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Research Article

Leveraging DeepL Write to Improve Writing Performance among Vocational High School Students

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ABSTRACT

This research investigates how DeepL Write (henceforth DW) can address the challenge of low writing performance among vocational high school students by using an AI-assisted approach that supports more effective English writing outcomes. The aim of this research was to examine how DW was implemented in the classroom and the extent to which it enhanced students' writing. This study adopted a quantitative quasi-experimental approach, incorporating pre- and post-tests along with Brown's evaluation rubric to evaluate forty students assigned to control and experimental groups. The statistical analysis revealed that the p-value (2.98×10^{-9}) was far below the 0.05 significance threshold, and the calculated t-statistic (10.3578) exceeded the critical two-tailed t-value (2.093). These suggest that DW offers effective real-time feedback, grammatical accuracy improvement, and vocabulary enrichment. It can serve as a powerful assistant in the classroom as an automatic writing feedback, although it should not replace traditional methods. The study recommends integrating AI-based writing tools to enhance learning outcomes while preventing student overreliance. Teachers are advised to integrate DW in a balanced manner with reflective activities to ensure that students continue to understand the thought process behind each correction provided by AI.

Keywords: *Artificial intelligence, Automated writing feedback, DeepL Write, English as a foreign language, Vocational education, Writing performance*

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INTRODUCTION

A key to 21st-century skill in English is writing (Deane, 2022). While writing performance is critical in today's globalized world, the challenge of developing proficient writing performance continues to be a significant obstacle for many students when learning English. In vocational school, the English writing skills is needed especially to open more window for world-wide employability. Writing performance is when one can express ideas clearly and effectively in written form (Sakkir, 2022). However, students often struggle to grasp complex concepts such as grammar, vocabulary, and the overall structure of effective writing (Eslit & Valderama, 2023; Makovskaya & Radjabzade, 2022) . Writing in their non-native language causes difficulty in expressing their ideas accurately of delivering their thoughts into words that accurately convey their intended meaning, further worsening the difficulties they face in producing effective written work (Mondal, 2024).

"AI can be helpful when it is used wisely"

In reality, for Indonesian vocational high school students, writing in English is challenging because learning English is not their priority. However, they are required to understand complex concepts like grammar, vocabulary, and structure of effective writing (Alisha et al., 2019; Hadi et al., 2023) when their English is still on the primary level. Grammar is a crucial aspect in writing. Grammar used rules and norms to bound sentence structure. Grammar refers to the principles for forming and combining words, phrases, and sentences (Mufida et al., 2025). Larsen-Freeman (2003) emphasizes that it covers meaning and use. Without grammar, sentences will just be meaningless words combined. Grammar helps to communicate coherent thoughts. Just like grammar, vocabulary is also the next most important thing in writing. Endarto & Subekti (2020) claim that vocabulary is one of the most fundamental and important pillars in mastering English. Without a strong vocabulary bank, which is the collection of words that people use and possess in a given language or situation, students struggle to convey their ideas clearly, even with good grammar. Therefore, a growing vocabulary bank is essential for both spoken and especially written communication.

Aside from the problem that has been addressed, students face challenges in improving their writing performance. Therefore, in today's digital learning environment, technological innovations should support and enhance educational practices. Nurfidah & Fandir (2024) asserted that digital instruments like online writing platforms and automated feedback systems help students with writing tasks, offering real-time assistance with a personalized writing style. This is in line with the idea found in Pitukwong & Saraiwang (2024), which reported that with feedback-providing system, whether it is human or digitally based app can help students write better essays and increase their performance. This report supported the idea of how external factors, such as digital tools that provide feedbacks, can help student to improve their writing performance.

Along with advancement in technology, Artificial Intelligence (henceforth AI), which is the computer systems that are capable of performing tasks that require human intelligence. The fact that AI can perform is supported by the statement "Computing systems that can engage in human-like processes such as learning, adapting, synthesizing, self-correction, and the use of data for complex processing tasks" by Popenici & Kerr (2017). In the field of education, AI itself is suitable considering the existence of the TPACK framework. According to Koehler & Mishra (2013), technological pedagogical content knowledge (TPACK) is a framework for teachers that emphasizes technology integration. This paradigm incorporates technology knowledge with Shulman's concept of pedagogical content knowledge (PCK). The paradigm contends that, for technology-assisted instruction to be effective, teachers must develop. AI-assisted writing serves as a bridge between technology and language learning practices. AI expands the teacher's role from mere evaluator to reflective facilitator, and helps students move from mere language users to process-aware and independent writers. Targeted AI integration also supports the principle of TPACK, where teachers are able to effectively combine technology, pedagogy, and language content to improve writing learning outcomes.

In the education field, some writing assistants took AI form. DW and Grammarly are used to check text's grammar, vocabulary, or the choice of words, style, and clarity to provide feedback to students in order to help them improve their writing (Syarifah & Fakhruddin, 2024). DW is an AI tool that helps students improve their grammar, word choice, and sentence structure. Kirana et al. (2024) stated DW helps students by identifying common grammar mistakes and offering helpful revisions. Schmidt & Strassner (2022) noted that DW's vocabulary suggestions fit the text's structure and message.

One of the key advantages of AI is that it detects specific weaknesses in writing, such as sentence structure or vocabulary, and directly offers suggestions that adjust to each student's learning style (Wang, 2025). This feature is especially valuable for English as Foreign Language (EFL) and English Second Language (ESL) students, who often face challenges expressing their ideas due to language barriers (Marzuki et al., 2023) .The term "AI-assisted writing" represents the application of technology, such as AI tools, to support writing tasks by helping with vocabulary improvement, content organization, and grammar correction, as a part of the Automated Writing Evaluation System (AWE). However, while previous research has examined the importance of grammar and vocabulary in improving writing skills, relatively little has examined how AI-based tools like DW can support these aspects in the context of school students, particularly in vocational high schools. As Birdsell (2022) stated, external support and correction provided by teachers as facilitators can significantly impact students' writing when using AI tools like DW.

Therefore, based on the research background explained above, there are two research questions that can be formulated:

(1) How is DW implemented to improve 11th-grade students' English writing performance at SMKN 3 Kasihan?

(2) To what extent does DW help improve 11th-grade students' writing performance at SMKN 3 Kasihan?

Based on the research questions above, the hypothesis of this study is that the use of DW can significantly improve the writing ability of 11th grade students at SMKN 3 Kasihan, especially in the aspects of grammar and vocabulary, compared to conventional guidance or revision from the teacher without AI assistance.

LITERATURE REVIEW

AI and AI-Assisted Writing

AI refers to the development of computer systems that are capable to perform tasks that require human intelligence. It is supported by the statement "Computing systems that can engage in human-like processes such as learning, adapting, synthesizing, self-correction, and the use of data for complex processing tasks" is a current definition of AI by Popenici & Kerr (2017). In the field of education, AI itself is suitable considering the existence of TPACK framework. According to Phillips et al. (2025) , technological pedagogical content knowledge (TPACK) is a framework for teachers that emphasizes technology integration. This paradigm incorporates technology knowledge with Shulman's concept of pedagogical content knowledge (PCK). Conceptually, the relationship between AI and the TPACK framework shows how AI functions as a component of "technological knowledge" that supports pedagogical practices and the teaching of language. In the context of this research, the use of DW demonstrates how AI technology can be pedagogically integrated into English writing classes, where teachers act as facilitators who guide students to use automated feedback from AI as a reflection and revision of their writing. Thus, AI not only functions as a technological tool in the practice but also becomes an important part of the application of the TPACK concept in improving students' writing performance.

The term "AI-assisted writing" represents the application of technology, such as AI tools, to support writing tasks like vocabulary improvement, content organization, and grammar correction, part of the Automated Writing Evaluation System. According to Shermis & Burstein (2016) , Automated Writing Evaluation (AWE) systems use Natural Language Processing (NLP) methods to give students prompt, reliable feedback. They talk about how NLP methods are essential to the operation of AWE tools, which evaluate writing using algorithms. These fundamental AI techniques enable the computers to analyze and assess language in a way that mimics human evaluators. With its feature of Natural Language Processing (NLP) data, it enables AI to adapt and understand users' writing patterns based on personalized needs such as grammar, word choice, and tone (Kruse et al., 2023).

DW, which function is to assist human in writing based on their needs. It belongs to the AWE and NLP category. Same as other AI, DW also processes large multilingual text databases to keep learning and improving its language capabilities and accuracy all the time (Koehn, 2020) . This method makes the system generate translation and writing that are not only grammatically correct but also sound natural by mimicking human-like fluency

(Vaswani et al., 2017) .This makes DW not just an auto-correction tool, but also an NLP-driven feedback system, a learning platform that encourages the development of students' linguistic awareness and revision skills in English writing.

Writing, Grammar, and Vocabulary

Writing is a set of dynamics that is to be the outcome of thought, drafting, and revision processes requiring specific abilities that not all speakers are born with (Brown & Lee, 2015). Therefore, writing also requires mental effort to express thoughts, ideas, and information, so that the writing process will produce a meaningful writing product. In writing, grammar is one of the most crucial aspects. Like any other field in this world, writing is also bound by rules and norms, which are grammar. Larsen-Freeman (2003) emphasizes that grammar includes more than simply form (a language's rules and structures); it additionally covers meaning (what the structures express) and use (when and why the structures get applied in context). Aside from grammar, the important collection of words that people use and possess in a given language or situation is known as their vocabulary. Endarto & Subekti (2020) claim that vocabulary is one of the most basic and important pillars in mastering English. Without a strong vocabulary, even those with good grammar may struggle to convey their ideas clearly. As writing was evaluated with these aspects, DW were there to serve as assistance by providing feedback. The students can then upgrade their writing through the improvement of these aspects. In line with the theories, many studies have recently focused on how AI can assist writing. Karagoz's (2025) research shows that AI-based feedback can improve linguistic awareness and the accuracy of structure in writing. Similarly, Mekheimer (2025) found that the use of AI encourages more frequent revision and more accurate writing. Furthermore, Chen & Gong (2025) emphasized that AI-assisted writing instruction not only helps improve linguistic skills but also fosters students' motivation and independence in the revision process.

Writing Assessment

Assessment is an important part of learning to write because it functions not only to measure learning outcomes, but also to help students understand their writing process. Tests, according to Brown & Abeywickrama (2019), are a subset of assessment, a genre of assessment methods. The best method to test students' writing performance is to get the students to write, according to Weigle (2002). A diagnostic or pre-test test is used to determine which language skills a student needs to work on, or which should be covered in a course, as stated by Brown. In this study, pre-tests and post-tests were used to assess the extent to which DW helped improve students' writing skills. For the after process, a summative assessment or post-test is there intended to measure or summarize what a student has learned. Testing in writing is a subjective matter. However, it could be minimized using a rubric. Wiggins (1998) stated that a rubric is an instrument in a performance assessment set that provides potential performers and assessors with information about the most important elements of performance and how the work is assessed. The results will be categorized in terms of relative quality. By combining the views of Brown, Weigle, and Wiggins, this study positions writing assessment as a reflective

process that not only assesses results but also encourages improvement in skills through feedback provided by the AI system.

Theoretical Framework

Previous research, which focused on DW's that act as an assistant in improving EFL students' writing performance, showed positive results. A significant improvement of students who utilize DW in their writing performance, especially in their wider range of words and grammar correction, was observed by Birdsell (2022). Research by Polakova & Klimova (2023) asserted that even with the potential possessed by DW to transform EFL students' language learning, its full effectiveness hasn't been explored due to certain limitations. These findings support the idea that DW can aid in improving writing performance through real-time suggestion and personalized feedback. However, these two studies focused more on descriptive results without explaining in depth how AI feedback contributed to students' revision process and linguistic awareness. This is where this study attempts to fill this gap by analyzing how DW affects grammar and vocabulary aspects in a vocational EFL context.

The studies of DW in improving writing performance in vocational high school settings are still limited, which represents a significant research gap. In addition, based on the previous observation that was conducted at SMKN 3 Kasihan by the researcher, there is still a low number of students who maximize the potential of DW as an aid to develop their English writing skill. This gap provides an important basis for research to examine the application of DW in the context of TPACK, where technology is not only used as a tool, but is integrated with pedagogical and content knowledge from teachers and students to support effective writing.

These findings and theories form the basis for this research to explore how DW can help students improve their writing skills. The chosen approach aligns with the concept of Automated Writing Evaluation (AWE) which explains how AI-based systems such as DW provide automated NLP-based feedback to improve the quality of students' writing (Wei et al., 2023; Yang et al., 2024). The definition and characteristics of Analytical Exposition texts help the researcher understand the requirements that students must meet in order to be classified as having high English writing proficiency. AI and AI-assisted writing theories outline the instruments the researcher uses to treat the treatment group. A rubric that assesses the writing proficiency of Class XI Animation and DKV students in creating the exposition text will be created by combining the theories of grammar and vocabulary. A basic understanding of how to create a rubric can be gained from the theory of testing writing, particularly the theory of rubrics. The study's second research question asks to what extent DW helps improve 11th-grade students' writing performance at SMKN 3 Kasihan. Each item in the rubric, which is organized according to the theories of exposition texts, particularly the grammar and vocabulary, can be analyzed to determine the answer. The researcher can use the data from the analysis of the exposition writing to answer the second question in the problem formulation, which shows how much the students have improved.

METHOD

Research Design and Context

This study employed quasi-experimental methods as its research design. Experimental was a method that involved the use of an independent variable as the treatment group and a dependent variable as the control group to assess the effects of a particular variable (Miller et al., 2020). This aligns with the view of Shadish et al. (2002) who popularized the experimental method in educational research. This method was developed to help researchers establish cause-and-effect relationships by comparing treatment and control groups under controlled conditions. This method was chosen because it is aligned with the research purpose. The method was suitable to determine whether the writing performance of grade XI students at SMKN 3 Kasihan was improved by using DW AI in writing. Therefore, this research involved two groups, consisting of a treatment group where students used DW as the medium and a control group where students did not use it. To ensure the equivalence and balance between the subjects, an interview was conducted by the researcher with the teacher. It was stated that although the subjects came from different majors, they had the same learning input, which made them ideal subjects. The research was conducted in 6 meetings, in 2 of the 6 meetings, the researchers were introducing and implementing the DW in the writing process as a feedback source, with guidance by the teacher. The quasi-experimental method was chosen because it is practically impossible to randomize subjects in a school setting. Classes are determined by the school based on majors, so researchers cannot randomly assign students to experimental and control groups. Therefore, a quasi-experimental design is considered the most realistic approach to testing the effectiveness of treatments in real-world classroom conditions. Furthermore, this method allows researchers to maintain a fair comparison between two groups with relatively similar learning backgrounds. By maintaining natural classroom conditions, the research results are expected to better reflect the actual learning situation at SMKN 3 Kasihan.

Participants

The research was conducted at SMKN 3 Kasihan. Access to the research site and participants was gained through a pre-established professional relationship with the school's English teacher, developed during a teaching internship at the same school. This professional relationship facilitated the permitting process, technical coordination, and ethical participant cooperation. Students from two 11th–grade classes that consisted of XI DKV 1 and XI Animation in the academic year 2024/2025 were the subject of this research.

Purposive sampling was used in selecting the classes, as supported by the observations conducted from previous research. There was an indication that students in XI Animation class had better overall writing performance compared to students in XI DKV 1 class. It was supported by Campbell et al. (2020), who stated that purposive sampling is a non-randomized method in which the researcher deliberately selects the subjects based on certain characteristics and criteria to obtain deeper and relevant information for the research. It has to be highlighted that even when the subjects came from different majors, they had the same learning input, which made them ideal subjects. Class XI Animation was

the control group, and class XI DKV 1 was the treatment group, which created balances comparison.

Table 1
Participants' Characteristics

Characteristic	*XI Animation (Control Group)*	*XI DKV 1 (Treatment Group)*
Grade level	11th grade	11th grade
Academic year	2024/2025	2024/2025
Estimated age	16–17 years	16–17 years
English proficiency	Beginner–Intermediate (generally higher)	Beginner–Intermediate (generally lower)
Major focus	Animation and multimedia	Visual communication design
Exposure to English	Frequent through digital tools and software	Limited, mainly in class
Learning input	Same English curriculum	Same English curriculum
Role in study	Control group	Treatment group

The subjects' ages were estimated to be between 16 and 17 years of age. Their English proficiency levels varied from beginner to intermediate. As for example, most students in the XI Animation class, as the control group, showed relatively higher English proficiency. This case happens because they are more frequently exposed to and dealt with English through digital software and online materials, as their major involves multimedia and animation projects, which often use English interfaces. They are more accustomed to English from the digital world, and they even brand themselves as digital artists, which increases their familiarity with the language. In contrast, students in XI DKV 1 Class, as the treatment group, generally showed lower English proficiency. This factor is because many of them had limited exposure and chance to learn English, as most of them only learned it during class. Another factor is that they viewed English as a less relevant thing to their field, since there is a mindset that they will rarely deal with the English language. Nevertheless, a few students from this class demonstrated higher proficiency and motivation to learn the language.

In terms of sociocultural background, the majority of participants came from middle to lower middle-class families. Their daily environment primarily uses Indonesian and Javanese, with minimal English interaction outside school. However, students from XI Animation slightly have better exposure, as they tend to engage more actively with global digital communities through online platforms, which gives them accessible resources for English usage and understanding. The presence of variation in levels provides a balanced

comparison for this study. The research followed strict ethical protocols to ensure the protection of the subjects' rights. There was an agreement between the researcher, the research participant subjects, and the teacher involved in this research. Verbally informed consent was obtained from everyone before the research was initiated.

Data Collection

The instrument of this research was a pre-test and a post-test to identify the significant improvement in students' writing performance as a result of using DW AI. The pre-test and post-test served a purpose that was essentially to recognize further learning processes needed in the classroom Marithasari et al. (2023). Thus, the tests were designed to assess improvement in key areas such as grammar and vocabulary, which were highlighted in the research questions. Consequently, in order to get an authentic comparison, the students were divided into two experimental groups, namely the treatment group that used DW AI to assist them in writing exposition texts and the control group that was expected to write without the help of DW AI. However, these two groups had the same instruction and topic to allow for a controlled comparison of how the use of DW AI affected their writing performance. DW was utilized as a revising tool where students can revise their result by putting their work into the DW and see the suggestions there. Later, the students need to consult to the teacher and researchers as a mentor and facilitator to ensure they did critical filtering in accepting the DW revision.

The data for the research were collected from 22 October to 6 November 2024 in the English subject class of XI Animation and XI DKV 1. The data were taken from a test that consisted of a pre-test and a post-test, which were completed by the participants in the form of an exposition text. The total number of research participants was 57, consisting of 40 valid data and 17 invalid data. The invalid data were those from participants who did not join either the pre-test or the post-test.

Data Analysis

The instrument of this research was pre-test and post-test to identify the significant improvement in students' writing performance as a result of using DW AI. The pre-test and post-test served a purpose that was essentially to recognize further learning processes needed in the classroom (Marithasari et al., 2023). Thus, the tests were designed to assess improvement in key areas such as grammar and vocabulary, which were highlighted in the research questions.

(1) Selection of Research Subjects

In order to get an authentic comparison, the students were divided into two experimental groups, namely the treatment group that used DW AI to assist them in writing exposition texts and the control group that was expected to write without the help of DW AI. However, these two groups had the same instruction and topic to allow for a controlled comparison of how the use of DW AI affected their writing performance.

(2) Pre-test

After the pilot, the research was conducted. In the pre-test, both groups are writing without any help from digital tools like an AI-based writing tool.

(3) Intervention Stage
The experimental group was introduced to DW and given the opportunity to familiarize themselves with the feedback feature during the writing process. Meanwhile, the control group only received teacher guidance and access to a conventional translator.

(4) Post-test implementation
After the intervention phase, both groups took a post-test. In the post-test, the control group was allowed to use DW as a source of feedback. The teacher and researchers supervised and facilitated as a consultant in this activity to ensure the students also critically evaluate the feedback before fixing their writing. In the control group, they only have access to the regular translator and the teacher's guidance. The post-test result was then collected to be scored and analyzed.

(5) Data collection and validation
The data for the research were collected from 22 October to 6 November 2024 in the English subject class of XI Animation and XI DKV 1. The total number of research participants was 57, consisting of 40 valid data and 17 invalid data. The invalid data were those from participants who did not join either the pre-test or the post-test. The writing test was designed to evaluate students' writing in the form of an exposition text. The type of text was chosen because it requires accurate and effective writing, as exposition is an argumentative text. The test was piloted and then validated by an expert.

FINDINGS

The Students Writing Improvement After the Implementation of DW

The second research question: to what extent does DW help improve 11th-grade students' writing performance at SMKN 3 Kasihan, can be answered by analyzing the data using the rubric explained in the methodology.

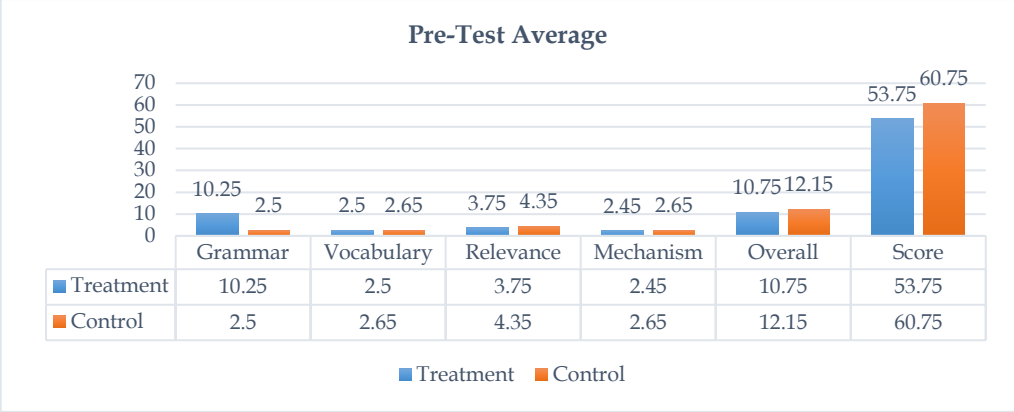
Pre-Test Result

The following data in graphical form is presented in order to provide a more readable and comprehensible result. It provides comparison of the initial ability of the students in the experimental and control classes.

Figure 1 presents the result of the students' exposition writing pre-test score without any usage of AI tools. The writing process was purely done by the students themselves. The majority of the students performing averagely, and only a few were able to excel in the pre-test. It can be said that both the treatment and control groups possess similar writing performance. The majority of the students performing averagely, and only a few were able to excel in the pre-test. This shows that the students haven't yet been able to perform an advanced writing performance, considering that they are vocational students focusing on skill development. Deep English writing guidance and understanding were not explored, considering the focus of the vocational school itself.

Figure 1

Treatment and control class pre-test result



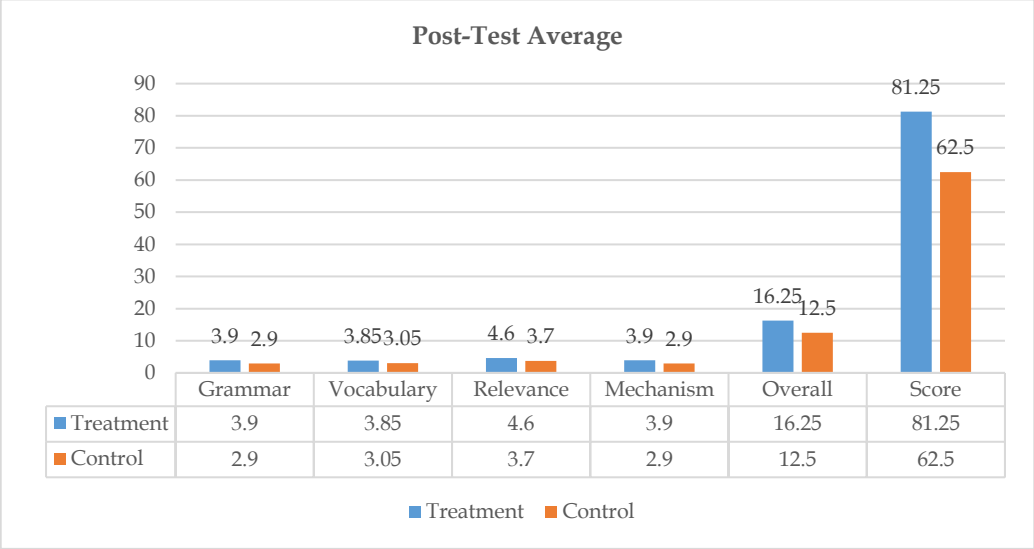
Post-Test Result

In contrast to the pre-test, where the students were doing the text writing on their own skill and ability, presented below the score of the student's writing on the exposition after the researcher applied the instrument for treatment in the class.

During implementation, treatment group students used DW to check and revise their drafts. Their primary focus was on grammar correction, word choice, and sentence fluency. They also consulted with their teachers and researchers to determine revisions based on the feedback they received from DW. Classroom observations showed that students gradually became more confident in revising their work and became aware of common grammatical errors. After the instrument was introduced to the students, the post-test was conducted to find out whether the writing performance score has risen compared to the pre-test. The post-test results indicate actual improvement, with most students moving to the good and excellent categories. This shift suggests that DW effectively supported accuracy and writing effectivity.

Figure 2

Treatment and control group post-test result



As validating data, the researcher gave the control group no treatment with the DW as an instrument but only through guiding in the classroom. The students can ask the researcher, but there was no AI involved or helping tools allowed. Figure 2 shows that the score obtained by students was lower than the treatment group's post-test. The control group's performance is relatively unchanged, indicating no notable improvement without the use of DW.

Data Calculation

Following the collection of the pre-test and post-test results, the scores were categorized according to the previously described categorization. The table below displays the outcome.

Table 1
Frequency pre & post category XI DKV 1

No	Classification	Interval	Pre-test		Post-test	
			F	**%**	**F**	**%**
1	Excellent	76 – 100	1	5	13	65
2	Good	51 – 75	8	40	7	35
3	Fair	26 – 50	11	55	0	0
4	Poor	0 – 25	0	0	0	0
Total			20	100	20	100

As seen in the table, the pre-test data showed that the majority of the students were categorized as fair, with a frequency of 11 (55%) out of 20 students. They were mostly struggling with grammar and punctuation. By analyzing that, it can be said that before the instrument for the treatment was introduced, the students' writing performance in the treatment class was still low. Therefore, the researcher provides the instrument, which was DW, to improve the student's writing performance.

In the post-test, the researcher has introduced DW as the treatment. The pattern seen in the table shows a significant shift from the fair to excellent category, which can be interpreted as a significant improvement in writing performance after using DW. The result supports the hypothesis that DW can improve the writing performance of the students. To compare, presented below is the categorization of the control group data

Table 2
Frequency pre & post category XI Animation

No	Classification	Interval	Pre-test		Post-test	
			F	%	F	%
1	Excellent	76 – 100	1	5	4	20
2	Good	51 – 75	19	95	16	80
3	Fair	26 – 50	0	0	0	0
4	Poor	0 – 25	0	0	0	0
Total			20	100	20	100

Table 2 shows that the students were mostly performed well. In the sense that the writing class was good according to their English teacher, even though there were a few

students receiving a fair score. However, without any introduction or usage of the DW, there was no significant change shown in the result. The researchers' guidance only on the post-test was shown to be ineffective in improving student's writing performance.

Data Calculation Analysis

After the calculation of the student's overall score, the researcher then calculated the average value of both the treatment and control group.

(1) The mean score in treatment class

a) Pre-Test

$$X_1 = \frac{\sum x1}{n_1} = \frac{1075}{20} = 53{,}75$$

b) Post-Test

$$X_1 = \frac{\sum x1}{n_1} = \frac{1625}{20} = 81{,}25$$

(2) The mean score in control class

a) Pre-Test

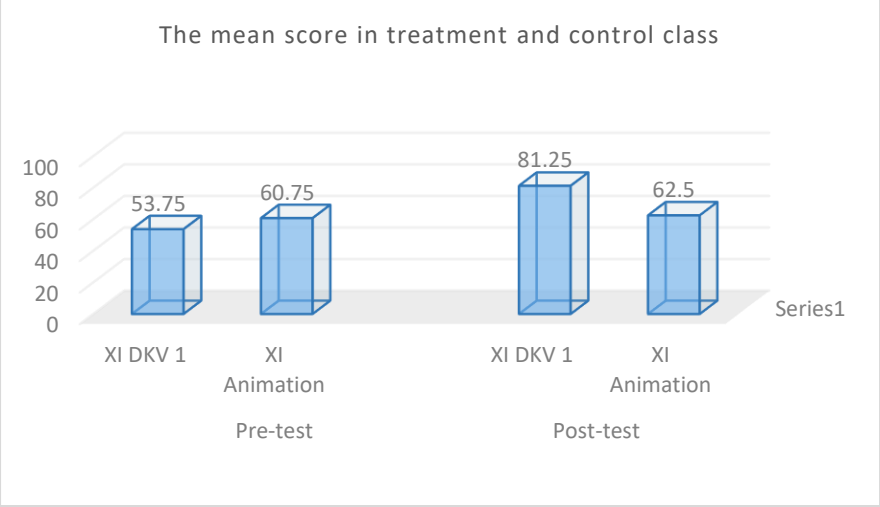
$$X_1 = \frac{\sum x1}{n_1} = \frac{1215}{20} = 60{,}75$$

b) Pre-Test

$$X_1 = \frac{\sum x1}{n_1} = \frac{1250}{20} = 62{,}5$$

Figure 3

Mean of Both Groups Graph



After data calculation, it was found that the mean score of the experimental class (XI DKV 1) in the pre-test was 53.75, while the post-test mean score was 81.25. The 27.5-point increase is a substantial improvement in writing performance. These results suggest that DW provided feedback and guidance that were able to enhance students' accuracy and confidence more than traditional methods.

The mean score of the control class (XI Animation), which was not allowed to use DW at all, received 60.75 as the mean of the pre-test. The post-test mean score was 62.50. From the scores, it can be observed that there was only a 1.75-points difference. This minimal improvement means there was no drastic improvement in the writing abilities of the students in the control group. Since the difference is too little to be declared statistically significant, it is possible to assume the traditional teaching techniques by themselves were insufficient to improve students' abilities in the specialized case, like what researchers did. Before conducting the t-test, the data were examined to ensure they met the parametric assumptions. Normality and homogeneity were considered to be met based on the balanced distribution of data between the experimental and control groups. The analysis was then continued with an independent t-test to determine significant differences between the two groups.

T-Test Analysis

After understanding the data, then the researcher calculated the t-test value to ensure the improvement of the students' writing performance and to prove the researcher's hypothesis.

Table 7
Pre-test Data Analysis

Measures	***XI DKV 1***	***XI Animation***
Mean	53,75	60,75
Variance	65,46052632	116,5131579
Observations	20	20
Pearson Correlation	0,794752017	
Hypothesized Mean Difference	2	
df	19	
t Stat	-6,126710811	
P(T<=t) one-tail	3,43428E-06	
t Critical one-tail	1,729132812	
P(T<=t) two-tail	6,86855E-06	
t Critical two-tail	2,093024054	

Table 8
Post-test Data Analysis

Measures	***XI DKV 1***	***XI Animation***
Mean	81,25	62,5
Variance	33,88157895	146,0526316
Observations	20	20
Pearson Correlation	0,907176168	
Hypothesized Mean Difference	2	
df	19	
t Stat	10,35781235	
P(T<=t) one-tail	1,48927E-09	

t Critical one-tail	1,729132812
P(T<=t) two-tail	2,97854E-09
t Critical two-tail	2,093024054

Statistically, to determine hypothesis acceptance between the alternative hypothesis (Ha) and the null hypothesis (H0), the writer used the t-test value to calculate the result. The calculation shows that the t-test value of the experimental class (10.36) is greater than the t critical value (2.09), while the t-test value of the control class (-6.13) is lower than the t critical value (2.09). The experimental class's t-test score is noticeably higher than the threshold, indicating a significant performance difference, which means that the alternative hypothesis (Ha) is accepted, and the null hypothesis (H0) is rejected. This result indicates that the use of DW AI significantly improved students' writing performance compared to the control class. After that, the effect size was calculated using Cohen's d formula to determine the magnitude of the effect of the treatment. The value obtained was 1.97, which is categorized as a very large effect. These results indicate that the use of DW has a strong impact on improving students' writing skills compared to conventional methods. The results shown that DW most effectively improved grammar accuracy and vocabulary use, also better organization of ideas. Students' sentences became more effective and grammatically accurate, more coherent, and richer in vocabulary after using the tool. Pedagogically, this means that DW not only raised writing scores but also helped students become more aware of their language use and more confident in revising their own work.

DISCUSSION

DW has shown its potential. The statement is supported with the significant increase of the student's writing in the experimental group, especially in the aspects of grammar and vocabulary. With the ability to provide immediate feedback and suggestions, DW has empowered students to identify while also correct grammatical errors and select more suitable vocabularies. By offering accurate and context-appropriate suggestions, DW successfully helped students to improve the quality of their writing. By offering various and contextually accurate suggestion, DW has assisted the students to improve their writing quality.

Based on the findings, a noticeable improvement can be seen in the choices of vocabulary used by the students; they used more varied words. The accuracy of the subject-verb agreement was also increasing. Plural and singular terms were also used correctly by the students. The significant improvement found in the experiment has shown the positive impact of using DW as an assistant in writing class. The increase suggests that by its ability to enhance the accuracy of students' writing and enrich students' vocabulary, DW affected the writing positively. This finding is in line with Brown's writing theory, which stated that grammatical accuracy and varied vocabulary are the critical components of effective writing. Aside from Brown, the finding was also aligned with the TPACK framework, proposed by Koehler & Mishra (2013), that agreed how integration of technology supports language learning. The results of this study are also in line with the findings of Wei et al.

(2023) and Yang et al. (2024), who explained that the AI-based Automated Writing Evaluation (AWE) system consistently improved EFL students' accuracy, revision, and learning engagement. Karagoz's (2025) research result also supports the finding; they found that AI-based feedback improved students' linguistic awareness and revision skills. Aside from that, Mekheimer (2025) asserted that the use of AI increased writers' engagement and confidence, and Chen & Gong (2025) showed that AI-assisted writing learning increased students' motivation and independence.

From the perspective of education, the use of DW is leaning into the positive side for teaching writing practices in the classroom. Teachers can utilize DW as a supporting facility that helps provide real-time feedback as the students learn to critically evaluate the corrections and suggestions. In that way, AI is existing in between the teachers and students as a digital collaborator in the learning-teaching dynamic. However, this research is still limited in the context of one vocational school. Future researchers are suggested to explore and compare DW or other AI-based tools in a wider context. This can help to understand how far the variety of AI writing tools affects the different aspect of language and linguistic in writing.

CONCLUSION

The study's purpose was to understand whether DW will help in improving students' writing performance. Based on the results, the implementation of DW was proven effective in improving students' writing skills. The implementation of DW AI (Write) provided students with instant feedback, suggestions, and word choices, supporting their learning process. Students who were using DW AI demonstrated better writing performance. These results demonstrate that DW aligns with the TPACK framework, where technology integration supports teachers' pedagogical and content skills in creating more effective writing instruction. These findings reinforce previous research (Chen & Gong, 2025; Karagoz, 2025; Mekheimer, 2025) about the benefits of AI-based feedback on improving students' grammatical accuracy, vocabulary, and learning motivation. This shows the potential of AI-based tools to complement traditional teaching methods and improve students' writing performance. However, DW should not be relied on dependently; DW exists as a complementary tool. The AI-assisted writing tools can assist and guide students in addressing common writing challenges. This study is limited by its relatively small sample, making the results not generalized yet. Further research is recommended to expand the participants' variety and explore comparisons of AI-based writing tools to understand their effectiveness in different educational contexts.

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