backgrounds (Hargis, 2024; Wang & Xie, 2017). Not to mention that it is imperative to address issues of accessibility and digital equity to ensure that all ESL students, regardless of their socioeconomic status, have equal opportunities to benefit from GenAI-powered writing support (Zhang & Li, 2020). Thus, policymakers may consider initiatives such as subsidizing GenAI software licenses for schools and providing funding for developing open-access GenAI platforms to promote widespread access to these resources.

In the same way, policy initiatives should promote the adoption of innovative teaching methods that foster collaboration, technology integration, and personalized learning experiences (Kessler, 2018). Correspondingly, policymakers should encourage educators to experiment with new pedagogical approaches that leverage cooperative learning strategies, digital technologies, and GenAI feedback to enhance ESL student writing proficiency and academic success (Li & Lalani, 2020). This may involve providing incentives for schools to implement innovative ESL writing programs, offering grants for research and development projects focused on ESL writing instruction, and establishing partnerships with industry stakeholders to facilitate the integration of GenAI technology into ESL education (Wang & Xie, 2017).

In either case, policymakers can advance the quality and effectiveness of ESL education in China by prioritizing investments in teacher training, advocating for equitable access to GenAI resources, and promoting innovative teaching methods. Ultimately, these policy initiatives aim to enhance ESL student

writing proficiency, promote academic success, and foster inclusive and equitable learning environments for higher education ESL students. Through collaborative efforts between policymakers, educators, industry stakeholders, and parents, ESL education in China can continue to evolve and adapt to meet the needs of students in the 21st century.

DISCUSSION AND CONCLUSION

Integrating cooperative learning, technology, and Generative Artificial Intelligence (GenAI) in ESL student writing support within English Medium Instruction (EMI) universities represents a significant advancement in ESL education. By leveraging these innovative approaches, educators can create dynamic and immersive learning environments that cater to the diverse needs of ESL students and empower them to thrive academically.

One key aspect of integrating GenAI into ESL classes is providing personalized feedback and support to students in their writing endeavors. GenAI-powered tools can analyze students' writing samples, identify areas for improvement, and offer targeted suggestions for enhancing language proficiency and writing skills. For instance, GPT-4Omni can highlight grammatical errors, suggest more precise vocabulary, and improve overall coherence. Educators can incorporate GenAI feedback into writing assignments, peer review activities, and individualized learning pathways to provide students with immediate and personalized assistance.

Educators can integrate GenAI-powered collaborative writing tools into ESL instruction to encourage active student engagement and collaboration. These tools facilitate real-time collaboration, peer feedback, and knowledge construction, enabling students to co-create written texts and develop their writing skills collaboratively. For example, in a peer editing workshop, students could use GenAI to suggest improvements and discuss them with their peers, fostering a deeper understanding of writing conventions and collaborative skills.

When considering the integration of GenAI into ESL classes, it is essential to identify and address potential variables that may influence the effectiveness of these approaches. Educators should consider factors such as students' language proficiency levels, technological proficiency, and learning preferences when designing GenAI-powered learning activities. Additionally, ethical and privacy considerations associated with AI-powered tools must be addressed to protect students' rights and privacy throughout the learning process.

To answer the research question, “How can integrating cooperative learning strategies, technology, and Generative Artificial Intelligence (GenAI) feedback enhance ESL student writing support within English Medium Instruction (EMI) universities in China?” the study reveals several key insights: Cooperative learning and GenAI feedback significantly improve students' writing skills by providing immediate, personalized feedback and fostering collaborative learning environments. Also, GenAI tools and collaborative activities boost student engagement and motivation by making learning interactive and personalized. GenAI encourages self-directed learning, allowing students to take ownership of their writing development and receive continuous, real-time feedback. In addition, personalized support from GenAI tools ensures that students with diverse learning needs and linguistic backgrounds receive equitable assistance.

In conclusion, it is recommended that educators adopt a learner-centered approach to maximize the benefits of integrating GenAI into ESL classes, providing students autonomy, agency, and self-directed learning opportunities. Educators can create a supportive and inclusive learning environment that fosters academic success and achievement by empowering students to take ownership of their learning and offering the necessary support and guidance. Integrating cooperative learning, technology, and GenAI in ESL student writing support within EMI universities represents a transformative opportunity to enhance ESL education. By embracing these innovative approaches and addressing potential variables and challenges, policymakers can create a supportive and inclusive learning environment that empowers ESL students to thrive academically and achieve their full potential in English language proficiency and writing skills.

LIMITATIONS, CHALLENGES AND FUTURE RESEARCH

The review aims to tackle Chinese ESL college students' writing challenges and investigate new methods to improve writing assistance. However, it is important to note several limitations and challenges. The applicability of this review's findings may be restricted to the context of Chinese EMI universities. Variables like cultural differences, institutional policies, and student demographics differ across educational environments and could influence the success of the suggested interventions. Moreover, adopting cooperative learning, technology integration, and GenAI feedback in ESL teaching demands sufficient resources, such as teacher professional development, technological infrastructure, and funding for AI tools. A lack of resources could impede the practicality and expansion of these interventions, especially in settings with limited resources.

Additionally, incorporating technology and GenAI feedback into ESL teaching presents technical hurdles concerning software compatibility, usability, and dependability. System breakdowns, connectivity problems, and software errors can interrupt the educational process, impacting student engagement and outcomes. Although cooperative learning, technology integration, and GenAI feedback have potential advantages for ESL education, their implementation must be thoughtfully considered, aligning with pedagogical principles and instructional design. Instructors should ensure these methods correspond with educational goals, encourage active participation, and cater to varied learning styles and needs. It is also crucial to remember that employing GenAI tools introduces ethical issues regarding data privacy, algorithmic bias, and learner independence. Teachers must consider these ethical aspects and set forth explicit policies to safeguard student rights and promote ethical GenAI use in education.

Furthermore, assessing the effectiveness of the proposed interventions requires robust measurement and evaluation methods to track changes in students' writing skills, language proficiency, and academic performance over time. Valid and reliable assessment tools generate meaningful data and insights that inform evidence-based decision-making. Sustaining the benefits of cooperative learning, technology integration, and GenAI feedback in ESL instruction also requires ongoing support, professional development, and institutional commitment. Without long-term sustainability measures, the initial gains from these interventions may diminish.

To address these limitations, it is essential to conduct longitudinal studies to evaluate the long-term impact of integrating cooperative learning, technology, and GenAI feedback on ESL student writing proficiency, language acquisition, and academic success. Additionally, comparative studies should be conducted to assess the effectiveness of different pedagogical approaches (e.g., cooperative learning alone, technology integration alone, GenAI feedback alone) to identify the most effective strategies for enhancing ESL writing support in EMI universities. Cross-cultural studies are also necessary to explore differences in ESL writing difficulties and instructional preferences among students from diverse cultural backgrounds within EMI universities, aiming to develop culturally responsive pedagogical approaches. Finally, investigating the role of teacher training and professional development programs in supporting educators to effectively implement innovative pedagogical approaches and leverage technology and GenAI tools in ESL instruction is critical.

Addressing these limitations and challenges requires a comprehensive and collaborative approach involving educators, researchers, policymakers, and other stakeholders. By acknowledging these factors and adopting a systematic approach to implementation and evaluation, the proposed study can overcome barriers and contribute to the advancement of ESL instruction in Chinese EMI universities.

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