



# AI-Integrated Writing Approach and Senior High School Students' Writing Competencies in English

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**Abstract**— Integrating artificial intelligence (AI) in education offers significant potential to enhance writing competencies. This quantitative study investigated the effect of an AI-integrated instructional approach on the writing performance of Senior High School students at Liberty National High School, Tampakan, South Cotabato. The study measured improvements in students' writing competencies in English, which focused on vocabulary, grammar, content development, and organization. A quasi-experimental single-group design was employed to assess the effects of an AI-integrated approach in writing. Statistical analyses indicated significant positive gains across all measured domains following the implementation of AI support. The results demonstrated that AI integration facilitated immediate grammar correction, expanded vocabulary use, and improved overall coherence and structural organization in students' written outputs. These findings provide empirical support for using AI technologies to enhance students' writing competencies in English. The study underscores the importance of strategically incorporating AI as a supplementary tool in writing approach to optimize learning outcomes while maintaining academic rigor.



**Keywords**— Artificial Intelligence (AI), Academic Writing, Writing Competencies, Senior High School Students, AI-Assisted Instruction, Quantitative Research.

## I. INTRODUCTION

Artificial Intelligence (AI) is increasingly becoming a part of daily life, especially in education. Researchers recognize AI's importance in supporting academic writing by providing students with the information they need for scholarly work. AI helps gather ideas, supplement research, and develop writing structure. It refers to computer systems capable of simulating human intelligence processes such as machine learning, speech recognition, and natural language processing.

Despite AI's growth, many Senior High School (SHS) students at Liberty National High School (LNHS), Tampakan, South Cotabato, Philippines, struggle with academic writing, particularly those outside the Humanities and Social Sciences (HUMSS) strand. Instructors observed that students from technical, vocational, and STEM-related fields often find it difficult

to organize and express their ideas in academic English. This challenge prompted the researcher to explore how AI-based tools might enhance students' writing skills, especially in crafting research introductions, which emphasized AI's role in assisting struggling writers (Sahli & Essalmi, 2021).

AI writing tools, such as grammar checkers and essay generators, are increasingly common in English as a Foreign Language (EFL) classroom (Chang et al., 2021; Gayed et al., 2022; Jeanjaroonsri, 2023; Zhao, 2022). These tools save time and effort, offering students quick feedback on their drafts. However, the use of AI also raises concerns. Students risk accidental plagiarism, over-reliance on grammar correction apps, and a tendency to prioritize speed over the quality and depth of their writing.

Most existing research has focused on how AI tools improve grammar and syntax. Yet, grammar is only one

part of effective writing. Content and structure are equally crucial to ensure readers' understanding and engagement (Lee & Yuan, 2021; Ningrum, 2013). There is limited research about how AI impacts the organization of ideas and development of arguments, particularly in academic writing at the high school level.

Thus, this study aimed not only to check surface-level improvements (such as fewer grammar errors) but also deeper improvements in how students organize their thoughts and present their arguments logically. By comparing the results of the pretest and posttest, this research sought to determine whether using selected AI tools can significantly improve SHS students' writing performance.

This study tested an AI-integrated writing approach (AI-IWA) through a scheduled COT session. The findings could provide insights into the responsible use of AI in improving the research writing skills of senior high school students, especially in writing effective research introductions.

### Research Questions

This study identified the effect of an AI-integrated writing approach (AI-IWA) on SHS students' writing competencies in English. It answered the following questions.

1. What is the level of SHS students' writing competence before and after using the AI-IWA in terms of vocabulary, grammar, content, and organization?
2. Is there a significant difference between the pretest and posttest scores of the SHS students' writing competencies?

## II. METHODS

### Research Design

In the quantitative phase, a quasi-experimental one-group pretest-posttest design was utilized to assess the impact of the AI-IWA. Initially, a pretest was administered to evaluate the students' baseline writing competencies across four key areas: vocabulary, grammar, content, and organization. Following this, the AI-IWA was employed, where students engaged with standardized writing prompts and utilized AI tools to enhance their writing performance. A posttest was then administered to measure any improvements in writing competencies. This design was selected as it allowed for a direct comparison of students' writing skills before and after the intervention, thereby providing a clear measure of change within the same group of participants.

### Participants of the Study

This study's participants comprised thirty (30) SHS students from LNHS. Stringent inclusion criteria were established to ensure the selection of a suitable sample. Participants were required to be enrolled in Grade 12 at LNHS, possess prior exposure to AI writing tools such as QuillBot, Grammarly, or ChatGPT, and demonstrate a foundational proficiency in English writing.

### Research Instrument

The study utilized comprehensive research instruments aligned with each problem statement to ensure systematic data collection and analysis.

A pretest writing assessment was administered for SOP 1, which assessed students' baseline competencies in writing research introductions, particularly in vocabulary, grammar, content, and organization. Students were tasked with composing an introduction based on a standardized research prompt. The outputs were evaluated using a Likert scale rubric with four categories: poor, fair, good, and excellent.

The Department of Education's COT was also used to assess further and validate the writing competencies in English, ensuring alignment with national educational standards. This evaluation process enhanced the reliability and validity of the assessment results. It also focused on implementing the AI-IWA. All participants used the same AI writing tools and were provided with uniform prompts to ensure consistency across the sample. Students were guided through revising and improving their research introductions using the AI tools, following specific protocols to guarantee equal exposure and minimize biases.

A posttest writing assessment was administered after the AI intervention for SOP 2, which examined improvements in writing competencies. Students were again tasked to write a research introduction using the same assessment rubric and evaluation criteria as in the pretest. The comparison of pretest and posttest scores allowed for the quantitative measurement of changes in writing competencies, specifically in vocabulary, grammar, content, and organization.

### Data Gathering Procedure

The data-gathering procedure on AI-IWA involved a structured, multi-step approach to ensure comprehensive and reliable results. Thirty (30) participants were selected. Selection criteria included students' regular use of AI writing tools, enthusiasm for improving their writing skills, and ability to incorporate AI-generated content creatively and originally.

A performance-based task was used instead of a structured questionnaire. During the pretest, students were instructed to create an introduction for their research paper without using AI tools. After the AI-IWA, the same students were asked to revise or recreate their research introductions. Their outputs were assessed based on vocabulary, grammar, content, and organization to measure any improvements in their writing competencies.

Based on established writing criteria, the pretest and posttest writing outputs were evaluated using the COT rubric and rated using a Likert scale with poor, fair, good, and excellent categories. Surveys were administered either in person or electronically, depending on student preferences. Data were analyzed using appropriate statistical tools to determine significant improvements in writing performance.

#### Data Analysis Method

The data collected were analyzed through various statistical methods. First, the mean and standard deviation were calculated for students' vocabulary, grammar, content, and organization scores before and after the intervention. The mean scores provided an average measure of students' performance, while standard deviations indicated the variability of scores around the mean (Lund & Lund, 2020).

Subsequently, a paired-samples t-test was conducted to determine whether the observed differences between pretest and posttest scores were statistically significant. This test was particularly appropriate because it compares two related samples: the same participants' performance before and after the intervention. A p-value of less than 0.05 was considered statistically significant, meaning improvements could be attributed to the AI-IWA rather than random chance.

### III. RESULTS AND DISCUSSION

The writing competencies of the SHS students was evaluated across four domains: vocabulary, grammar, context, and organization. The pretest result shows that students' writing skills were largely within the Fair level across all areas.

The pretest results reveal that SHS students' writing competence before using the AI-IWA is within the fair category across vocabulary, grammar, context, and organization. These findings highlight areas requiring significant improvement to enhance students' writing and overall communication abilities.

*Table 1. Level of Students' Writing Competence Before Using AI-IWA*

Score Category	Vocabulary (N, %)	Grammar (N, %)	Context (N, %)	Organization (N, %)
Poor (1)	2 (5.41%)	0 (0%)	0 (0%)	0 (0%)
Fair (2)	23 (62.16%)	22 (59.46%)	14 (37.84%)	19 (51.35%)
Good (3)	12 (32.43%)	15 (40.54%)	23 (62.16%)	18 (48.65%)
Excellent (4)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
<b>Mean Score</b>	<b>2.32 (Fair)</b>	<b>2.38 (Fair)</b>	<b>2.62 (Fair)</b>	<b>2.49 (Fair)</b>

The vocabulary aspect received the lowest average score of 2.32, indicating that students have a restricted word range in their writing. The data reveal that 62.16% of students achieved a Fair level, suggesting they tend to use basic words and face challenges with lexical diversity. Utilizing AI-assisted tools to expand vocabulary could enhance word selection and the overall richness of their texts. Nation (2020) highlighted that vocabulary is essential for improving writing fluency and expression, pointing out that a limited vocabulary restricts fluency and coherence, making written outputs repetitive and less engaging. Without intervention, students may face difficulties in academic and professional writing tasks.

The grammar scores of 2.38 indicated that the students performed slightly better, demonstrating some knowledge of sentence structure but still encountering issues with grammatical accuracy. Ferris (2018) pointed out that L2 learners often struggle with verb tense consistency, subject-verb agreement, and overall sentence coherence. While only 40.54% of the students scored Good, most remained in the Fair category, indicating the need for reinforcement in grammar rules.

Context registered the highest average score of 2.62, indicating that learners have a stronger capability to relate content and ideas appropriately. Hyland (2019) emphasized that comprehending the context at a deeper

level is a key component of academic writing. The survey indicated that 62.16% of the students reached the Good level in context, showing their ability to construct relevant and meaningful content.

Organization, with a mean score of 2.49, reflected students' moderate skill in logically arranging ideas. Flower and Hayes (2021) emphasized coherence and transition between paragraphs as major indicators of well-structured writing. Although 48.65% of the students scored Good, a significant number remained at the Fair level, indicating challenges in the logical flow of their essays.

These findings suggest that integrating AI-IWA can provide real-time, personalized feedback, allowing students to refine their vocabulary, grammar, and structural coherence. This approach could be a valuable supplement to traditional writing teaching, fostering long-term writing proficiency.

After the AI-IWA, a notable improvement in students' writing competence was observed across all assessed domains.

Table 2. Level of SHS Students in Writing Competencies After Using AI-IWA

Score Category	Vocabulary (N, %)	Grammar (N, %)	Context (N, %)	Organization (N, %)
Poor (1)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Fair (2)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Good (3)	17 (56.67%)	17 (56.67%)	17 (56.67%)	17 (56.67%)
Excellent (4)	13 (43.33%)	13 (43.33%)	13 (43.33%)	13 (43.33%)
<b>Total Students</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>
<b>Mean Score</b>	<b>3.57</b> <b>(Good)</b>	<b>3.57</b> <b>(Good)</b>	<b>3.57</b> <b>(Good)</b>	<b>3.57</b> <b>(Good)</b>

In vocabulary, 43.33% of students achieved an Excellent level, while the remaining 56.67% were classified as Good. The results imply that AI support significantly helped students enhance their lexical choices, enabling more nuanced and varied expressions. Schmitt (2020) supported the view that acquiring new words leads to improved fluency and expression in writing.

Grammar similarly improved, with no students scoring Poor or Fair. Students gained better control over sentence structures, verb usage, and punctuation accuracy. Ferris (2018) emphasized that grammatical precision is critical for written clarity, and AI-driven grammar checkers greatly contributed to this enhancement.

In terms of context, students demonstrated stronger comprehension of topic relevance, supporting details, and argument development. This improvement was likely

aided by the structured feedback provided by the AI platform, aligning with Hyland's (2019) assertion that a deeper understanding of the context strengthens written output quality.

The organization improved notably, as students achieved better coherence, logical flow, and effective essay transitions. Flower and Hayes (2021) noted that clear organization strengthens a text's intelligibility and persuasive power, which the AI-supported tools helped students to achieve.

Overall, the uniform prompts and the use of the same AI tool for all participants ensured that differences in outcomes were attributable primarily to individual student engagement, not inconsistencies in instructional materials. This highlights the strength of using AI as a supportive tool in enhancing students' writing proficiency.

Table 3: Test of Difference Between Means on the Level of Students' Writing Competence During Pre-test and Post-tests

Indicators	Mean Difference	SE	t-value	p-value	Interpretation
Pre-test					
Post-test	-2.93	0.291	-10.1	<.001*	Significant

\*5% level of Significance



The data presented reveal a significant difference in students' writing competence between the pretest and posttest assessments. Specifically, the mean difference of -2.93, accompanied by a standard error of 0.291, yielded a t-value of -10.10, which is statistically significant at the 5% level ( $p < .001$ ). This indicates that students' writing skills improved substantially after the AI intervention.

The highly significant result validates the effectiveness of the AI-IWA. It suggests that the AI-IWA can effectively address students' writing weaknesses, promote skill development, and yield measurable learning gains within a relatively short period. Teachers may consider incorporating AI-driven platforms into their instruction to improve student vocabulary, grammar, content organization, engagement, and overall English writing proficiency.

Prior studies support these findings. Boscolo et al. (2007) found that synthesis writing interventions improved writing abilities at the undergraduate level. Kitila et al. (2023) indicated that integrated skills interventions positively affected writing proficiency among high school students, particularly in vocabulary and grammar. Furthermore, Archer (2008) highlighted that writing centers significantly improved assessed writing within tertiary education contexts.

#### IV. CONCLUSION

AI-IWA for SHS students has significant potential, particularly in enhancing vocabulary, grammar, content, and organizational writing competencies. AI applications such as ChatGPT, Grammarly, and QuillBot provided real-time feedback and scaffolding, promoting self-regulation, metacognitive awareness, and active engagement in the writing process. Notable improvements were observed in students' vocabulary acquisition, grammatical accuracy, content development, and organizational skills.

While an AI-IWA presents a promising avenue for improving student competencies, its effectiveness depends on strategic implementation, continuous teacher guidance, and independent and collaborative learning opportunities. This study contributes to the growing body of research affirming AI's transformative educational potential when thoughtfully applied alongside traditional methods.

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