

Effectiveness of ChatGPT-Assisted Writing Instruction in Improving Malay Essay Writing Achievement among Form Four Students

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ABSTRACT: The rapid advancement of generative artificial intelligence (AI) has created new opportunities for enhancing writing instruction in secondary education. However, empirical evidence regarding the effectiveness of ChatGPT in improving Malay essay writing achievement remains limited. This study examined the effectiveness of ChatGPT-assisted writing instruction in improving Malay essay writing achievement among Malaysian Form Four students. A quasi-experimental non-equivalent control group design was employed involving 77 students from a public secondary school in Selangor, Malaysia, comprising 37 students in the experimental group and 40 students in the control group. Both groups completed essay writing pre-tests and post-tests. Data were analysed using descriptive statistics, paired-samples *t*-tests, and independent-samples *t*-tests. The experimental group demonstrated significant improvement from the pre-test ($M = 46.11$, $SD = 5.290$) to the post-test ($M = 58.05$, $SD = 4.384$), $p < .001$. The experimental group also achieved significantly higher post-test scores than the control group ($M = 42.38$, $SD = 5.917$), $p < .001$. These findings demonstrate the potential of ChatGPT-assisted instruction as a pedagogical support tool for improving Malay essay writing achievement.

KEYWORDS - Artificial Intelligence, ChatGPT, Essay Writing, Malay Language, Writing Achievement

I. INTRODUCTION

Writing is an essential language skill that enables students to organise ideas, communicate meaning effectively, and demonstrate linguistic competence. In Malaysian secondary education, essay writing constitutes an important component of Malay language learning and requires students to generate relevant ideas, organise content coherently, employ appropriate vocabulary, and construct grammatically accurate sentences. Nevertheless, students continue to experience difficulties in various aspects of essay writing, including idea generation, paragraph organisation, elaboration, and language accuracy.

The rapid advancement of digital technology has created new opportunities for supporting students during the writing process. In Malaysia, the Digital Education Policy emphasises the strategic integration of digital technology to enhance the quality and effectiveness of teaching and learning (Kementerian Pendidikan Malaysia, 2023). More recently, generative artificial intelligence (AI) has attracted considerable attention because of its capacity to provide immediate and interactive responses. Among these technologies, ChatGPT enables users to interact through natural language and may support different stages of writing, including brainstorming, organising ideas, constructing sentences, developing paragraphs, and revising written work. When appropriately integrated into instruction, ChatGPT may therefore function as an additional form of support rather than replacing teachers or students' own involvement in writing.

Recent studies have demonstrated the potential of ChatGPT to support language learning and writing through immediate feedback, interactive assistance, and personalised learning experiences (Barrot, 2023; Ibrahim & Kirkpatrick, 2024; Mahapatra, 2024). Within the Malaysian secondary school context, teachers and students have also recognised the potential of ChatGPT to support writing development, although appropriate pedagogical guidance remains important (Aineh & Ngui, 2024). Nevertheless, empirical evidence concerning the effectiveness of ChatGPT specifically in Malay language essay writing at the Malaysian secondary school level remains limited.

Therefore, this study aimed to examine the effectiveness of ChatGPT-assisted writing instruction in improving Malay essay writing achievement among Form Four students. A quasi-experimental approach was employed to examine changes in writing achievement following the intervention and to compare the achievement of students receiving ChatGPT-assisted instruction with those receiving conventional writing instruction.

II. LITERATURE REVIEW

Essay Writing in Malay Language Education

Essay writing is a complex language activity that requires students to integrate linguistic knowledge, idea development, organisation, and revision in producing coherent written texts. In Malay language education, students are expected to generate relevant content, organise ideas systematically, use appropriate vocabulary, and construct grammatically accurate sentences. Difficulties in these areas may affect students' ability to produce well-developed essays and demonstrate their writing competence.

Effective writing instruction therefore requires more than the transmission of linguistic knowledge. Students require appropriate support throughout the processes of planning, drafting, reviewing, and revising their writing. Instructional approaches that provide timely guidance and opportunities for revision may assist students in developing greater control over these writing processes.

Artificial Intelligence in Education

Artificial intelligence (AI) has increasingly been integrated into educational contexts to support teaching and learning through interactive, adaptive, and personalised learning experiences. Recent developments in generative AI have further expanded these possibilities by enabling learners to receive immediate responses, explanations, and feedback during learning activities. Such capabilities may provide additional learning support beyond conventional classroom interaction and allow students to engage more actively with learning tasks.

Nevertheless, the educational value of AI depends largely on how it is pedagogically integrated into teaching and learning. AI should function as a supplementary instructional tool rather than replace teachers' professional guidance or students' active participation in learning. Effective integration therefore requires teachers to structure learning activities appropriately and encourage students to evaluate AI-generated information critically. In language education, these considerations are particularly important because students need to remain actively involved in developing their own linguistic knowledge and writing abilities.

ChatGPT in Writing Instruction

ChatGPT has attracted increasing attention in writing instruction because of its ability to provide interactive and immediate language support. Unlike conventional digital resources that primarily present predetermined content, ChatGPT allows students to interact with generative AI through natural language prompts. During writing activities, students may use the tool to generate and organise ideas, explore alternative sentence structures, develop paragraphs, obtain language-related explanations, and review their written work. These capabilities enable ChatGPT to provide support across different stages of the writing process while allowing students to remain responsible for producing their own texts.

Systematic and scoping reviews have similarly identified the growing application of generative AI in language and writing education, including its potential to provide immediate and personalised support throughout the writing process (Ibrahim & Kirkpatrick, 2024; Imran & Almusharraf, 2023; Lo et al., 2024; Xiao et al., 2026).

The effectiveness of ChatGPT in writing instruction, however, depends on the manner in which it is integrated into learning activities. Students should be encouraged to evaluate, adapt, and refine AI-generated suggestions rather than reproduce generated responses without critical consideration. Previous research has emphasised both the potential benefits and the need for appropriate pedagogical guidance when incorporating ChatGPT into writing instruction (Barrot, 2023; Woo et al., 2024). Accordingly, ChatGPT may be most beneficial when used as a supplementary writing support tool within structured teacher-guided instruction.

Theoretical Foundation

This study is underpinned by two complementary theoretical perspectives: Vygotsky's Sociocultural Theory and Flower and Hayes' Cognitive Process Theory of Writing. Together, these perspectives provide a theoretical basis for understanding how ChatGPT-assisted instruction may support students during the process of developing their essay writing skills.

Vygotsky's Sociocultural Theory emphasises that learning develops through social interaction and appropriate scaffolding within the Zone of Proximal Development (ZPD) (Vygotsky, 1978). Within the context of the present study, ChatGPT can be conceptualised as a form of digital scaffolding that provides students with immediate prompts, explanations, suggestions, and feedback during writing activities. Such support may assist students in completing writing tasks that they may initially find difficult to perform independently. However, ChatGPT does not replace the role of the teacher; rather, it functions as an additional instructional support within a structured learning environment in which teachers continue to guide students in evaluating and applying AI-generated suggestions appropriately. This conceptualisation is consistent with the broader principle of instructional scaffolding, whereby appropriate support facilitates learners' development towards greater independence (Walqui & van Lier, 2010).

The Cognitive Process Theory of Writing proposed by Flower and Hayes (1981) conceptualises writing as a recursive cognitive process involving three major activities: planning, translating, and reviewing. Subsequent developments in cognitive models of writing have similarly emphasised the dynamic and recursive nature of the cognitive processes involved in written composition (Hayes, 2012). Writing is therefore not regarded as a strictly linear process, as writers may repeatedly move between generating ideas, organising information, producing written text, evaluating their work, and revising their compositions.

This perspective is particularly relevant to ChatGPT-assisted writing because students can interact with the tool at different stages of the writing process. ChatGPT may provide support during planning through idea generation and organisation, during translating through sentence and paragraph development, and during reviewing through feedback, revision, and language refinement. The integration of these two theoretical perspectives therefore conceptualises ChatGPT-assisted writing instruction as a structured form of technological support that facilitates students' engagement in the writing process while maintaining their active role as writers.

Research Gap

Despite growing interest in generative AI in education, existing research on ChatGPT-assisted writing has predominantly focused on English as a second or foreign language and, in many cases, higher education contexts (Deng et al., 2025; Ibrahim & Kirkpatrick, 2024; Lo et al., 2024). Although emerging evidence suggests that ChatGPT can support various aspects of writing development, empirical research examining its effectiveness in Malay language essay writing remains limited. Evidence from Malaysian secondary school contexts is particularly scarce, with existing research providing greater attention to perceptions of ChatGPT than to experimentally measured improvements in writing achievement (Aineh & Ngui, 2024).

Therefore, there remains a need for classroom-based empirical research that examines whether structured ChatGPT-assisted instruction produces measurable improvements in Malay essay writing achievement. The present study addresses this gap by employing a quasi-experimental design involving experimental and control

groups in an authentic Malaysian secondary school setting. Specifically, the study examines changes in students' writing achievement following ChatGPT-assisted instruction and compares the post-test achievement of students receiving ChatGPT-assisted instruction with those receiving conventional writing instruction.

III. PROBLEM STATEMENT

Essay writing remains a challenging component of Malay language learning among secondary school students. Producing a well-developed essay requires students to generate relevant ideas, organise content coherently, elaborate on key points, use appropriate vocabulary, and construct grammatically accurate sentences. Difficulties in these areas may limit students' ability to communicate ideas effectively and consequently affect their overall writing achievement.

Conventional writing instruction provides important teacher guidance; however, students may require additional support at different stages of the writing process, particularly when generating ideas, developing paragraphs, constructing sentences, and revising their written work. The emergence of generative artificial intelligence, particularly ChatGPT, provides an opportunity to offer immediate and interactive support during these processes. Nevertheless, the availability of such technology alone does not establish its educational effectiveness, and empirical evidence is required to determine whether its structured integration into classroom instruction can contribute to measurable improvements in students' writing achievement.

Previous studies have demonstrated the potential of ChatGPT in language and writing instruction (Barrot, 2023; Ibrahim & Kirkpatrick, 2024; Mahapatra, 2024). However, much of the existing research has focused on English language learning and higher education contexts. Within Malaysian secondary education, empirical evidence concerning the effectiveness of ChatGPT in improving Malay essay writing achievement remains limited. In particular, there is a need for classroom-based studies that compare students receiving structured ChatGPT-assisted writing instruction with those receiving conventional writing instruction.

Therefore, this study addresses this gap by examining the effectiveness of ChatGPT-assisted writing instruction in improving Malay essay writing achievement among Form Four students in a Malaysian secondary school context.

IV. RESEARCH OBJECTIVE

The objective of this study is:

1. To examine the effectiveness of ChatGPT-assisted writing instruction in improving Malay essay writing achievement among Form Four students.

V. METHODOLOGY

A. Research Design

This study employed a quasi-experimental non-equivalent control group design to examine the effectiveness of ChatGPT-assisted writing instruction in improving Malay essay writing achievement. Two intact Form Four classes were assigned as the experimental and control groups. Both groups completed a pre-test before the intervention and a post-test following the intervention. The experimental group received ChatGPT-assisted writing instruction, while the control group received conventional writing instruction.

B. Participants

The participants comprised 77 Form Four students from a public secondary school in Hulu Langat, Selangor, Malaysia. Purposive sampling was employed to select two existing classes with relatively comparable academic backgrounds. The experimental group consisted of 37 students, while the control group consisted of 40 students. Both groups followed the same Malay language curriculum, with the primary difference being the instructional approach used during the intervention.

C. Research Instrument

Essay writing pre-tests and post-tests were used to measure students' Malay essay writing achievement before and after the intervention. Students' essays were assessed using a structured scoring rubric based on the Malaysian Certificate of Education (SPM) essay assessment criteria. The assessment focused on relevant aspects of essay writing, including content, organisation, language use, vocabulary, and overall writing quality.

D. Intervention Procedure

The experimental group participated in structured ChatGPT-assisted writing instruction, while the control group continued with conventional writing instruction. ChatGPT was integrated as a writing support tool to assist students in generating and organising ideas, constructing sentences, developing paragraphs, and revising their writing. Students remained responsible for producing their own essays, while ChatGPT provided additional guidance throughout the writing process. Teacher guidance was maintained during the intervention to ensure that students used AI-generated suggestions appropriately rather than reproducing generated responses without critical consideration.

The ChatGPT-assisted instruction was structured around different stages of the essay writing process. During the planning stage, students were guided to use ChatGPT to explore possible ideas related to the essay topic and to organise relevant points before beginning their writing. Rather than accepting generated suggestions directly, students were encouraged to select ideas that were appropriate to the task and reorganise them according to their intended essay structure.

During the drafting stage, ChatGPT was used as a supplementary resource for exploring sentence construction, vocabulary choices, paragraph development, and elaboration of ideas. Students were encouraged to compare AI-generated suggestions with their own writing and determine how the suggestions could be adapted appropriately. This approach was intended to maintain students' active involvement in the writing process rather than allowing the technology to generate complete essays on their behalf.

During the reviewing and revision stage, students could use ChatGPT to identify possible areas for improvement in their written work, including clarity of expression, sentence construction, organisation, and language use. Teacher guidance remained central throughout these activities. Students were reminded to evaluate the relevance and accuracy of AI-generated responses before incorporating any suggestions into their writing.

Following the intervention, both groups completed the post-test under comparable assessment conditions. The post-test scores were subsequently used to determine changes in the experimental group's writing achievement and to compare the achievement of the experimental and control groups.

E. Data Analysis

The data were analysed using Statistical Package for the Social Sciences (SPSS) version 29.0. Descriptive statistics involving mean and standard deviation were used to describe students' pre-test and post-test achievement. A paired-samples *t*-test was conducted to determine whether there was a statistically significant difference between the experimental group's pre-test and post-test scores. An independent-samples *t*-test was subsequently conducted to compare the post-test achievement of the experimental and control groups. Statistical significance was determined at $p < .05$.

F. Ethical Considerations

Ethical considerations were observed throughout the implementation of the study. The participants were informed about the purpose and procedures of the study, and their participation was managed in accordance with appropriate educational research practices. Students' identities were kept confidential, and no personally identifiable information was reported in the analysis or presentation of the findings.

Particular attention was also given to the use of generative artificial intelligence during the intervention. ChatGPT was introduced as a supplementary learning tool rather than a substitute for students' own writing. Students were guided to critically evaluate AI-generated suggestions and were reminded that they remained responsible for developing and producing their own essays. Teacher supervision was maintained throughout the

intervention to encourage responsible and pedagogically appropriate use of ChatGPT.

VI. RESULTS

A. Pre-test and Post-test Achievement of the Experimental Group

Table 1 presents the pre-test and post-test Malay essay writing achievement of students in the experimental group. The mean score increased from 46.11 ($SD = 5.290$) in the pre-test to 58.05 ($SD = 4.384$) in the post-test, representing a mean improvement of 11.94 points.

Table 1: Pre-test and Post-test Achievement of the Experimental Group

Test	N	Mean	SD	Mean Difference	t	df	p
Pre-test	37	46.11	5.290				
Post-test	37	58.05	4.384	11.94	-10.650	36	< .001

The paired-samples t-test revealed a statistically significant difference between the pre-test and post-test scores of the experimental group, $t(36) = -10.650$, $p < .001$. The mean score increased from 46.11 ($SD = 5.290$) in the pre-test to 58.05 ($SD = 4.384$) in the post-test, representing an improvement of 11.94 points. This finding indicates that students demonstrated significantly better Malay essay writing achievement after participating in the ChatGPT-assisted writing intervention.

B. Post-test Achievement between the Experimental and Control Groups

Table 2 presents the comparison of post-test Malay essay writing achievement between the experimental and control groups. The experimental group obtained a higher post-test mean score ($M = 58.05$, $SD = 4.384$) than the control group ($M = 42.38$, $SD = 5.917$).

Table 2: Comparison of Post-test Achievement between the Experimental and Control Groups

Group	N	Mean	SD	t	df	p
Control	40	42.38	5.917			
Experimental	37	58.05	4.384	-13.125	75	< .001

The independent-samples t-test revealed a statistically significant difference in post-test achievement between the experimental and control groups, $t(75) = -13.125$, $p < .001$. The experimental group recorded a higher mean score ($M = 58.05$, $SD = 4.384$) compared with the control group ($M = 42.38$, $SD = 5.917$), representing a mean difference of 15.67 points. This finding indicates that students who received ChatGPT-assisted writing instruction achieved significantly higher Malay essay writing scores than those who received conventional writing instruction.

VII. DISCUSSION AND RECOMMENDATION

The findings of this study demonstrate that ChatGPT-assisted writing instruction was effective in improving Malay essay writing achievement among Form Four students. The experimental group showed a statistically significant improvement from the pre-test to the post-test, with the mean score increasing from 46.11 to 58.05. Furthermore, the experimental group achieved a significantly higher post-test mean score than the control group.

These findings provide empirical evidence that the structured integration of ChatGPT into writing instruction can contribute positively to students' Malay essay writing achievement. Notably, the experimental group outperformed the control group by 15.67 points in the post-test, indicating that the observed difference was not only statistically significant but also substantial in terms of the students' actual writing scores.

The findings are consistent with previous studies demonstrating the potential of ChatGPT to support students' writing development. Mahapatra (2024) reported positive effects of ChatGPT-supported formative feedback on ESL students' academic writing skills. Similarly, Athanassopoulos et al. (2023) demonstrated the potential of ChatGPT as a learning tool for improving foreign language writing, while Yan (2023) highlighted its applicability in second-language writing pedagogy. At a broader level, Deng et al. (2025) found through a meta-analysis of experimental studies that ChatGPT interventions generally produced positive effects on students' academic performance. Collectively, these findings support the present study by suggesting that ChatGPT can contribute meaningfully to writing achievement when its use is structured and pedagogically guided.

The improvement observed in the experimental group may be attributed to the support provided by ChatGPT at different stages of the writing process. During the intervention, students used ChatGPT to assist in generating and organising ideas, constructing sentences, developing paragraphs, and revising their writing. Immediate access to suggestions and explanations may have enabled students to identify weaknesses in their writing, explore alternative ways of expressing ideas, and progressively refine their written work. Importantly, students remained responsible for producing their own essays, positioning ChatGPT as a supplementary writing support tool rather than a substitute for the writing process.

The findings can also be explained through Vygotsky's Sociocultural Theory, particularly the concept of scaffolding within the Zone of Proximal Development (Vygotsky, 1978). In this study, ChatGPT-assisted instruction provided additional scaffolding through prompts, explanations, suggestions, and immediate feedback during writing activities. Such support may have enabled students to perform aspects of writing that they initially found difficult to accomplish independently. Nevertheless, teacher guidance remained important in structuring learning activities and ensuring that students evaluated and applied AI-generated suggestions appropriately.

The findings are also consistent with Flower and Hayes' Cognitive Process Theory of Writing, which conceptualises writing as a recursive process involving planning, translating, and reviewing (Flower & Hayes, 1981). ChatGPT-assisted instruction provided opportunities for students to obtain support across these processes. During planning, students could generate and organise ideas; during translating, they could develop ideas into sentences and paragraphs; and during reviewing, they could evaluate and refine their written work. The improvement in students' writing achievement therefore suggests that ChatGPT may be particularly beneficial when integrated throughout the writing process rather than being used merely to generate completed written responses.

From a pedagogical perspective, the findings suggest that Malay language teachers may consider integrating ChatGPT as a supplementary tool in essay writing instruction. Structured activities can be designed to guide students in using ChatGPT for brainstorming, paragraph development, sentence construction, and revision while maintaining students' responsibility for their own writing. Teachers should also emphasise critical evaluation of AI-generated responses to prevent excessive dependence on generative AI and to ensure that students continue developing independent writing skills.

Beyond the statistical improvement observed in this study, the findings have practical significance for Malay language writing instruction. Students may experience different difficulties at various stages of essay writing. While some students may struggle to generate relevant ideas, others may require additional support in organising content, elaborating points, constructing sentences, or reviewing their written work. The interactive nature of

ChatGPT may provide opportunities for students to obtain additional support according to the particular difficulties they encounter during the writing process.

However, the effectiveness observed in the present study should not be interpreted as evidence that generative AI can independently improve students' writing achievement. In this study, ChatGPT was incorporated within structured instruction while teacher guidance and students' responsibility for producing their own essays were maintained. This distinction is pedagogically important because the educational value of ChatGPT may lie not simply in its ability to generate text, but in the way teachers structure its use to stimulate students' thinking, support revision, and facilitate active engagement with the writing process.

For Malay language teachers, these findings suggest that generative AI can be incorporated into writing activities in ways that promote both writing development and critical engagement with AI-generated information. For example, students may be guided to compare their own ideas with AI-generated suggestions, evaluate alternative sentence structures, identify weaknesses in generated responses, and justify the revisions made to their own writing. Such activities may position ChatGPT not merely as a source of generated content but as a supplementary resource that supports students in becoming more reflective and independent writers.

A. Implications and Future Recommendations

The findings have important implications for the integration of generative AI into Malay language education. ChatGPT can provide additional support to students during the writing process, particularly when immediate teacher assistance may not always be available. However, its pedagogical value depends on structured implementation and appropriate teacher guidance. Teachers should establish clear guidelines for the responsible use of ChatGPT and encourage students to evaluate, modify, and improve AI-generated suggestions rather than reproduce them directly.

Future research should involve larger and more diverse samples from different schools and educational contexts to improve the generalisability of the findings. Longer intervention periods may also provide further evidence regarding the sustainability of improvements associated with ChatGPT-assisted writing instruction. Future studies could additionally examine specific dimensions of writing development, including content, organisation, vocabulary, and grammatical accuracy, as well as students' perceptions and experiences of using ChatGPT during the writing process.

B. Limitations of the Study

Several limitations should be considered when interpreting the findings of this study. First, the study involved 77 Form Four students from a single public secondary school in Selangor. Although the findings provide useful evidence within the context examined, they should not be generalised to all secondary school students in Malaysia without caution. Students from different geographical locations, school environments, and academic backgrounds may demonstrate different responses to ChatGPT-assisted writing instruction.

Second, the study employed a quasi-experimental non-equivalent control group design involving intact classes rather than random assignment of individual participants. Although the two groups had relatively comparable academic backgrounds, the absence of random assignment means that other pre-existing differences between the groups cannot be completely excluded.

Third, the present study focused primarily on overall Malay essay writing achievement. Consequently, the findings do not establish whether ChatGPT-assisted instruction contributed equally to individual dimensions of writing such as content development, organisation, vocabulary, sentence construction, and grammatical accuracy. Future research could examine these dimensions separately to provide a more detailed understanding of how generative AI influences different aspects of students' writing development.

Finally, the findings reflect students' achievement following the intervention and do not establish whether the observed improvement would be sustained over a longer period. Future studies could incorporate longer intervention periods and delayed post-tests to examine the sustainability of improvements associated with ChatGPT-assisted writing instruction.

VIII. CONCLUSION

This study examined the effectiveness of ChatGPT-assisted writing instruction in improving Malay essay writing achievement among Form Four students. The findings demonstrated that students who received ChatGPT-assisted writing instruction showed significant improvement in their writing achievement from the pre-test to the post-test and achieved significantly higher post-test scores than students who received conventional writing instruction. These findings provide empirical evidence that ChatGPT, when integrated within a structured instructional approach, has the potential to serve as an effective pedagogical support tool for Malay essay writing. Its ability to provide immediate assistance during idea generation, sentence construction, paragraph development, and revision may complement teacher guidance and support students throughout the writing process.

Nevertheless, ChatGPT should be integrated as a supplementary instructional tool rather than as a replacement for teachers or students' independent thinking. Appropriate teacher guidance remains essential to ensure that students critically evaluate and appropriately apply AI-generated suggestions. Although the present study was conducted among Form Four students from a single secondary school in Selangor, the findings provide useful empirical evidence regarding the potential of generative AI in Malay language writing instruction. Future research involving larger and more diverse samples, longer intervention periods, and different educational contexts is recommended to further examine the effectiveness and sustainability of ChatGPT-assisted writing instruction.

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