# Synergizing Generative Pre-Trained Transformer (GPT) Chatbots in a Process-Based Writing Paradigm to Enhance University Students' Writing Skill

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## ABSTRACT

**Background:** The combination of the process-based writing framework and GPT-based chatbots establishes a dynamic and interactive environment, leading students through the stages of planning, drafting, revising, and editing. This collaborative approach not only elevates writing skills but also cultivates critical thinking and self-reflection, thereby transforming the writing process into a more effective and engaging learning experience. Despite the potential synergy to revolutionize the writing process, there exists a surprising lack of research within the educational domain exploring the impact of this innovative approach.

**Purpose:** This study investigates the influence of a GPT-based chatbot within a process-based writing framework on university EFL students' writing skills, specifically focusing on components such as organization, content, coherence-cohesion, logical connection, and argumentation.

**Method:** Employing a sequential mixed methods type of research with a pre- and post-test design, 30 university EFL students were selected via purposive sampling technique. They engaged in 10 sessions that incorporated GPT-based chatbots within a process-based writing framework. Data collections were through pre-and post- writing tests, writing quizzes, and semi-structured interviews.

**Results:** The results highlighted substantial improvements in participants' writing performance, evident through a noteworthy increase in post-writing test scores ($\bar{x}$=17.03) in comparison to pre-writing test scores ($\bar{x}$=9.13). The study identified a progressive enhancement in four out of five writing components - organization, content, coherence-cohesion, and argumentation - across the 1st to 4th quizzes. However, the 'logical connection' component experienced a temporary decline during the 2nd and 3rd writing quizzes, rebounding significantly in the 4th quiz. Notably, the most improved writing components were 'content' and 'argumentation,' while the component related to 'logical connection' exhibited the least improved one. Qualitative findings further underscored participants' acknowledgment of the effectiveness of the strategy in facilitating their writing tasks.

**Conclusion:** The integration of chatbots within a writing framework was concluded as a facilitative pedagogical approach, fostering a dynamic, personalized, and effective learning experience, contributing to the multifaceted improvement of their writing skills. As educators and practitioners consider innovative approaches, this study provides a compelling case for the effective utilization of GPT-based chatbots in fostering language proficiency and a more engaging learning experience.

## KEYWORDS

GPT-based applications, process-based writing, GPT-based chatbots within the process-based framework, writing skill

# INTRODUCTION

Effective writing skills are paramount in language learning, serving as a cornerstone for successful communication in academic and professional contexts. The significance of writing proficiency cannot be overstated, especially for EFL students navigating the challenges of tertiary education (Wonglakorn & Deerajviset, 2023). The ability to express thoughts coherently, organize ideas systematically, and construct persuasive arguments is not only a key academic requirement but also a skill with far-reaching implications for future career success (Malmir & Khosravi, 2018).

Acknowledging the profound importance of writing, this study emphasizes the central role of the process-based approach, transcending a mere set of steps to become a dynamic framework guiding learners through planning, drafting, revising, and editing. With robust support from research (Kitajroonchai et al., 2022; Robillos & Namwong, 2021; Simpson, 2013; Wutthipan, 2023), this methodology cultivates a growth mindset, encourages reflective learning, and propels continuous improvement. It nurtures creativity and exploration, enhancing students' problem-solving abilities concerning content, structure, arguments, and audience. Integrated feedback from peers, instructors, and writing tools is crucial for ongoing refinement of skills (Kitajroonchai et al., 2022), effectively reducing writing anxiety (Robillos & Namwong, 2021). This approach instills confidence through the iterative process, preparing students for future tasks with enhanced self-assurance. As real-world writing often involves multiple drafts and revisions, the process-based approach serves as a vital training ground for professional communication (Wonglakorn & Deerajviset, 2023). Moreover, it transcends traditional models, allowing students to develop skills applicable beyond the classroom, extending into real-world writing scenarios (Wuttiphan, 2023).

The rise of GPT-based chatbots, a cutting-edge language model developed by OpenAI (Open Artificial Intelligence), have sparked a paradigm shift in the field of writing assistance (Fitria, 2023; Phillips, 2022; Sinha, 2020; Su et al., 2023; Zoherey, 2023). Positioned at the forefront of technological innovation, GPT-based chatbots have garnered acclaim for their capacity to provide immediate and personalized support to users grappling with diverse writing challenges (Okonkwo & Ade-Ibijola, 2021; Zhai, 2022). Their merits encompass not only grammar and style checks, ensuring linguistic precision (Fitria, 2023), but also extend to offering insightful content development suggestions and generating thought-provoking writing prompts (Su et al., 2023). Beyond mere assistance, GPT-based chatbots introduce a novel dimension by fostering a dynamic and iterative feedback loop (Su et al., 2023; Zoherey, 2023). This continuous engagement facilitates ongoing conversations with users, enriching their understanding of the intricate nuances inherent in the writing process (Zoherey, 2023). Adaptable and scalable, GPT-based chatbots emerge as a versatile tool that not only aids in overcoming writing anxiety (Fitria, 2023) but also enhances accessibility, making the writing process more inclusive and user-friendly (Okonkwo & Ade-Ibijola, 2021). Additionally, by promoting independent learning, GPT-based chatbots empower users to not only refine their writing skills but also instill a sense of autonomy in navigating the complexities of effective communication (Zoherey, 2023).

Within the educational context of Thailand, conventional teaching approaches in writing pose challenges as they tend to inhibit students' free exploration of ideas and collaborative engagement with peers, restricting opportunities for compositional refinement. The overemphasis on rote memorization, grammar, and vocabulary accuracy further impedes the development of critical thinking, creativity, and collaborative writing skills (Robillos & Bustos, 2022; Wuttiphan, 2023). Moreover, an additional challenge arises in the reluctance of teachers to integrate technology tools into the writing process for their students. This hesitancy may stem from a lack of familiarity or confidence in utilizing such tools ((Robillos & Bustos, 2022), hindering the potential benefits technology can offer in facilitating the writing process. As a consequence, the traditional teaching methods not only impede the exploration of ideas and collaborative initiatives among students (Wuttiphan, 2023) but also fail to harness the transformative potential of technology in overcoming these limitations (Robillos, 2023). Consequently, the traditional teaching methods not only impede the exploration of ideas and collaborative initiatives among students (Robillos, 2022; Wuttiphan, 2023) but also fail to address and overcome the transformative potential of technology, leaving unaddressed the problems that students encounter in content creation, logical coherence, unity, and argumentation in their written compositions.

Recognizing the deficiencies in the current teaching practices, there emerges a pressing need for an innovative and transformative approach to teaching writing in Thai schools and universities. Traditional methods fall short in providing students with opportunities for holistic skill development, especially in articulating arguments and engaging in thoughtful analysis. To address these challenges, the integration of a robust writing framework with technological applications becomes imperative (Evmenova & Regan, 2019; Robillos, 2022; 2023). Extensive evidence supports the effectiveness of technology in various writing stages, such as prewriting, drafting, revising, proofreading, and publishing (Evmenova & Regan, 2019; Su et al., 2023; Zhang, 2021; Zoherey, 2023). The researcher leverages the capabilities of GPT-based chatbots to guide students towards a nuanced understanding of constructing and articulating arguments effectively within the process-based writing paradigm. This multifaceted approach not only addresses immediate writing challenges (Robillos & Namwong, 2021; Wuttiphan, 2023) but also cultivates foundational skills essential for academic success and beyond. As the study delves into investigating the impact of synergizing GPT-based chatbots in conjunction with the pro-

cess-based writing paradigm, the aim is not only to enhance immediate writing skills but also to underscore the potential for a transformative shift in the overall writing pedagogy. This paradigm shift marks a significant advancement in preparing students for the complex demands of contemporary communication, emphasizing empowerment and skill development in alignment with the evolving landscape of effective writing practices.

## LITERATURE REVIEW

### The Process Writing Approach and its Pedagogical Significance in EFL Instruction

The process writing approach, recognized as a cornerstone in EFL classrooms, has garnered significant attention from researchers (Karatay, 2011; Kitajroonchai et al., 2022; Wonglakorn & Deerajviset, 2023). This writing approach places its primary emphasis on the writing process, rather than solely emphasizing the final product (White & Arndt, 1991). This widely embraced methodology has been thoroughly examined and expanded upon by scholars (Brown, 2001; Coffin et al., 2003; Robillos & Namwong, 2021; Wuttiphan, 2023), solidifying its pedagogical importance. Coffin et al. (2003) contributed an intricate eight-stage writing process, encompassing pre-writing, planning, drafting, reflecting, peer reviewing, revising, and editing. Aligning with this, Brown (2001) emphasizes the cognitive aspects of writing, highlighting prewriting, drafting, revising, and editing as pivotal stages. Additionally, Karatay (2011) delves into the
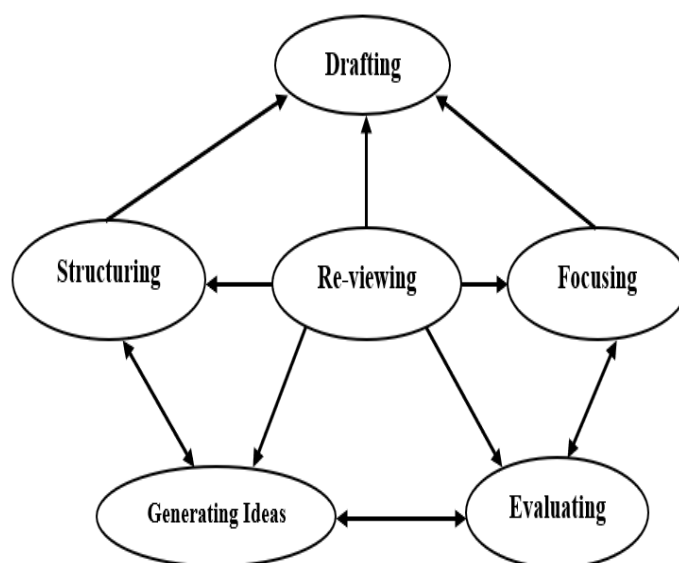
nuanced stages of the process-based writing approach, expanding the spectrum to include prewriting, drafting, editing, revising, and publishing. Together, these researchers not only endorse the prominence of process writing approach but also collectively enrich our understanding of its multifaceted stages and applications within the realm of language education. In line with this perspective, the present study is grounded in the process writing approach, drawing from the framework proposed by White and Arndt (1991), which provides a concise explanation of each stage within the approach.

The initial stage, known as "focusing," involves determining the purpose and underlying motivations for writing. The subsequent stage, "structuring," revolves around organizing ideas in a manner that is coherent and comprehensible to the reader. As the writing process progresses, the "drafting" stage signifies the shift from a writer-centered perspective to one that considers the reader's perspective. Multiple drafts are generated and feedback from teachers or peers is incorporated. "Re-viewing" entails stepping back from the text and assessing it objectively, questioning its accuracy and effectiveness. Evaluation is provided throughout the process to offer continuous support to students rather than solely at the end. It should be noted that the "generating ideas" stage is particularly crucial during the initial phases of the writing process, as it involves selecting a topic and establishing a purpose

Several recent studies, including those by Wonglakorn and Deerajviset (2023), Robillos and Namwong (2021), and Kitajroonchai et al. (2022), highlight the positive impact of the

**Figure 1**
*The Process-Based Writing Approach*



*Note.* Adapted from White & Arndt (1991).

process writing approach. For example: Wonglakorn and Deerajviset (2023) conducted a study involving 62 Thai EFL secondary school students, using a mixed-methods research design. Their findings revealed that collaborative writing positively influenced students' skills and attitudes, with the writing process serving as a useful guide for organizing well-structured and coherent paragraphs. Similarly, Robillos and Namwong (2021) investigated the impact of a process-oriented approach on 27 Thai university students, showing significant improvements on their writing performance and positive responses to the effectiveness of the writing approach in developing compositions and enhancing writing self-regulation. These studies collectively emphasize the valuable role of the process-oriented approach in enhancing students' writing skills.

Despite the wealth of research on the process writing approach, a critical gap persists in the literature concerning the integration of innovative technologies, such as GPT-based chatbots, with this established methodology. The existing studies provide a solid foundation but fall short in exploring the potential synergies and pedagogical implications of incorporating advanced natural language processing tools into the established process-based writing framework. This gap prompts the need for further investigation into the unexplored territory of how emerging technologies can enhance and complement the process writing approach. By examining the potential benefits, challenges, and pedagogical implications of merging GPT-based chatbot with the well-established writing approach, the present study aims to contribute valuable insights into the evolving landscape of EFL instruction, paving the way for a more dynamic and personalized writing instructional paradigm in the digital age.

## Affordances of GPT-Based Chatbots in Students' Writing

The integration of GPT-based chatbots into the realm of education has garnered considerable attention, particularly for its potential to enhance students' writing skills (Su et al., 2023; Shibani et al., 2017). GPT-based chat applications, driven by advanced natural language processing (NLP) algorithms, have emerged as a technological breakthrough in language learning (Moqbel & Al-Kadi, 2023; Su et al., 2023). These applications leverage extensive pre-training data to simulate human-like conversations, providing personalized language support and immediate feedback (Okonkwo & Ade-Ibijola, 2021; Shibani et al., 2017). The flexibility and adaptability of GPT-based chatbots make them promising tools for supporting various aspects of language education, with a particular focus on writing.

Prior studies have highlighted the ability of GPT-based chatbots to engage learners in interactive language exchanges,

creating an environment conducive to language learning (Sinha, 2020; Su et al., 2023). The affordances lie not only in generating authentic conversations but also in providing tailored assistance for writing tasks. Learners can receive instant feedback on their written expressions, promoting continuous improvement and refinement of their writing skills (Zhai, 2022). A noteworthy affordance of GPT-based chatbots is their role in reducing writing anxiety among students (Li et al., 2017). The presence of AI-powered tools offers a less intimidating space for learners to express themselves in writing (Okonkwo & Ade-Ibijola, 2021). This aspect is particularly crucial in fostering a positive writing environment, empowering students to take ownership of their learning and become more self-directed in their writing endeavors.

However, despite these positive aspects, a comprehensive understanding of the specific benefits and challenges of GPT-based chatbots in the context of students' writing is yet to be fully explored. Existing studies tend to provide broad overviews of the potential of technology without delving into the intricacies of its application in writing instruction. That is, while studies acknowledge the overall benefits of the technology, they often lack in-depth examinations of its practical implementation and specific impact on the instructional aspects of writing. The unique affordances and limitations of GPT-based chatbots within the writing domain, especially in educational settings, warrant focused investigation. The emphasis is on the need for a more nuanced exploration of how GPT-based chatbots afford or hinder students' writing skills. The research niche lies in bridging this gap and providing insights into the specific affordances that this technology offers in the realm of writing education, contributing to a more targeted and effective approach for students in various educational contexts.

While previous research has separately explored the advantages of the process-based writing approach (Karatay, 2011; Kitajroonchai et al., 2022; Robillos & Namwong, 2021; Wonglakorn & Deerajviset, 2023; Wuttiphan, 2023) and GPT-based chat applications (Fitria, 2023; Kostka & Maliborska, 2016; Shibani et al., 2017; Sinha, 2020; Su et al., 2023), there is a scarcity of empirical studies investigating their synergistic impact on language learning, particularly in enhancing writing skills. This study aims to fill this gap by demonstrating the potential of integrating GPT-based chatbots as real-time collaborators within a process-based writing framework. Recognizing that the use of technology alone may not be as effective without a structured instructional approach, the study focuses on demonstrating how these chat applications, when integrated with a process-based approach, provide learners with instant access to language resources, vocabulary suggestions, and grammar assistance, ultimately elevating the quality of their written responses. The findings of this study seek to offer valuable insights into the efficacy of this integrated, learner-centered approach, pro-

viding practical implications for language educators looking to incorporate innovative technological tools in EFL writing instruction. Specifically, the following research questions (RQ's) are sought to be answered:

RQ#1: Is there a significant difference between the students' writing performance before and after the use of GPT–based chatbots within a process-based writing paradigm (the intervention used)?

RQ#2: Do the students' writing quiz performances improve via the implementation of the intervention in terms of organization, content, coherence-cohesion, logical connection, and argumentation?

RQ#3: What learning experiences have the students obtained in facilitating their writing tasks using the intervention?

# METHOD

## Design

The research design employed in the current study was a sequential mixed-method approach, drawing on both quantitative and qualitative methodologies (Creswell & Creswell, 2018). The quantitative aspect of the research involved the use of data to assess the measurable impact of integrating GPT-based chatbots within the process-based writing framework on students' writing skills. This included analyzing performance metrics such as scores in quizzes and post-writing assessments. On the other hand, the qualitative aspect delved into the subjective experiences and perceptions of participants, seeking to uncover their opinions on how the intervention influenced their writing tasks. Semi-structured interviews were utilized to capture the rich, nuanced insights of the participants, providing a more holistic understanding of the intervention's effectiveness beyond numerical metrics (Creswell & Creswell, 2028).

Furthermore, a single group of pre- and post-test design was employed to assess the impact of the intervention on the participants' writing skills. In the study, a writing pre-test was administered to evaluate the participants' writing abilities and establish a baseline for comparison. The pre-test aimed to provide insight into the participants' initial proficiency levels across various writing components, including organization, content, coherence-cohesion, logical connection, and argumentation. Following the intervention, a post-test was administered to the same group of participants. The post-test evaluates the impact of the intervention by measuring any changes or improvements in the participants' writing skills. This design allows for a direct

comparison within the same group, offering insights into the effectiveness of the intervention over time. The adoption of a single-group design was necessitated due to the constrained availability of a larger student populace, a limitation addressed to optimize the efficacy of addressing the research inquiries.

## Participants

The study involved 30 participants selected through purposive sampling (Best & Khan, 2012), comprising 10 male and 20 female university students. These participants were enrolled in a provincial university situated in the Northeastern part of Thailand and were studying the subject "Approaches to Writing". The selection of these participants in writing compositions, particularly in L2, is motivated by a pressing need to address critical deficiencies in their writing abilities. These students exhibit challenges in content creation, logical coherence, unity, and the absence of argumentation in their written compositions. The challenges observed in content creation, logical coherence, unity, and the absence of argumentation in the students' written compositions were identified through a comprehensive analysis of their course assignments.

In addition, the students' age range was between 18 and 19 years, and collectively, they exhibited an average of more than ten years of exposure to English language instruction within the Thai national education system preceding their matriculation into the university. The participants were apprised of the study's objectives, the tasks incumbent upon them, the confidential nature of their responses, their prerogative to withdraw from participation at any juncture, and the provision for elucidating any queries regarding the research procedures (Best & Khan, 2012).

## Data Collection

### Writing Pre-Test

A writing pre-test was employed in this study, wherein students were given one hour to develop a writing topic consisting of a minimum of 200 words. The topic was thoughtfully chosen to align with the subjects covered in their writing class. Before initiating their drafts, students engaged in preparatory activities such as question posing and brainstorming, mirroring their regular writing class practices. Subsequently, two English lecturers from the study university evaluated the written compositions using a writing scoring rubric designed by the researcher (refer to the test marking). The scoring rubric covered five aspects: organization, content, coherence-cohesion, logical connection, and argumentation. To ensure the reliability of

the ratings, the two inter-raters independently assessed ten compositions, and the correlation between their scores was calculated. The obtained inter-reliability scores for the first and second inter-raters were .87 and .84, respectively, indicating a strong level of agreement between them (Creswell & Creswell, 2018).

### Writing Post-Test

The writing post-test was conducted following the implementation of the intervention. Participants were provided with a different topics (parallel in difficulty level) and were instructed to develop a composition of at least 200 words. However, they were not specifically reminded about the strategies or instruments they should employ. Revising and editing checklists were made available on the teacher's desk, but it was up to the participants whether to utilize them or not. To assess the participants' writing performance, two experienced writing experts (the same raters who had assessed the participants' written compositions during the pre-writing test) evaluated the written compositions. They are English lecturers with over five years of teaching experience in EFL writing courses at the study-university.

### Students' Writing Quizzes

The writing composition tasks completed by students during the intervention comprised four distinct assignments (parallel in difficulty level) utilized throughout the program. Each composition underwent assessment using a writing rubric, evaluating aspects such as organization, content, coherence-cohesion, logical connection, and argumentation. The topics covered a range aligned with their regular writing class, ensuring relevance and stimulating student interest. Topics were intentionally broad, fostering creativity and allowing for personal experiences while providing opportunities to practice writing skills. During the writing stage, students actively collaborated to gain insights, receive constructive feedback, and refine organizational thoughts. Utilizing the GPT-based chatbot, students sought support in generating and confirming ideas, ensuring grammatical and structural accuracy, making comparisons, and developing argumentative details. The teacher remained available to address questions or concerns. In the post-writing stage, allocated for revising and editing, students autonomously scrutinized compositions with GPT-based chatbot assistance. They were responsible for employing a comprehensive revision checklist to ensure coherence and completeness and resolve lexical and organizational challenges, both individually and collaboratively. In the editing phase, students utilized an editing checklist to identify and rectify minor errors, with GPT-based chatbot support for refining details and enhancing overall quality. The writing drafts for each quiz were assessed using the same scoring rubric as their pre-and post-writing tests.

To evaluate participants' compositions, a writing scoring rubric (see Appendix A) with criteria including organization, content, word choice, and language was employed. Designed by the researcher himself, this rubric underwent review by two English lecturers at the study-university for adjustments. Additionally, a descriptive checklist ensured standardized assessment. Each criterion had a maximum score of 20 points, with subsections assigned a maximum of four points each, established through consensus among evaluators.
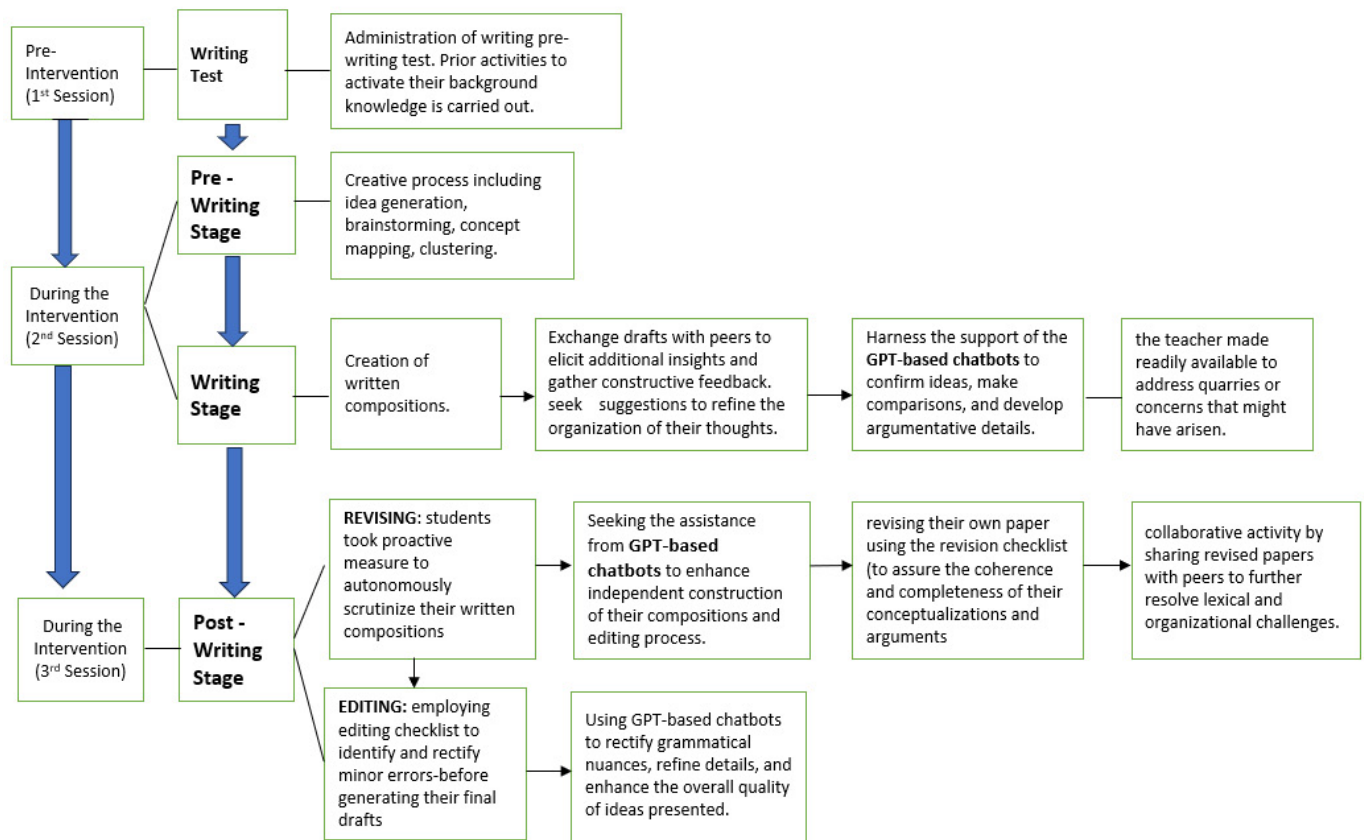
### Semi-Structured Interviews

Semi-structured interviews were conducted to obtain comprehensive insights and detailed information regarding the students' utilization of GPT-based chatbots within the process-based writing framework. The aim was to delve into their experiences and perceptions in facilitating various components of their writing tasks, including organization, content, coherence-cohesion, logical connection, and argumentation. These interviews were carried out after the completion of the post-writing test. 15 participants voluntarily participated in the interview. Each interview session lasted approximately 30 to 45 minutes, allowing for in-depth discussions while ensuring the participants' comfort and engagement. The interviews took place in a quiet and comfortable setting within the university premises, providing a conducive environment for open and honest conversations. The participants were assured of the confidentiality of their responses, encouraging them to share their experiences freely.

## The Intervention Programme

An intervention program consisting of ten sessions was developed and implemented. Of these sessions, eight sessions were dedicated to the implementation of the process writing approach as the intervention, while one session each was allocated for the administration of the pre- and post-writing tests. The figure below presents the intervention programme implemented in the study via utilizing the GPT-based chatbot within the process-based writing framework that constitutes pre-writing, writing, and post-writing stages along with its learning activities.

In the subsequent three sessions (4th – 9th sessions), the students actively participated in additional composition writing exercises, delving into diverse topics (parallel in difficulty level). The primary aim of these sessions was to provide students with a comprehensive opportunity to apply the acquired strategy. This phase was strategically positioned before their involvement in the post-writing activity, slated for the 10th session. Furthermore, during these composition sessions, students were encouraged to seamlessly integrate GPT-based chatbot into their writing process, leveraging its

**Figure 2**

*The Intervention Programme*



capabilities to refine and augment their compositions across varied subject matters. This integration served as an instrumental component in fostering not only writing proficiency but also in harnessing the potential of advanced linguistic

support in the preparation for subsequent activities. Finally, after the intervention, (10th session), the students were tasked to compose an essay comprising at least 200 words, all completed within a 60-minute time constraint.

## Data Analysis

In terms of quantitative data analysis, the study employed Descriptive Statistics, calculating and presenting measures such as frequency, mean, and Standard Deviation in a tabular format. Furthermore, a t-test statistical analysis was conducted to discern the variance between students' pre- and post-writing test results. Additionally, Analysis of Variance was applied to investigate the significant differences among quiz results. For qualitative data analysis, the responses gathered from semi-structured interviews were subjected to thorough examination. This process involved

a meticulous approach known as topical coding, in line with the methodology outlined by Creswell and Creswell (2018). Texts were systematically transcribed and labeled, interpreted, and analyzed to pinpoint emerging themes within the interview responses, contributing to a comprehensive understanding of the qualitative aspects of the study.

## RESULTS

### Quantitative Analysis

#### *Significant Difference between the Students' Writing Performance Before and After the Use of GPT–Based Chatbots within the Process-Based Writing Framework (RQ#1)*

Overall test of difference on the participants' writing test performances

Table 1 presents the outcomes of the test aimed at comparing students' pre- and post- writing test results. The overall

mean and SD scores reveal a substantial disparity between the two sets of results. The pre-writing test performance (9.13; SD=2.619) was significantly lower than their post-writing test performance (17.03; SD=2.917). This marked difference is corroborated by a computed p-value of 0.001, which is below the significance threshold of $p<0.05$. This signifies that the implementation of the process writing approach had a noteworthy and positive impact on students' performance in their written assignments.

### Students' Writing Quiz Performances Improve through the Integration of GPT-Based Chatbots within the Process-Based Writing Framework in Terms of Organization, Content, Coherence-Cohesion, Logical Connection, and Argumentation (RQ#2)

Table 2 displays the descriptive results for the four quizzes administered to the students. The initial quiz scores for the students commenced at a comparatively lower level. However, there was an observable improvement in the overall writing quiz scores as the intervention progressed. This improvement is reflected in the mean scores of x̄ =12.75, x̄ =13.86, x̄ =14.19, and x̄ =16.48 for Quiz 1, Quiz 2, Quiz 3, and Quiz 4, respectively. Additionally, the table reveals that four out of five writing components, namely "organization" (x̄ =12.33; x̄ =13.21; x̄ =14.32; and x̄ =16.14), "content" (x̄ =13.14; x̄ =14.75; x̄ =15.96; and x̄ =17.12), coherence-cohesion (x̄ =12.41, x̄ =13.89, x̄ =15.18, and x̄ =15.82), and "argumentation" (x̄ =13.23, x̄ =15.31, x̄ =16.35, and x̄=17.43), exhibited a gradual increase from the 1st to the 4th quizzes, respectively. One writing component (logical connection) experienced a decrease in scores during the 2nd (x̄ =12.17) and 3rd(x̄ =12.14) quizzes but demonstrated a significant improvement in the 4th quiz (x̄ =15.93). While the most improved writing components were "content" and "argumentation", the component related to "logical connection" showed the least improvement.

Table 3 presents the result for Repeated Measure Analysis of Variance (within subjects). It can be observed that the p-value under the *Sig.* column and sphericity assumed is less than 0.05, this indicates a significant difference among the scores in the four quizzes. The value of the ANOVA is indicated by the F column (F=97.115).

Table 4 presents the pairwise comparison of the means of the four quizzes. Here, the 1st quiz is compared to 2nd quiz, 3rd quiz, and 4th quiz. It was noticeable that the p-value was all less than 0.05 level of significance. Thus, scores in 1st quiz were significantly different to the scores in the other 3 quizzes. It was also indicated from the means found in the second table, the mean in 1st quiz is less than the mean of the other 3 quizzes, meaning, their score in 1st quiz was found significantly lower than their scores in the other quizzes. The *asterisks* from the mean scores found in the third column indicated a significant difference.

## Qualitative Analysis

### Learning Experiences Have the Students Obtained in Facilitating Their Writing Tasks through GPT-Based Chatbots within the Process-Based Writing Paradigm (RQ#3)

**Table 1**

*Overall Test of Difference on the Participants' Pre- and Post- Writing Test Performances*

| Variables | Mean | S.D. | t-computed value | p-value |
|---|---|---|---|---|
| Pre-writing test performance | 9.13 | 2.619 | 11.014 | .001 |
| Post-writing test performance | 17.03 | 2.917 | | |

*Note: p<0.05*

**Table 2**

*Students' Quiz Performances*

| Writing Quizzes | Quiz 1 | | Quiz 2 | | Quiz 3 | | Quiz 4 | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Organization | 12.33 | .56 | 13.21 | .54 | 14.32 | 65 | 16.14 | 61 |
| Content | 13.14 | .54 | 14.75 | .67 | 15.96 | 59 | 17.12 | .71 |
| Coherence-cohesion | 12.41 | .51 | 13.89 | .67 | 15.18 | .78 | 15.82 | .49 |
| Logical Connection | 12.64 | .51 | 12.17 | .67 | 12.14 | .78 | 15.93 | .49 |
| Argumentation | 13.23 | .57 | 15.31 | .72 | 16.35 | .71 | 17.43 | .76 |
| Overall | 12.75 | 0.53 | 13.86 | 0.67 | 14.19 | 0.71 | 16.48 | 0.63 |

**Table 3**

*Repeated Measure ANOVA (Measure: MEASURE 1)*

|  | Source | Type III sum of squares | df | Mean Square | F | Sig | Partial eta squared |
|---|---|---|---|---|---|---|---|
| Quiz | Sphericity Assumed | 120.105 | 3 | 40.035 | 97.115 | <.001 | .781 |
|  | Greenhouse-Geisser | 120.105 | 1.512 | 78.806 | 97.115 | <.001 | .781 |
|  | Huynh-Feldt | 120.105 | 1.517 | 75.227 | 97.115 | <.001 | .781 |
|  | Lower Bound | 120.105 | 1.010 | 120.10 | 97.115 | <.001 | .781 |
| Error | Sphericity Assumed | 33.391 | 81 | .411 |  |  |  |
| (Quiz) | Greenhouse-Geisser | 33.391 | 41.149 | .810 |  |  |  |
|  | Huynh-Feldt | 33.391 | 43.102 | .772 |  |  |  |
|  | Lower Bound | 33.391 | 27.010 | 1.229 |  |  |  |

*Note. p<0.05*

**Table 4**

*Pairwise Comparisons of the Means of the Four Quizzes. Measure: MEASURE 1*

| Quiz | (J) Quiz | Mean Difference (I-J) | Std Error | Sig b | 95% Confidence Interval for Difference[b] | |
|---|---|---|---|---|---|---|
|  |  |  |  |  | Lower Bound | Upper Bound |
| 1 | 2 | -2.070* | .185 | <.001 | -2.597 | -1.545 |
|  | 3 | -2.501* | .227 | <.001 | -3.146 | -1.853 |
|  | 4 | -2.501* | .227 | <.001 | -3.146 | -1.853 |
| 2 | 1 | 2.072* | .185 | <.001 | 1.544 | 2.598 |
|  | 3 | -.428* | .140 | .030 | -.827 | -.029 |
|  | 4 | -.428* | .140 | .030 | -.827 | -.029 |
| 3 | 1 | 2.501* | .227 | <.001 | 1.851 | 3.147 |
|  | 2 | .428* | .140 | .030 | .028 | .828 |
|  | 4 | .000 | .000 | .000 | .000 | .000 |
| 4 | 1 | 2.501* | .227 | <.001 | 1.851 | 3.147 |
|  | 2 | .428* | .140 | .030 | .028 | .828 |
|  | 3 | .000 | .000 | . | .000 | .000 |

*Note.* Based on estimated marginal means

\* = the mean difference is significant at the .05 level

[b] = adjustment for multiple comparisons: Bonferroni

Theme 1: Benefits of using process-based approach on students' writing tasks

Established a strong foundational knowledge through planning activities. Prior knowledge activation is a powerful instructional approach, especially when it comes to the initial planning phase of writing. During this planning stage, students are encouraged to tap into their pre-existing mental frameworks and understanding of the subject matter (Robillos, 2021). By doing so, they establish a strong foundational knowledge base upon which to construct their written compositions. The participants emphasized the use of a specific technique known as clustering, which allowed them to explore a multitude of ideas before arranging them in a specific order. This approach helped students realize that certain words or concepts had numerous related aspects to write about. Over time, what initially appeared as random connections gradually transformed into logical patterns of thought. As one participant (P3) conveyed:

> "The clustering method enables me to examine numerous ideas before arranging them in a specific sequence." **P3**

*Bolstered self-assurance through collaboration.* One of the activities involved in the process-based writing approach is

collaboration activity. This activity, such as pair and group work, plays a vital role in bolstering students' self-assurance and fostering a supportive learning atmosphere (Wonglakorn & Deerajviset, 2023). Through collaboration, students can receive feedback, exchange viewpoints, and gain fresh insights, all of which contribute to a heightened confidence in expressing themselves through writing. The experiences shared by students underscore confidence and encouraging active participation in the writing process. By collaborating, students tap into their peers' collective knowledge and expertise, benefiting from constructive feedback and broadened perspectives. This collaborative approach not only enhances their writing skills but also cultivates a sense of support and motivation within the learning community. As expressed by P9:

> "Before I was hesitant to share my ideas, fearing they might be wrong, but as I shared, I realized that others also had similar thoughts, confirming my capabilities." **P9**

*Empowered control of students' writing.* Evaluating one's own language involves a meticulous examination of the text, scrutinizing its structure, grammar, vocabulary usage, and coherence. It necessitates students' attention to detail, identification of writing flaws or weaknesses, and consideration of ways to enhance clarity and effectiveness. This introspective practice empowers students to take control of their writing and actively participate in the process of revision and editing. The techniques of revising and editing offer students' specific strategies and guidelines for refining their writing. Drawing from P2's experiences, he/she shared his/her firsthand encounters with revising and editing techniques, indicating their value and benefits in enhancing her writing. As expressed by P2,

> "After learning techniques like revising and editing, my writing has become more meaningful and freer from grammatical errors." **P2**

## Theme 2. Affordances of GPT-Based Chatbots in Facilitating Students' Writing Task/s

*Writing practice.* Interacting with the GPT chatbots involves writing in the target language. This provides writing practice, encouraging learners to compose questions, responses, and sentences. Regular engagement with GPT chatbots enhances writing skills, fostering fluent and accurate expression akin to real-life communication. Conversing with GPT chatbots demands critical thinking for coherent questions and responses, involving vocabulary selection, sentence structure, and grammar use. Consistent practice develops the ability to craft intricate sentences. By observing GPT chatbot's sentence construction and understanding responses, learners learn by example, gradually applying these patterns to their writing for improved fluency and quicker idea expression. As stated by P1:

> "The more I practice writing, the more I refine my skills in areas suchas sentence coherence, and overall writing structure." **P1**

*Immediate feedback.* GPT-based chatbots provide instant feedback on the correctness and clarity of learners' language use. Incorrect grammar, phrasing, or vocabulary can be highlighted by comparing the GPT-based chatbot's responses with the learner's input. If a learner's input contains grammatical errors or incorrect syntax, AI's response may highlight those issues. For example, if a learner writes *"I has a cat,"* the AI's response might respond with the corrected version: *"I have a cat."* This direct correction assists learners in understanding and internalizing proper grammar and sentence structure. As conveyed by P9:

> "The application improved my language skills by providing me immediate feedback on the errors on my text." **P9**

*Reduced anxiety.* Using a GPT-based chatbot offers a low-pressure language practice setting. Unlike interactions with native speakers, there's no immediate social judgment or pressure for perfection. Learners can freely explore, learn, and make mistakes without anxiety. This allows them to focus on improvement instead of worrying about errors. As learners practice and realize effective communication with AI, their language confidence increases. P4 expressed that:

> "I can experiment with different ways of expressing my ideas since I don't feel any pressure of a live conversation" **P4**

## Theme 3: Challenge/s of Using the Strategy

*Time constraints.* The process writing approach places significant emphasis on engaging in each phase of the writing process, which typically includes prewriting, writing, post-writing (including revising and editing). However, within the context of this study, there arose a notable challenge for students due to time constraints that hindered their ability to complete all these stages thoroughly and within the allocated timeframe. This constraint had a tangible impact on their capacity to fully immerse themselves in each phase and deliver their written work on schedule. P6's account offers a glimpse into how these time limitations affected the students. She felt the pressure of attempting to navigate through all the writing stages within the specified timeframe. This observation underscores that the restricted time available hindered her and potentially others from fully embracing and implementing the process writing approach as it was originally intended. As articulated by P6:

> "Strategies such as planning and revising were beneficial but the time required to complete these required more time to finalize our drafts." **P6**

*Misunderstandings and inaccuracies.* While GPT-based models can produce coherent and contextually relevant responses, they are not infallible. That is, the AI-generated responses might contain inaccuracies or be contextually

inappropriate. This is because the model's understanding is based on patterns rather than true comprehension, and it might not always grasp the nuances of language, cultural references, or complex ideas. When learners encounter inaccurate or misunderstood responses, it can lead to confusion and misinterpretation of information. As P3 narrated:

> "Sometimes the apps gave me inaccurate details, especially in translating the words to English, which confused me and caused me misunderstanding." **P3**

*Overreliance on the AI.* While GPT-based chat applications offer instant answers and suggestions, some learners might start depending excessively on the AI for generating content. This overreliance can discourage the development of critical thinking skills and independent language production. Learners might prioritize convenience over engagement, missing out on the cognitive effort required to think through and formulate their own ideas. P8 expressed that:

> "I felt overly dependent on the application and this has been hindering my own way of formulating my own ideas." **P8**

*Lack of personalized feedback.* GPT-based models lack the capacity for personalized, detailed feedback customized to learners' individual strengths and weaknesses. In contrast, human teachers can identify areas needing improvement and provide tailored guidance. Personalized feedback is crucial for learners to comprehend progress, tackle challenges, and hone language skills effectively. The absence of this personalized touch could impede targeted improvement and hinder language proficiency advancement. P1 affirmed this sentiment.

> "Sometimes the response of the AI did not offer me detailed and personalized feedback according to my intellectual level like my teacher would give." **P1**

### Theme 4: Enhanced Critical Thinking Skills

*Reflective learning.* Metacognition encourages students to reflect on their learning process, set goals, and evaluate their progress. By using GPT-based chatbots, students can engage in conversations and then review and analyse their interactions. This reflection helps them identify areas of strength and weakness, allowing for more targeted practice and improvement. P12 narrated that:

> " I struggled with using correct prepositions, however, I started to set a goal to focus on preposition usage next time, aiming to improve this aspect." **P12**

Reflective learning, part of metacognition, prompts learners to assess what they've learned, how they learned it, and how to enhance their learning strategies. Engaging with GPT-based chatbots mirrors real conversations. Learners can review these interactions, including their input and AI's responses, a vital metacognitive aspect. This reflection lets

students recognize strengths and weaknesses, boosting motivation and confidence. P4 noted:

> "Using the applications enabled me to reflect on my language interactions which inspired me to finish my task." **P4**

*Monitoring comprehension.* Using GPT-based chat applications, students must continuously monitor their own comprehension of the conversation. This encourages them to pause, reflect, and ensure they are understanding the AI's responses correctly. This skill transfers to real conversations, where monitoring comprehension is essential. Monitoring comprehension is a metacognitive skill that involves assessing one's understanding of the information presented (Robillos & Bustos, 2022). When students engage in conversations with GPT-based chat applications, they actively monitor their comprehension of the AI's responses to ensure they are understanding the content correctly. If learners encounter a response from the AI that they do not fully understand, they can ask for clarification or confirmation. P3 mentioned that:

> "The intervention enabled us to compare our input with the AI's responses which could help us assess whether theintended meaning was effectively conveyed." **P3**

*Error awareness and correction.* When students engage with the AI, they actively look for errors in their language use and use the AI's responses to self-correct. This process trains students to be more vigilant about their language skills and to proactively correct mistakes. Metacognition underscores the importance of self-awareness and improvement, encouraging learners to actively monitor their language production. During interactions with the AI, learners develop a habit of actively seeking errors in their own language production. This heightened awareness prompts them to analyze their sentences and phrases more critically, leading to improved accuracy. P10 conveyed that:

> "After recognizing such pattern through interactions with the AI, I became more aware about using the correct preposition in real conversations." **P10**

## DISCUSSION

### Students' Writing Performances Before and After the Implementation of GPT-Based Chatbots within the Process-Based Writing Framework

The results presented in table 1 reveal a significant improvement in students' writing performance using GPT-based chatbots within the process-based writing framework. Prior to the intervention, the students had a mean score of x̄=9.13, indicating a relatively lower level of performance. However, after the intervention, their average mean score increased substantially to x̄=17.03. Results of the study underscore

a noteworthy improvement in participants' writing proficiency attributed to an innovative intervention that utilizes GPT-based chatbots within a process-based writing framework. This comprehensive method incorporates key phases of the process-based approach, including prewriting, writing, and post-writing, empowering students to approach their writing assignments strategically. The interactive GPT-based chatbots, coupled with the process-based approach, effectively fosters student engagement in composing their written pieces. Moreover, the application's provision of real-time feedback and clarifications contributes to the proactive regulation of understanding, ensuring that students receive immediate guidance during their writing endeavours (Sinha et al., 2020). This feature proves particularly beneficial during the pre-writing and writing stages, where students engage in planning and writing activities. The interactive nature of the chat application allows students to refine their ideas based on an evolving grasp of the content, promoting a dynamic and iterative approach to the writing process. The post-writing stage assumes a pivotal role in guiding students toward a deeper comprehension of their focal points and the arguments to be included in their drafts. This phase serves as a reflective platform, encouraging students to critically assess and refine their work. The evaluative process not only promotes self-directed learning but also equips students with tools to enhance their strategies in subsequent writing tasks, fostering continuous improvement. The result is in congruence with Wuttiphan's (2023) and Robillos and Namwong's (2021) studies reporting that utilizing process-based approach helped students facilitate their writing tasks and thus effectively improve their writing performance.

## Students' Writing Quiz Performances Across Various Writing Aspects

It is noteworthy to emphasize that the students' writing quiz performances showed an improvement in terms of writing aspects such as organization, content, coherence-cohesion, logical connection, and argumentation. Integrating GPT-based chatbot within the process-based writing framework offers students a valuable tool for enhancing organizational skills. Through interactive discussions, students can articulate and refine their ideas, facilitating the identification of logical connections and the creation of a well-structured framework for their writing. Real-time conversations also allow for collaborative development of outlines, providing a systematic approach to organizing thoughts and ensuring a coherent structure in their written compositions (Wonglakorn & Deerajviset, 2023). Regarding 'content', the intervention enabled students to access a wealth of information in real-time, supporting them in gathering relevant and diverse content for their compositions (Fitria, 2023). The interactive nature of the chat application exposes students to a variety of perspectives, fostering a comprehensive understanding of their chosen topics. This exposure to diverse viewpoints enriches the depth of content in their writing, making their compositions more robust and well-informed.

Moreover, engaging in coherent discussions within the GPT-based chatbots (Zoherey, 2023) allow students to practice expressing ideas in a structured manner. This skill is directly transferable to their written work, where they learn to maintain logical connections between sentences and paragraphs. Shibani et al. (2017) highlighted that by capitalizing on massive pre-training data, GPT-based chatbots can comprehend the context of learners' responses and deliver appropriate language assistance, making language learning more dynamic and engaging. Real-time feedback from the chat application helps highlight inconsistencies or gaps in students' discussions, prompting them to address and enhance coherence in their written compositions.

Lastly, the application becomes a dynamic platform for students to develop and refine their argumentation skills within the process-based writing framework (Kitajroonchai et al., 2022). Through interactive debates and defending ideas in real-time, students can hone their abilities to construct compelling arguments. This practice in the virtual setting translates into more persuasive and well-supported arguments in their written compositions. Su et al. (2023) emphasized that the application's real-time feedback provides constructive insights into the strength of students' arguments, encouraging them to refine and strengthen their persuasive techniques for effective written expression. The aforementioned statements are in congruence with the responses of the participants when they were asked about the benefits they obtained from the intervention. A participant stated that the more they practice writing, the more they refine their writing skills such as content, organization, coherence, argumentation, and overall writing structure.

Conversely, the observed minimal improvement in the aspect of "logical connection" when utilizing a GPT-based chat application within a process-based writing framework could stem from a combination of factors, including the technology's primary focus on grammar and structure, potential limitations in guiding complex idea progression, and a potential misalignment between the AI's capabilities and the nuanced requirements of content coherence (Fitria, 2023; Su et al., 2023). The emphasis on grammar and the process-based writing processes might have overshadowed logical organization, and the AI's lack of explicit guidance on transitions and coherent content arrangement could have contributed to the comparatively lesser enhancement in this aspect of writing. In certain situations, the AI-generated responses might contain inaccuracies or be contextually inappropriate. When learners encounter inaccurate or misunderstood responses, it can lead to confusion and misinterpretation of information leading to illogical organization.

## Learners' Learning Experiences After the Implementation of GPT-Based Chatbots within the Process-Based Writing Famework

The qualitative analysis of the study delves into the students' learning experiences (particularly in their writing skill) with the GPT-based chatbots within the process-based writing framework, were significantly enhanced. Firstly, the process-based approach provided a structured framework, allowing students to build a strong foundation through planning, drafting, and revising. Activities such as peer reviews and iterative revisions fostered collaboration and self-directed learning, leading to improved writing skills and greater confidence. The emphasis of the writing process methodology on multiple drafts and reflective practices enabled students to refine their work systematically, aligning with research that underscores the value of such methodologies (Wonglakorn & Deerajviset, 2023; Robillos & Namwong, 2021). Secondly, the GPT-based chatbots offered immediate, personalized feedback, helping students address writing issues in real-time and reducing anxiety by providing a supportive, non-judgmental space for practice. This use of advanced NLP tools facilitated continuous improvement and enhanced students' writing proficiency, reflecting findings on the benefits of technology in language education (Moqbel & Al-Kadi, 2023; Su et al., 2023; Okonkwo & Ade-Ibijola, 2021).

However, integrating GPT-based chatbots also introduced challenges, such as time constraints, inaccuracies in feedback, and the risk of overreliance on AI tools. These issues sometimes impeded the effectiveness of the writing process, emphasizing the need for a more nuanced approach to integrating technology with traditional methodologies (Zhai, 2022). Despite these challenges, the intervention effectively enhanced students' critical thinking skills, such as reflective learning and error correction, aligning with the literature on the benefits of process-based approach (Wonglakorn & Deerajviset, 2023). This highlights the importance of further research into optimizing the integration of GPT-based chatbots with established writing frameworks to address emerging challenges and improve educational practices in the digital age.

## CONCLUSION

This study illuminates the transformative impact of integrating GPT-based chatbots within a process-based writing framework on learners' writing skills. The noteworthy outcomes underscore the considerable potential of this intervention in enriching language learning experiences. Participants exhibited remarkable improvements across various writing components, indicating the effectiveness of GPT-powered interactions. The consistent practice and exposure to diverse language patterns facilitated by the GPT-based chat applications contributed significantly to heightened language proficiency. Furthermore, the integration of a process-based writing approach empowered learners to self-regulate and engage in reflective practices, fostering a more effective language acquisition process. The positive reception of GPT-based chat applications by participants emphasizes their adaptability and openness to embracing technological innovations in their language learning journey. The user-friendly interface, coupled with instant feedback and accessibility, created an immersive language practice environment that resonated well with participants.

Importantly, the findings not only highlight the positive impact on writing skills but also underscore the broader implications for self-regulation, reflective learning, and the integration of technology in language education. As educators and practitioners consider innovative approaches, this study provides a compelling case for the effective utilization of GPT-based chatbots in fostering language proficiency and a more engaging learning experience. Future researchers might gain valuable insights into the potential of incorporating GPT-based chatbots within a pedagogical framework to enhance language learning outcomes.

Despite the promising outcomes, it is essential to acknowledge certain limitations warranting consideration. Firstly, the study's scope was confined to a specific context with a relatively small sample size, potentially limiting the generalizability of the findings. To address this, future research should aim to broaden the scope by incorporating diverse contexts and populations. Additionally, increasing the sample size would enhance the robustness and representativeness of the analysis. Secondly, the present study identified a less improved writing component, specifically in "logical connection." To address this in future interventions, a multifaceted approach is recommended. Begin by developing targeted instructional modules that explicitly address the intricacies of logical connections, emphasizing the use of transitional phrases and cohesive devices. Tailor the intervention to cater to individualized learning needs, recognizing varying proficiency levels among students. To strengthen the feedback mechanism of the GPT-based chatbot, provide detailed and constructive feedback on logical connections, facilitating a clearer understanding for students. Integrate explicit instruction on logical connections within the broader framework of the process-based approach, highlighting the importance of coherence in writing. Furthermore, implement a longitudinal assessment approach to track students' progression in mastering logical connections over time. A mixed-methods research design, combining quantitative measures with qualitative insights, can provide a comprehensive understanding of the factors influencing improvement. Lastly, maintain a flexible approach, continuously evaluating and adapting the intervention based on ongoing feedback and assessment results to effectively address emerging needs and challenges. This proactive strategy ensures the intervention remains responsive and impactful within evolving educational landscapes.

## DECLARATION OF CONFLICTING INTERESTS

None declared.

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# APPENDIX A

## WRITING RUBRIC FOR QUIZZES

| Components | 4 marks | 3 marks | 2 marks | 1 mark |
|---|---|---|---|---|
| Organization | The writing presents a clear and effective structure that enhances the overall flow and readability. Each section and paragraph seamlessly transition to the next, contributing to a strong sense of unity and purpose. | The organization is solid, with a discernible structure that supports the overall message. While some improvements could enhance the flow, the reader can easily follow the logical progression of ideas. | The organization is somewhat inconsistent, and improvements are needed to create a smoother flow. The structure may be confusing at times, impacting the overall coherence of the writing. | The writing lacks a clear organizational structure, making it difficult for the reader to follow the intended message. Significant revisions are necessary to improve overall organization. |
| Content | The content demonstrates a deep understanding of the topic. Relevant details are effectively incorporated, contributing to a comprehensive and engaging narrative. | The content provides a clear and sufficient exploration of the topic. While some additional depth or elaboration could enhance the overall quality, the key points are generally well-addressed. | The content is somewhat lacking, and there are notable gaps in coverage. The writer needs to provide more relevant details or information to fully address the topic. | The content is insufficient, with significant gaps in information. The writer must substantially expand and improve the content to adequately address the topic. |
| Coherence-Cohesion | The writing exhibits exceptional coherence and cohesion. Sentences and paragraphs are skillfully connected, creating a seamless and fluid progression of ideas. The reader can easily follow the writer's line of thought. | The coherence and cohesion are generally strong, with effective transitions between sentences and paragraphs. While there may be a few areas that could benefit from improvement, overall, the writing maintains a good flow. | The coherence and cohesion could be stronger. Some sentences or paragraphs may feel disjointed or disconnected, requiring attention to improve the overall flow of the writing. | The writing lacks coherence and cohesion, making it challenging for the reader to follow the writer's intended message. Substantial revisions are needed to create a more connected and fluid piece. |
| Logical Connection | The logical connections between ideas create a compelling and persuasive argument. The writer effectively builds upon each point, leading to a strong and convincing conclusion. | The logical connections are solid, with a clear progression of ideas that contributes to a persuasive argument. While some areas may benefit from additional support or development, the overall structure is effective. | The logical connections are somewhat weak, and the argument may lack sufficient support in certain areas. The writer should strengthen the logical flow to enhance the overall persuasiveness. | The logical connections between ideas are unclear or absent, resulting in a weak and unconvincing argument. Significant revisions are necessary to establish a more coherent and compelling line of reasoning. |
| Argumentation | The argument presents a compelling and persuasive case. It effectively anticipates and addresses counterarguments, providing thorough and convincing support for the writer's perspective. The reasoning is clear, and the overall argument is highly compelling. | The argument is solid, presenting a clear and well-supported case. While there may be room for additional depth or exploration of certain points, the writer effectively supports their perspective and addresses key counterarguments. | The argument is somewhat underdeveloped, lacking in-depth analysis or support in certain areas. The writer should provide more thorough reasoning and evidence to strengthen the overall persuasiveness of the argument. | The argument is weak, with insufficient support and limited analysis. The writer needs to substantially improve the depth and coherence of the argument to make it more persuasive and convincing. |