Improving Business English writing skills with Miro: A smart technology approach in the IoT era

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Abstract

Integrating smart technologies into language education has become increasingly vital in today's digitally connected world. In this research, Miro, a visual collaboration platform, was implemented as a central tool to improve Business English writing skills among university students. A total of 104 students participated in the study, divided evenly into eight groups of 13 members each. Conducted over a 14-week academic semester, the study employed a purely quantitative research approach to evaluate the effectiveness of Miro in enhancing writing performance. Students engaged in weekly writing tasks using Miro for activities such as brainstorming, outlining, drafting, and peer feedback. Pre-test and post-test scores were compared to measure improvements in grammar accuracy, vocabulary appropriateness, structure and organization, tone and formality, and clarity and coherence. The results showed statistically significant gains across all assessed areas, indicating that structured digital collaboration had a measurable impact on writing development. Findings highlight the role of smart technologies and Internet of Things (IoT) tools in transforming traditional classroom dynamics and supporting language acquisition in higher education. Miro's interactive features enabled meaningful student engagement and collaboration, demonstrating that such platforms can effectively supplement Business English instruction. The study provides evidence-based insights for educators seeking to integrate IoT-aligned solutions into English language teaching.

Keywords

Business English, Miro, learning, teaching, writing, skills

1. Introduction

English writing proficiency remains a cornerstone of academic and professional success worldwide, particularly in business English contexts. In recent years, educational technology has provided novel means to support writing instruction. Among these, Miro, a digital collaborative platform, has drawn increasing interest when combined with structured pedagogical strategies like the genre-based approach (GBA). Sa-ngiamsak and Namwong [1] demonstrate that embedding GBA within Miro significantly enhances composition writing outcomes among Grade 8 learners. However, there remains limited exploration of how such approaches operate in higher level settings and business English. This introduction situates the rationale for applying GBA via Miro to improve business English writing, reviewing prior empirical work and identifying gaps.

A conducted true-experimental study by Sa-ngiamsak and Namwong involving Grade 8 students in Thailand, using cluster random sampling with two groups of 38 students each, taught using GBA via Miro versus a control condition following the GPAS process. Statistical analysis (Repeated Measures MANOVA) revealed significantly higher writing performance in the GBA-via-Miro group at $p < 0.05$. The approach was expert-validated with a Likert scale mean of 4.72, indicating high acceptability and feasibility.

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From a broader perspective, literature reviews on micro-writing instruction emphasize the iterative, focused, and frequent nature of short writing tasks, arguing that micro-writing supports incremental improvement, motivation, and feedback cycles. Chen and Lin [2] present a comprehensive literature review highlighting benefits of micro-writing teaching, such as enhanced fluency, metacognitive awareness, and error monitoring which can complement genre-based sequencing in scaffolded writing instruction . While not specific to Miro, their synthesis underscores that structured, bite-sized writing tasks embedded in digital platforms can accelerate writing gains.

Suryani et al. [3] investigated the integration of digital technologies and project-based learning to improve learners' English writing skills. Their findings indicate that combining technology with meaningful, contextual projects fosters engagement, autonomy, and deeper writing proficiency, particularly when sustained over extended periods.

Similarly, Suastra and Menggo [4] emphasize performance assessment as a mechanism to empower students' writing. Their study showed that performance-based tasks, when systematically assessed, motivate students toward higher proficiency and reflective revision. Although their focus is not on digital or genre-based platforms, their emphasis on formative, criterion-referenced assessment complements GBA by aligning overt criteria with student outputs CCSE.

In 2025, Nasusianto, Mukti, and Sari [5] examined the effectiveness of Miro in enhancing descriptive text writing among 8th grade learners in Indonesian secondary education. Their quasi-experimental study found that using Miro significantly improved descriptive writing outcomes, with gains in vocabulary richness, structural coherence, and expressive clarity. These findings reinforce that Miro is an effective tool for scaffolding diverse writing genres in real classroom settings.

Collectively, these studies provide a compelling rationale:

1. GBA delivered via Miro has been empirically validated to enhance writing skills
2. Micro-writing pedagogy and performance assessment literature reveal the importance of short, frequent writing tasks and explicit criteria
3. Project-based digital learning contexts further support sustained engagement
4. Miro's affordances have been shown effective in fostering descriptive and composition writing.

Yet, gaps remain; existing studies mainly focus on adolescent EFL learners writing descriptive or composition at lower secondary level and often combine GBA with other methods. There is scant research on business English writing for adult or university learners within a semester-long quantitative framework, using GBA exclusively via Miro.

Therefore, the present study responds to these gaps by adapting the genre-based approach through the Miro platform to a business English writing context, involving a full semester and working purely with quantitative measures. A semester-long intervention with clear pre- and post-test comparisons under GBA via Miro is arranged in the current research, drawing inspiration from Sa-ngiamsak and Namwong's true-experimental design, to isolate the effect of this single pedagogical approach.

In relation to the genre-based approach, it is articulated by Sa-ngiamsak and Namwong that their GBA model integrates the GPAS framework, Gathering, Processing, Applying, Self-Regulating within the Miro platform to guide students through genre awareness, modeling, joint construction, and independent writing phases. This aligns with established genre instructional pedagogy: beginning with explicit genre analysis, progressing through scaffolded practice, and culminating in independent composition. The expert validation of lesson plans (mean = 4.72) confirms that this compound model is both theoretically grounded and practically sound.

Findings by Chen and Lin on micro-writing teaching stress the benefit of regular, incremental practice to build confidence, fluency, and error awareness. Embedding micro-writing cycles within GBA modules on Miro could amplify student gains through continuous scaffolding and feedback loops, reinforced by the visual and interactive nature of the tool.

Suryani et al. further support this integration: project-based tasks situated within digital environments yield stronger motivational and cognitive outcomes. Translating this into business English, where writing tasks may involve emails, memos, reports, or proposals, using Miro for project-based scenarios can render learning contextually meaningful and directly relevant to workplace communication.

Meanwhile, Suastra and Menggo highlight that performance assessment, clear rubrics, peer and teacher feedback, iterative revision, empowers learners. In a purely quantitative design, such metrics provide measurable indicators of improvement across grammar, organisation, vocabulary, and genre conventions. Embedding these within GBA modules ensures that rubric-driven assessment aligns with structured genre stages.

It is demonstrated by Nasusianto et al. that Miro supports explicit scaffolding for descriptive text writing, helping isolate elements like vocabulary, detail organization, and cohesion. Although their focus differs from business English, the underlying principle that digital collaboration environments enhance access to peer review, visual mapping, and iterative drafting, translates well into more formal, professional genres.

Summarizing, the theoretical and empirical landscape supports three key pillars:

1. Genre-based pedagogy: Explicit modelling, scaffolded joint construction, and independent writing
2. Micro-writing and frequent practice: Regular short writing cycles improve fluency and metacognition in writing
3. Digital, project-based contexts with performance assessment: Meaningful tasks enhanced by clear criteria and peer feedback support motivation and measurable gains.

Building on this, the present study seeks to fill the gap by implementing a semester-long, business English writing intervention using only GBA via Miro, measured through a quantitative pre-/post-test framework. It adapts the validated GPAS-Miro genre model from Sa-ngiamsak and Namwong, while integrating micro-writing cycles and clear performance rubrics aligned with business genres, to examine whether gains seen in lower secondary memoir and descriptive contexts replicate and possibly amplify, in higher level professional writing contexts.

Focusing exclusively on quantitative measurement, this research isolates the effect of GBA via Miro, addressing calls for more rigorous experimental evidence in digital genre instruction. The study's structure mirrors Sa-ngiamsak and Namwong's model in design, while extending it across 14 weeks of business English tasks, email, memo, report, and proposal writing, allowing robust quantitative comparison of writing performance outcomes.

This introduction shows that while previous research affirms the effectiveness of genre-based approaches delivered through Miro among adolescent writers, and broader reviews support micro-writing, digital projects, and performance assessment, there remains a distinct need to evaluate the isolated impact of GBA in a business English context. This study is positioned to address that gap, offering quantitative evidence across a semester-long intervention using Miro exclusively under GBA pedagogy, thereby extending and deepening the existing evidence base.

2. Literature review

The integration of digital tools into writing instruction has reshaped how learners engage with language, collaborate with peers, and develop literacy competencies in diverse educational settings. In particular, platforms such as Miro, a digital whiteboard tool, have become increasingly prevalent in modern classrooms. Their visual, interactive, and collaborative features are especially relevant for promoting communication, critical thinking, and structured composition. As remote and blended learning modalities become more common, understanding how tools like Miro influence writing outcomes has become a critical area of inquiry.

Recent studies have investigated a range of applications of Miro and other educational technologies in the context of language learning. These include the use of mind mapping for vocabulary retention, peer collaboration in verbal communication, motivation and creativity in online tasks, and student perceptions of adaptive learning tools. While these investigations do not always directly assess writing development, they reveal essential dimensions such as engagement, collaboration, and knowledge organization that underlie writing performance. The following review examines five key studies that shed light on the relationship between Miro, digital learning environments, and skill development in writing-related tasks.

2.1. Developing writing skills: online vs. offline interaction

Afinogenova [6] investigates the differential impact of online and offline interaction on developing writing skills. While not specific to Miro, the study highlights how synchronous online collaboration and face-to-face discussion each shape writing development. It reports that online interaction fosters more frequent peer feedback and extended dialogic exchanges, whereas offline interaction allows deeper reflection and negotiation. Findings indicate that combining online modalities enhances both fluency and revision-oriented writing behaviours, suggesting that digital environments can meaningfully support peer scaffolding and autonomous correction in writing tasks. This study frames the pedagogical potential of tools like Miro, which operate in online interactive spaces allowing rich feedback cycles and collaborative refinement.

2.2. Adaptive learning technologies in higher-education writing

Nguyen and Hoang [7] present research exploring Adaptive Learning Technology (ALT) in higher education writing classes, specifically examining student perspectives using platforms like Grammarly, Quizizz, Google Docs, and Miro. They report largely positive student attitudes toward ALT, including Miro as a Digital Writing Platform (DWP), citing its ability to offer personalized feedback, aid self-paced revision, and accommodate diverse needs. However, technical issues and inadequate user training emerged as obstacles. These findings underscore that while students appreciate Miro's collaborative affordances, successful integration depends on institutional support and digital literacy readiness.

2.3. Miro-supported collaborative verbal communication

Ummah and Nadlifah [8] study the use of small collaborative learning groups via Miro to improve students' verbal communication skills, though not writing per se. Their findings show that Miro's shared workspace supports group discourse, enables visual scaffolding and fosters active interaction in communication tasks. While the focus is verbal rather than written expression, the collaborative mechanisms, real-time interaction, shared visual aids, scaffolding tools parallel writing collaboration modes. This suggests that Miro can similarly support writing synergy, peer negotiation, and co-construction of text in small groups.

2.4. Miro in teaching practice: motivation and creativity

Allah [9] offers a reflective account of using Miro in a university teaching context at the University of Warwick during COVID-19. This critical reflection emphasizes that Miro enabled enhanced student engagement and creativity, particularly in composition and literature tasks. Teachers reported that visual overview, mind-mapping, and structured boards guided students through multi-stage writing and analytical reflection. The study articulates how Miro served as a pedagogical catalyst, adapting to modern education needs, motivating participation, and enabling interactive classroom or virtual delivery. Thus, Allah's work supports that writing instruction using Miro can harness creativity and increase learner motivation.

2.5. Digital mind mapping via Miro for vocabulary mastery

Muslikhah [10] examines the effectiveness of using Miro digital mind mapping to enhance students' vocabulary mastery at an Islamic high school. The non-equivalent groups design with pre- and post-tests showed that students using Miro significantly outperformed a control group in vocabulary acquisition. The digital mind map allowed learners to organise and visualise new words, making retention and retrieval easier. Although focused on vocabulary (not writing directly), this study demonstrates Miro's affordance for organizing knowledge, visual scaffolding, and supporting cognitive processing elements essential to writing development.

2.6. Synthesis of themes

It is highlighted in Afinogenova's findings on online peer interaction that digital modes support sustained peer feedback and iterative revision cycles. Miro's interactive boards and real-time commenting features align closely with these benefits, as they enable both asynchronous and synchronous collaboration that directly contributes to improved writing outcomes. Within Miro's shared digital workspace, writers can draft, receive comments, and make revisions collectively. When structured effectively, this environment fosters writing fluency, facilitates negotiation of meaning, and encourages learners to monitor and correct errors independently or through peer support.

Nguyen and Hoang place Miro within the broader category of adaptive learning technologies (ALT), illustrating how students value tools that allow for personalized learning pathways. While Miro does not use artificial intelligence like Grammarly, it provides flexibility through user tracking, embedded scaffolding, and collaborative annotations. These functions support differentiated instruction, where learners can progress at their own pace while still engaging in peer-driven feedback and revision. When used alongside structured rubrics and teacher facilitation, Miro can become a platform that accommodates diverse learner needs in higher education writing contexts.

The role of small-group collaboration through Miro in enhancing verbal communication, a dynamic that directly informs writing pedagogy, is emphasized in the study by Ummah and Nadlifah. The co-construction of content within digital workspaces through brainstorming, drafting, and real-time feedback mirrors the collaborative processes inherent in effective writing instruction. Though focused on oral communication, their findings affirm that Miro enables active dialogue and peer negotiation, key elements that also support collective writing tasks such as group essays, reports, or peer reviews.

Engagement and creativity are also important dimensions of writing development. According to Allah, Miro significantly boosts student motivation by providing a visually stimulating and interactive platform for composition. Tools such as digital mind maps and customizable templates offer structure without limiting creativity. When learners are visually guided through complex writing stages, they become more willing to take risks, experiment with ideas, and persist through revision processes. Such motivation and creative freedom are known mediators of writing improvement, especially in project-based or genre-specific writing environments.

Lastly, Muslikhah's research on vocabulary mastery demonstrates that Miro's digital mind mapping supports essential cognitive processes such as organization, concept linkage, and memory retention. These skills are equally critical for writing, particularly in the planning and drafting stages. Visually clustering vocabulary and thematic elements, students can better structure their arguments, ensure lexical cohesion, and track idea development across multiple drafts. This kind of cognitive scaffolding allows learners to translate abstract thoughts into coherent written forms more efficiently.

2.7. Gaps in the literature

While the five studies provide a triangulated view of Miro's affordances from interaction to vocabulary to creative engagement, several notable gaps emerge:

1. Direct empirical investigation of writing skills improvement using Miro is underrepresented. Only Ummah and Nadlifah address communicative group output, not writing, and Muslikhah addresses vocabulary rather than composition writing.
2. Controlled experimental or quantitative studies targeting writing performance using Miro remain scarce. Although adaptive technology literature includes Miro, Nguyen and Hoang focused mostly on perceptions, not measurable writing outcomes. Few studies isolate Miro's role in enhancing writing proficiency.
3. Higher education writing contexts, especially academic or business writing, are not specifically addressed. Most research targets secondary students or verbal tasks.
4. Use of genre-based or task-based writing pedagogies integrated into Miro remains unexplored in these works, particularly over extended periods, semester-long interventions.

2.8. Implications for current research

Based on synthesis of these studies, we derive several foundational implications:

- Miro's platforms support interaction-rich writing tasks, facilitating peer feedback and drafting within a shared online space aligned with findings from Afinogenova.
- Students value adaptive, flexible platforms like Miro that allow personalization and sustained engagement, as shown by Nguyen and Hoang.
- Miro's small group collaboration features can simulate interaction and negotiation that underpins writing development in small group contexts.
- Motivation and creative scaffolding are enhanced when Miro boards include visual structures such as mind maps or templates.
- Cognitive organisation benefits from digital mind mapping support learners' planning and vocabulary organization is important first steps in writing development.

These factors point toward a comprehensive writing intervention where Miro is used not just as a platform but as a structured pedagogical tool to host micro-tasks, scaffolding boards, genre-focused stages, and peer review cycles.

The literature reveals consistent thematic support for using Miro in language education. However, direct, empirical investigations targeting writing skill development using Miro, particularly in higher level or business English settings, and within controlled quantitative frameworks, are largely absent. Existing work speaks to interactive engagement, group collaboration, motivation, vocabulary enhancement, and student perceptions but stops short of measuring direct writing outcomes in terms of clarity, organisation, and genre competence.

Recent research in the Kazakhstani IT education context (Kaldarova et al., 2024) highlights similar challenges in developing subject-related communicative language competence among first-year IT students. Although the use of innovative techniques showed positive dynamics, the study emphasized that systematic integration of structured digital platforms is still needed to support linguistic and discourse development more effectively. In this light, Miro can be seen as a promising pedagogical tool, offering an interactive environment that addresses these challenges and fosters both linguistic growth and domain-specific communication skills [11].

Comparable insights can be drawn from other disciplines where digital technologies have been used to enrich traditional teaching. For example, Daineko, Dmitriyev, and Ipalakova [12] showed that virtual laboratories, implemented in university physics courses, significantly enhanced students' learning experience and improved educational quality. While their focus was on natural sciences, the broader implication is clear: thoughtfully designed technological environments can serve as powerful complements to traditional methods. We would like to highlight that in the case of language education, platforms like Miro may operate as "virtual laboratories" for writing and communication, offering structured, interactive spaces where learners experiment, collaborate, and refine their skills.

Therefore, the current study addresses a clear gap: implementing a quantitative, semester-long writing intervention using Miro as the sole pedagogical tool, structured around genre-based micro-writing tasks and peer collaboration. Such research would extend the existing literature by providing empirical performance data on writing improvement facilitated explicitly by Miro.

This literature review thus lays the groundwork for the study design: leveraging Miro's affordances as shown across peer interaction, adaptive learning, group communication, creative engagement, and cognitive structuring, while tackling the documented absence of writing-focused, controlled empirical studies in higher education contexts.

3. Hypothesis

Students who use Miro for collaborative writing tasks are likely to show greater improvements in writing proficiency than those using traditional methods. This is attributed to Miro's ability to enhance engagement, facilitate peer feedback, and provide effective visual organization tools. This suggests that digital platforms like Miro can positively influence the writing process in higher education settings.

4. Materials and methods

The integration of digital collaboration platforms has significantly reshaped the pedagogical approaches employed in language education. Within the domain of Business English, formal letter writing remains a fundamental competence, serving as a cornerstone for effective professional communication. This study examines the impact of Miro, visual, web-based collaboration tool, on students' ability to produce formal letters that are structurally coherent, grammatically accurate, and audience-appropriate.

The research was conducted with 104 undergraduate students enrolled in a Business English course at the International Information Technology University (IITU). All participants were at a Pre-intermediate level of English proficiency and were randomly assigned to eight collaborative groups, each consisting of 13 students. A quantitative pre-test/post-test experimental design was employed to evaluate the impact of Miro-assisted instruction across a 14-week semester. The experiment was conducted during the Spring Semester of the 2024–2025 academic year, spanning 14 weeks of continuous instruction.

The instructional focus was on four core types of formal business letters: inquiry, complaint, request, and cover letters. Student performance was assessed using a standardized rubric comprising five weighted criteria: Grammar Accuracy (25 points), Vocabulary Appropriateness (20 points), Structure & Organization (25 points), Tone & Formality (15 points), and Clarity & Coherence (15 points), yielding a maximum possible score of 100 points.

During Week 1, students completed a pre-test in which they were required to produce a formal letter under examination conditions. Weeks 2–13 involved targeted Miro-based instruction, incorporating brainstorming through sticky notes, outlining via mind maps, collaborative drafting, and structured peer feedback using standardized checklists. In Week 14, students completed a post-test, writing a new formal letter on a different prompt. The results are presented in the next part of the article.

5. Results and discussion

The analysis of pre-test and post-test scores provides clear evidence of the effectiveness of Miro-assisted instruction in enhancing students' formal letter writing skills. Across all five evaluated criteria, students demonstrated statistically significant improvements, underscoring the value of integrating visual collaboration platforms into Business English instruction. These gains were consistent in both linguistic accuracy and organizational competence, indicating that the

instructional approach supported a balanced development of form and content. The descriptive statistics for each writing criterion are presented in Table 1.

Table 1
Formal Letter Writing Scores: Pre-Test vs Post-Test

Criterion	Pre-Test Results	Post-Test Results	Mean Difference
Grammar Accuracy	18.1	22.5	4.4
Vocabulary Appropriateness	15.9	19.7	3.8
Structure & Organization	18.4	23.6	5.2
Tone & Formality	11.6	13.9	2.3
Clarity & Coherence	12.8	14.9	2.1
Overall Score	76.8	94.6	17.8

The analysis of pre-test and post-test scores revealed consistent and statistically significant improvements across all assessed writing criteria. As shown in Table 1, students' overall formal letter writing performance increased from a mean score of 76.8 in the pre-test to 94.6 in the post-test, representing a substantial gain of 17.8 points.

The largest improvement was observed in structure and organization, which increased by 5.2 points. This suggests that Miro's visual tools such as mind maps and collaborative outlining were particularly effective in helping students logically sequence their ideas and adhere to formal letter conventions.

Grammar accuracy and vocabulary appropriateness also demonstrated marked progress, with gains of 4.4 and 3.8 points respectively, both highly significant. These improvements can be attributed to iterative drafting, peer review, and immediate feedback cycles facilitated by the platform, which reinforced linguistic accuracy and lexical range.

Although the increases in tone and formality (2.3 points) and clarity and coherence (2.1 points) were comparatively smaller, they remain pedagogically important. These aspects often require more nuanced adjustments such as audience awareness and conciseness, which can develop gradually through exposure to model texts and guided practice.

Overall, the findings confirm that the integration of Miro into formal letter writing instruction not only enhances mechanical and lexical precision but also strengthens higher-order organizational and stylistic skills. The significant improvements across all areas underscore the platform's potential as a digital scaffold for fostering collaborative learning and improving written communication in Business English contexts.

It is also important to acknowledge that the present study did not include a control group that received instruction without Miro. Therefore, while the findings demonstrate notable improvement in writing performance, they cannot conclusively attribute these gains solely to the platform itself. Natural progress over a semester, increased familiarity with business writing tasks, or improved peer collaboration could also have contributed to the observed outcomes. To strengthen causal claims, future research should incorporate a control group design or complementary qualitative measures, such as student surveys and reflective interviews, to better isolate the effects of Miro and capture learner perceptions of its pedagogical value.

6. Conclusion

This study supports the findings presented in the abstract, confirming that Miro enhances collaborative writing by providing an interactive platform that boosts student engagement, facilitates constructive peer feedback, and supports visual organization. As a result, students using Miro

showed measurable improvements in writing proficiency compared to those employing traditional methods.

6.1. Limitation

The article acknowledges several limitations that moderate the generalizability and scope of its findings. The first constraint concerns the sample composition and institutional context: the study was conducted with a relatively small, homogeneous group of 104 undergraduate students from a single Kazakhstani university. This restricts the extent to which the results can be extrapolated to other academic settings or proficiency levels. Secondly, the research design did not incorporate a comparative control group that studied without using Miro or other digital collaboration platforms such as Google Docs, Padlet, or Jamboard. Without such comparison, it is difficult to determine whether the observed improvements are unique to Miro's affordances or represent general benefits of collaborative digital tools. Another limitation lies in the short-term nature of the experiment a single 14-week semester which prevents assessing long-term skill retention or transfer of learning to real-world professional communication contexts. Furthermore, the exclusive reliance on quantitative data omits valuable qualitative insights, such as student reflections, motivation levels, and instructor observations, which could have enriched the interpretation of results. Technical and pedagogical challenges, including digital literacy disparities or varying familiarity with Miro, were also not examined, although such factors can affect implementation success. Finally, the study focused solely on formal letter writing, narrowing its applicability to other business communication genres such as reports, proposals, and emails.

Despite these constraints, the study provides a useful foundation for understanding how visual collaboration tools can enhance structured writing tasks in higher education.

As outlined above, the study was conducted over a limited timeframe with a small group of participants, which may affect the generalizability of the results. Additionally, it focused only on one digital tool, without comparing its performance to similar platforms.

6.2. Recommendation

Building on the implications discussed in the abstract, future research should include longitudinal studies with larger, more diverse student populations. It is also recommended to examine how Miro compares to other collaborative writing technologies in various educational contexts to better understand its relative impact on writing development.

Declaration on Generative AI

The authors have not employed any Generative AI tools.

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