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The Effect of Formative Assessment Assisted by Artificial Intelligence on Students' Essay Writing Skills at UMMY Solok

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Abstract

The development of Artificial Intelligence (AI) has created new opportunities for implementing formative assessment in higher education, including writing instruction. However, empirical research examining the effect of AI-assisted formative assessment on essay writing skills among students in Indonesian language education remains limited. This study aims to analyze the effect of AI-assisted formative assessment on the essay writing skills of students in the Indonesian Language Education Study Program at Mahaputra Muhammad Yamin University (UMMY) Solok. A quantitative approach with a quasi-experimental method and a nonequivalent control group design was employed. The sample consisted of 40 students, comprising 20 students in the experimental group and 20 students in the control group. The experimental group received AI-assisted formative assessment, whereas the control group received conventional formative assessment. Data were collected using an essay writing test assessed based on five aspects: content, organization, vocabulary, language use, and writing mechanics. The data were analyzed using descriptive statistics, normality tests, homogeneity tests, paired sample t-tests, independent sample t-

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tests, and effect size analysis using Cohen's d. The findings show that the average post-test score of the experimental group was higher than that of the control group. The independent sample t-test produced a Sig. (2-tailed) value of 0.020 (< 0.05), indicating a significant difference between the two groups. The effect size analysis yielded a Cohen's d value of 0.77, categorized as medium to high. In addition, improvement in the experimental group occurred across all assessment aspects, with the highest gains found in content and language use. This study concludes that AI-assisted formative assessment has a significant effect on students' essay writing skills. The findings contribute to the development of technology-enhanced formative assessment in writing instruction and provide practical implications for using AI as a supporting tool to improve academic writing quality through fast, specific, and continuous feedback.

Keywords: Academic Writing; AI-Assisted Formative Assessment; Essay Writing Skills; Indonesian Language Education; Writing Instruction

INTRODUCTION

The digital transformation happening across various sectors of life has driven significant changes in education. One technological development that has gained widespread attention in recent years is Artificial Intelligence (AI). The presence of AI not only changes how individuals access information but also affects learning processes, assessments, and evaluation of learning outcomes. In many countries, AI is beginning to be integrated into the education system as a means to improve learning effectiveness, personalize learning experiences, and enhance the quality of feedback students receive. These developments mark a shift in the education paradigm towards more adaptive, responsive, and technology-based learning.

Recent studies indicate that AI technologies are increasingly integrated into educational settings to support personalized learning, adaptive instruction, and data-driven decision-making processes (Lim & Gunasekara, 2024). In addition, educators have begun exploring the potential of generative AI to enhance teaching effectiveness, assessment practices, and student engagement in higher education environments (Kohnke et al., 2024).

The use of Artificial Intelligence in higher education is increasingly growing as a tool that supports learning and assessment processes. One form of implementation that has received considerable attention is the use of AI in formative assessment. Formative

assessment refers to the process of gathering and using information during learning to improve instructional practices and enhance student achievement. (Black & Wiliam, 2009) explain that formative assessment plays an important role in helping students understand the gap between their current performance and expected learning outcomes through continuous feedback. Formative assessment is also viewed as a continuous process that provides evidence for both instructors and students to make informed decisions regarding learning progress and instructional adjustments (Heritage, 2010). Furthermore, (Andrade & Cizek, 2015) emphasize that formative assessment encourages learner autonomy by engaging students in monitoring, reflecting on, and improving their own learning performance.

The effectiveness of formative assessment is closely associated with the quality of feedback provided to learners. (Hattie & Timperley, 2007) argue that effective feedback should answer three fundamental questions: *Where am I going?*, *How am I going?*, and *Where to next?*. Through these questions, feedback serves not only as information about learning outcomes but also as guidance for future improvement. In writing instruction, feedback plays a crucial role in helping students identify weaknesses and revise their work more effectively. (Zhang & Hyland, 2018) found that students' engagement with feedback, whether provided by instructors or automated systems, is strongly associated with improvements in writing quality. In writing education, feedback has consistently been recognized as one of the most influential factors contributing to writing development and academic achievement (Graham, 2019). Effective feedback not only improves writing quality but also promotes self-regulated learning by encouraging students to evaluate their own performance and revise their work independently (Panadero, 2018). However, providing individualized and continuous feedback remains a significant challenge in higher education. Instructors often face constraints related to time, workload, and class size, making it difficult to deliver detailed feedback to every student in a timely manner.

Recent developments in Artificial Intelligence offer promising opportunities to address these challenges. AI-powered systems are increasingly capable of providing immediate, personalized, and adaptive feedback that supports students' learning processes. (Zawacki-Richter, 2019) emphasize that AI applications in higher education can enhance learning efficiency through intelligent tutoring systems, automated feedback mechanisms, and personalized learning environments. Furthermore, (Kasneci, 2023) argue that generative AI has the potential to transform educational practices by supporting learners in writing, reflection, problem-solving, and self-regulated learning.

In the context of assessment, AI technologies have demonstrated considerable potential to strengthen formative assessment practices. (Ouyang & Weng, 2024) reported that AI-assisted assessment can increase student engagement in revision activities and encourage deeper reflection on learning progress. Similarly, (Sharma, 2024) found that generative AI contributes positively to learning outcomes by providing adaptive guidance and helping learners identify weaknesses independently. These findings indicate that AI can function not only as a learning support tool but also as an assessment partner that facilitates continuous improvement.

Despite these promising developments, the effectiveness of AI largely depends on how it is integrated into instructional and assessment practices. (Chan & Hu, 2025) argue that meaningful learning improvements occur when AI is systematically embedded within formative assessment processes that encourage reflection, feedback utilization, and continuous revision. Therefore, empirical studies are needed to examine how AI-assisted formative assessment influences students' writing performance in specific educational contexts, particularly in language learning environments.

In practice, carrying out formative assessments in universities still faces various challenges. One of the main obstacles is the limited time lecturers have to provide detailed feedback on student assignments, especially in courses that produce a large amount of written work. This situation means that students don't always get feedback quickly, so the opportunity to make improvements during the learning process is less than optimal. In fact, various studies show that timely feedback significantly contributes to improving student learning outcomes.

This problem is also found in writing classes in the Indonesian Language Education Study Program. Writing skills are one of the productive competencies that students need to master because they are related to the ability to convey ideas in a systematic, logical, and communicative way. The ability to write essays is an important indicator that reflects students' critical, argumentative, and reflective thinking skills.

According to (Hyland, 2019), academic writing involves the ability to organize ideas coherently, develop arguments logically, and communicate information effectively to specific audiences. Likewise, (Richards & Renandya, 2022) emphasize that writing is a complex cognitive process that requires linguistic knowledge, critical thinking, and continuous revision. Therefore, essay writing is not merely a language production activity but also a

reflection of students' ability to construct knowledge, evaluate information, and express ideas systematically in academic contexts. Preliminary observations conducted in the Indonesian Language Education Study Program at Mahaputra Muhammad Yamin University Solok revealed that many students experienced difficulties in developing arguments, organizing essay structures, selecting appropriate vocabulary, and applying Indonesian language conventions consistently in academic writing.

Various previous studies have shown that using digital technology can help improve the quality of writing learning. (Mahapatra, 2024) found that using ChatGPT in academic writing learning can improve the quality of arguments, writing coherence, and students' language accuracy. (Banihashem et al., 2024) also showed that AI-based feedback systems can help learners revise their writing more systematically by providing quick and specific information about their writing weaknesses. Similar findings were reported by (Lee & Moore, 2024), who stated that generative artificial intelligence can enhance the effectiveness of the writing revision process since students get feedback directly without having to wait for manual corrections from instructors.

Even so, most previous studies have focused more on using AI as a writing aid or learning media. Research specifically examining AI as a tool for formative assessment in writing learning is still relatively limited. Moreover, studies on the implementation of AI-assisted formative assessment for students in the Indonesian Language Education Program in Indonesia, especially at private universities in West Sumatra, are still hard to find. This situation shows there's a research gap that needs more attention.

The novelty of this research lies in the use of Artificial Intelligence as a formative assessment tool that's applied systematically throughout the essay writing learning process. Unlike previous studies that mostly use AI as a helper for generating text, this research integrates AI into the assessment process to provide continuous feedback to students. So, this study doesn't just explore using technology in writing education, but also looks at how effective it is as part of a formative assessment strategy.

This study is expected to enrich research on the integration of Artificial Intelligence in formative assessment in language learning. Practically, the results of this study are expected to provide an alternative for lecturers in developing assessment models that are more effective and adaptive to the development of educational technology. Based on that, this study aims to analyze the effect of AI-assisted formative assessment on the essay writing

skills of students in the Indonesian Language Education Study Program at Mahaputra Muhammad Yamin University Solok.

METHODS

This study uses a quantitative approach with a quasi-experimental research method. This method was chosen because the researcher could not fully randomize the subjects (random assignment) into the study groups. The research design used is the Nonequivalent Control Group Design, which involves two groups: the experimental group and the control group. The experimental group received treatment in the form of formative assessment assisted by Artificial Intelligence, while the control group received conventional formative assessment.

The research design can be illustrated as follows.

Group	Pretest	Treatment	Posttest
Eksperiment	O_1	X	O_2
Control	O_1	–	O_2

Notes:
O_1 = *Pretest*
X = Formative assessment assisted by Artificial Intelligence
O_2 = Posttest

Research Population and Sample

The research population includes all second and fourth semester students in the Indonesian Language Education program at Mahaputra Muhammad Yamin University (UMMY) Solok for the 2025/2026 academic year, who are taking the Basic Writing Skills and Writing Skills courses. The sample was picked using purposive sampling, considering similar academic characteristics, learning materials, and lecturers. There are 40 students in total, with 20 in the experimental group and 20 in the control group.

Research Instrument

The research instrument consisted of an academic essay writing test given during the pretest and posttest. The essay topics were adjusted according to the learning outcomes of the course and were designed to measure students' ability to develop ideas, construct arguments, and use academic Indonesian effectively.

Essay assessment was conducted using an analytic rubric adapted from (Jacobs, 1981). The rubric consisted of five assessment aspects, namely content, organization, vocabulary, language use, and writing mechanics. The use of this rubric was based on the consideration that the instrument has been widely used in writing skills research and has relevant indicators to assess the quality of students' academic writing.

Table 1. Essay Writing Skills Assessment Rubric

Assessment Aspects	Indicators	Maximum Score
Content	Topic relevance, completeness of ideas, depth of discussion, strength of arguments	30
Organization	Essay structure, coherence, cohesion, paragraph development	20
Vocabulary	Accuracy of word choice, vocabulary variety, use of terms	20
Language Use	Grammar, sentence structure, sentence effectiveness	25
Mechanics	Spelling, punctuation, capitalization, writing style	5
Total		100

Instrument Reliability

The reliability of the instrument is maintained through the use of a standardized analytic rubric that is applied consistently across all student written work. Assessments are conducted based on the same indicators for each aspect, resulting in scores that are objective and comparable between respondents. Using an analytic rubric allows the evaluation process to be systematic and minimizes evaluator subjectivity.

Research Procedure

The research was carried out over four meetings. The first meeting was used to conduct a pretest on the experimental group and the control group. The second and third meetings were used to give treatments in the form of formative assessments assisted by Artificial Intelligence for the experimental group and conventional formative assessments for the control group. The fourth meeting was used to conduct a posttest to find out the changes in students' essay writing skills after the treatment was given. With this procedure, the effect of AI-assisted formative assessment on students' essay writing skills can be observed by comparing the pretest and posttest results between the experimental group and the control group.

Data Collection Technique

Research data were collected through a test technique. The test was conducted twice, namely a pretest before the treatment and a posttest after the treatment. The test results are in the form of essay writing skill scores obtained based on assessment of five aspects, namely content, organization, vocabulary, language use, and writing mechanics.

Data Analysis Techniques

The research data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20. The analysis was carried out through the following steps:
1. Descriptive statistical analysis to determine the mean, maximum score, minimum score, and standard deviation.
2. Normality test using Shapiro-Wilk to find out whether the data is normally distributed.
3. Homogeneity test using Levene's Test to determine the equality of variance between the experimental group and the control group.
4. Paired Sample t-Test to find out the improvement in essay writing skills within each group.
5. Independent Sample t-Test to see the difference in essay writing skills between the experimental group and the control group after the treatment was given.
6. Effect size calculation using Cohen's d to know the magnitude of the impact of AI-assisted formative assessment on students' essay writing skills.

The decision-making criteria use a significance level of 0.05. The research hypotheses are formulated as follows.

H_0: There is no effect of AI-assisted formative assessment on students' essay writing skills.
H_1: There is an effect of AI-assisted formative assessment on students' essay writing skills.
H_0 is rejected and H_1 is accepted if the significance value (Sig.) is less than 0.05.

RESULTS

Descriptive Analysis Results

This study aims to analyze the effect of AI-assisted formative assessment on the essay writing skills of students in the Indonesian Language Education Study Program at Mahaputra

Muhammad Yamin University (UMMY) Solok. Before conducting hypothesis testing, a descriptive analysis was first carried out on the pretest and posttest scores of both groups.

Table 2. Descriptive Statistics of Pretest and Posttest Results

Group	N	Pretest (Mean)	SD	Posttest (Mean)	SD
Eksperimental	20	71,15	4,40	88,45	4,05
Control	20	68,30	5,55	85,40	3,91

Based on Table 2, the average pretest score of the experimental group was 71.15, while the control group was 68.30. After the treatment was given, the average posttest score of the experimental group increased to 88.45, while the control group reached 85.40. This data shows that both groups improved their essay writing skills. However, the improvement in the experimental group was higher compared to the control group.

Assumption Test for Analysis

Normality Test

The normality test is done using the Shapiro-Wilk test to find out whether the data is normally distributed.

Table 3. Normality Test Results

Variable	Sig.
Experimental Pretest	0,759
Experimental Posttest	0,657
Control Pretest	0,854
Control Posttest	0,763

The test results show that all significance values are above 0.05. Therefore, the research data is normally distributed, which means it meets the requirements for parametric statistical analysis.

Homogeneity Test

The homogeneity test was conducted to find out the similarity of variances between the experimental group and the control group.

Table 4. Homogeneity Test Results

Levene Statistic	Sig.
0,005	0,942

The significance value of 0.942 is greater than 0.05. Therefore, it can be concluded that the data from both groups have homogeneous variance.

Hypothesis Testing

Paired Sample t-Test

This test was conducted to find out the difference in students' essay writing skills before and after treatment in each group.

Table 5. Results of the Paired Sample t-Test

Group	t	Sig.
Eksperimental	-13,586	0,000
Control	-11,489	0,000

The analysis results showed that the significance value in both groups was less than 0.05. Thus, there was a significant improvement in essay writing skills in both the experimental group and the control group after the learning process took place.

Independent Sample t-Test

This test was conducted to find out the difference in students' essay writing skills between the experimental and control groups after the treatment was given.

Table 6. Independent Sample t-Test Results

t-hitung	Sig. (2-tailed)
2,424	0,020

The significance value of 0.020 is smaller than 0.05. Therefore, the research hypothesis is accepted. This means that there is a significant effect of using AI-assisted formative assessment on the essay writing skills of students in the Indonesian Language Education Study Program at UMMY Solok.

Effect Size Test (Cohen's d)

In addition to testing the significance of the difference using an independent sample t-test, this study also calculated the effect size to find out the magnitude of the effect of AI-assisted formative assessment on students' essay writing skills. The effect size calculation was carried out using (Cohen, 1988) formula.

$$d = \frac{M_1 - M_2}{SD_{pooled}}$$

Note:

d = Cohen's d

M_1 = mean of the experimental group

M_2 = mean of the control group

SD_{pooled} = pooled standard deviation

Based on the calculation, the Cohen's d value obtained is 0.77.

Table 7. Interpretation of Effect Size

Value Cohen's d	Category
0,20	Small
0,50	Medium
0,80	Large

Based on (Cohen, 1988) criteria, an effect size of 0.77 falls into the medium to high category. These results show that AI-assisted formative assessments not only have a statistically significant impact but also have a fairly strong practical effect on improving students' essay writing skills.

Analysis of Improvement in Each Aspect of Essay Writing Skills

Besides looking at the overall score improvement, this study also analyzed changes in each aspect of essay writing skills, including content, organization, vocabulary, language use, and writing mechanics. This analysis was carried out to identify which aspect saw the greatest improvement after implementing AI-assisted formative assessments.

Table 8. Improvement of Each Aspect of Essay Writing Skills in the Experimental Group

Assessment Aspects	Pretest	Posttest	Improvement
Content	18,00	26,80	8,80
Organization	16,15	19,15	3,00
Vocabulary	12,00	12,85	0,85
Language Use	16,30	20,40	4,10
Mechanics	8,70	9,25	0,55

Based on Table 8, all aspects of essay writing skills improved after students received formative assessments assisted by Artificial Intelligence. This shows that using Artificial Intelligence not only contributes to higher final scores but also impacts various components that shape the quality of students' academic writing.

The highest improvement occurred in the content aspect, with an average increase of 8.80 points. This finding indicates that the feedback provided by Artificial Intelligence helps students develop ideas more deeply, strengthen arguments, and expand the discussion according to the topics they write about. Students become better at organizing ideas logically and relevantly for the purpose of their essays.

The language usage aspect showed an increase of 4.10 points. This improvement indicates that Artificial Intelligence helps students improve sentence structure, grammar usage, and the effectiveness of conveying ideas in writing. The immediate feedback allows

students to identify language errors and make corrections on their own. In terms of organization, the average score increased by 3.00 points. These results show that students are becoming more capable of structuring essays systematically, paying attention to paragraph connections, coherence, and cohesion in writing. The revision process based on Artificial Intelligence feedback helps students refine the structure of their writing, making the flow of arguments clearer and more organized.

Meanwhile, the vocabulary aspect saw an increase of 0.85 points. Although the improvement wasn't as much as in content and language use, this result shows that students are starting to use more accurate and varied word choices in expressing their ideas. Artificial Intelligence helps students identify inappropriate diction and provides more academic vocabulary alternatives.

The lowest increase was found in the writing mechanics aspect, which was 0.55 points. This finding indicates that students' abilities in spelling, punctuation, and writing conventions were already relatively good since the pretest, so there was less room for improvement compared to the other aspects. To give a clearer picture of each aspect's contribution to improving essay writing skills, the percentage increase for each aspect can be presented in Table 9.

Table 9. Percentage Increase of Each Aspect

Assessment Aspects	Percentage Increase (%)
Content	48,89
Organization	18,58
Vocabulary	7,08
Language Use	25,15
Mechanics	6,32

Based on Table 9, the content aspect showed the highest percentage increase of 48.89%, followed by the language use aspect at 25.15% and organization at 18.58%. These results indicate that formative assessment aided by Artificial Intelligence is more effective in helping students develop ideas, improve writing structure, and enhance language use quality compared to the mechanical aspects of writing.

So, this finding shows that using Artificial Intelligence as a tool for formative assessment contributes positively to various aspects of students' essay writing skills. Quick, specific, and ongoing feedback allows students to reflect and revise more effectively, leading to better improvement in academic writing quality compared to learning with conventional formative assessment.

DISCUSSION

Research results show that formative assessments assisted by Artificial Intelligence significantly affect the essay writing skills of students in the Indonesian Language Education Study Program at Universitas Mahaputra Muhammad Yamin Solok. This finding is shown by the results of an independent sample t-test, which obtained a significance value of 0.020 (< 0.05). The results indicate that students who received AI-assisted formative assessments have better essay writing skills compared to students who received conventional formative assessments.

The findings of this study support the theory of formative assessment put forward by (Black & Wiliam, 2009), which states that feedback is a key component in improving the quality of learning. Formative assessment doesn't just measure learning outcomes, but also helps students understand their strengths and weaknesses so they can make continuous improvements. In this study, Artificial Intelligence serves as a means of providing feedback, allowing students to quickly get information about the quality of their writing.

The main advantage of using Artificial Intelligence in formative assessment lies in its ability to provide instant and repeated feedback throughout the writing process. In conventional learning, students often have to wait for the professor's correction to find out mistakes in their writing. On the other hand, with Artificial Intelligence, students can get feedback in a relatively short time, allowing them to revise immediately. This makes it possible for students to reflect on their work and fix errors before producing the final written product.

The research results also show that the effect size value of 0.77 falls into the moderate to high category. This finding suggests that using Artificial Intelligence not only produces a statistically significant difference but also has a fairly strong practical impact on improving students' essay writing skills. In other words, the improvements are not just due to data variations but are a real effect of the treatment given during the learning process.

Analysis of each aspect of essay writing skills shows that the biggest improvement happened in the content aspect. This finding indicates that Artificial Intelligence helps students more in developing ideas, expanding discussions, and strengthening the arguments presented in their writing. The feedback provided allows students to get input on the completeness of information, relevance of ideas, and logic of their arguments, making the essay content better. The ability to develop content is an important part of academic writing

because the quality of writing is determined not only by language accuracy but also by the depth of ideas presented.

A fairly significant improvement was also found in the use of language. The results show that Artificial Intelligence can help students improve sentence structure, grammar, and the effectiveness of academic language use. The feedback provided specifically allows students to identify language mistakes that they previously hadn't noticed. This finding aligns with Shreyasi Mahapatra's study, which shows that using Artificial Intelligence can boost the quality of students' academic writing through a more systematic and targeted revision process.

In terms of writing organization, students also showed quite a good improvement. Artificial Intelligence helps students understand the importance of paragraph coherence, the connection between ideas, and organizing essay structures systematically. Through the feedback provided, students can fix parts of their writing that are less coherent, making the flow of arguments easier to understand. These findings show that using Artificial Intelligence doesn't just focus on linguistic aspects, but also supports structured thinking skills in writing.

Meanwhile, improvements in vocabulary and writing mechanics were relatively lower compared to other aspects. This can be understood because students' basic skills in these areas were already in the fairly good category since the pretest. As a result, the room for improvement was more limited compared to content and language use. Even so, the improvements still show that Artificial Intelligence contributes to the accuracy of word choice, spelling, and punctuation in students' writing.

The findings of this study are also in line with (Zawacki-Richter, 2019) review, which states that the use of Artificial Intelligence in higher education has the potential to improve learning quality through personalized feedback and more adaptive learning support. In the context of writing education, continuous and personalized feedback allows students to learn more independently and develop the ability to revise their writing effectively.

Even so, the use of Artificial Intelligence in formative assessment isn't meant to replace the role of lecturers. AI should be seen as a tool that supports the learning process, while lecturers still play a role in giving guidance, clarification, and evaluations that take the broader academic context into account. The collaboration between technology and the lecturer's teaching skills is an important factor in creating effective writing learning in the digital age.

Implications of the Findings

The results of this study have theoretical and practical implications. Theoretically, the research findings reinforce the theory of formative assessment, which emphasizes the importance of feedback in improving learning outcomes. This study shows that technological advancements make it possible for feedback to be provided more quickly, specifically, and continuously through the use of Artificial Intelligence.

Practically, this research offers an alternative for lecturers in carrying out formative assessment in writing instruction. Artificial Intelligence can be used as a supportive tool to help students identify weaknesses in their writing independently and make revisions more effectively. In this way, lecturers can leverage this technology to enhance the quality of writing instruction without diminishing their pedagogical role.

In addition, the results of this study can serve as a consideration for universities in developing technology-based learning policies that support the improvement of students' academic literacy skills. Integrating Artificial Intelligence into formative assessments has the potential to enhance learning effectiveness while also preparing students to meet the demands of digital literacy in the era of artificial intelligence.

Research Limitations

This study has several limitations that need to be taken into account when interpreting the results. First, the sample size of the study is relatively small as it only involved 40 students from a single study program at one university, so the generalization of the results is still limited.

Second, the treatment duration was only carried out over four meetings, so it hasn't been able to show the long-term impact of using Artificial Intelligence on students' writing skill development. Research with a longer treatment period is needed to get a more comprehensive picture of the effectiveness of using Artificial Intelligence in writing learning.

Third, this study only measured learning outcomes in the form of essay writing skills and hasn't looked into other aspects like learning motivation, students' perceptions, technology acceptance, or user experience while using Artificial Intelligence during the learning process. Therefore, future research is recommended to use a mixed methods approach to gain a deeper understanding of the effectiveness and experience of using Artificial Intelligence in formative assessment.

CONCLUSION

This study aimed to analyze the effect of AI-assisted formative assessment on the essay writing skills of students in the Indonesian Language Education Study Program at Mahaputra Muhammad Yamin University Solok. Based on the research results and discussion, it can be concluded that AI-assisted formative assessment has a significant effect on students' essay writing skills.

Statistical analysis results show that the significance value of the independent sample t-test is 0.020, which is smaller than the significance level of 0.05. This finding indicates a significant difference in essay writing skills between students who received AI-assisted formative assessment and those who received conventional formative assessment. Therefore, the research hypothesis stating that AI-assisted formative assessment affects students' essay writing skills is accepted.

The impact of the treatment is shown by an effect size (Cohen's d) of 0.77, which falls into the moderate to high category. This result shows that using Artificial Intelligence not only has a statistically significant effect but also has a fairly strong practical impact on improving students' essay writing skills.

Analysis of each assessment aspect shows that all aspects of essay writing skills improved after the implementation of AI-assisted formative assessment. The highest improvement was in content, followed by language use and organization. These findings suggest that feedback provided through Artificial Intelligence helps students develop ideas, improve the structure of their writing, and enhance the quality of academic language use.

Based on the research results, AI-assisted formative assessment can be used as one of the alternative assessment strategies in writing courses at universities. Using AI allows students to get quick, specific, and continuous feedback, making the process of revising and improving their writing more effective. Therefore, integrating AI into writing instruction should be developed in a focused way while still considering the role of lecturers as facilitators and guides in the learning process.

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