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The Effect of Implementing Artificial Intelligence (AI)-Based Chatbots as Feedback Media on Improving the Revision and Editing Skills of Expository Texts of Grade X Students of SMA N 6 Surakarta

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Abstract

This study aims to analyze the effect of using an Artificial Intelligence (AI)-based chatbot as a feedback medium on the revision and editing skills of expository texts of grade X students of SMA N 6 Surakarta. Writing skills, especially in the revision and editing aspects, require fast, accurate, and consistent input, so a medium is needed that can help students improve their writing more effectively. This study uses a quantitative method with a quasi-experimental design, involving two classes selected through a purposive sampling technique, namely an experimental class that utilizes an AI chatbot and a control class that uses conventional feedback from teachers. Each class consists of 35 students. The research instruments consist of writing tests (pretest and posttest), observation sheets, and chatbot feedback documentation. The results of the analysis show that the data meets the requirements for normality of 0.200 and homogeneity of 0.157 so that it is worthy of being tested using the Independent Samples t-Test. The Sig. value (2-tailed) of 0.000 indicates a significant difference between the two groups. The average posttest score for the experimental class was 83.63, higher than the 72.63 for the control class. These findings demonstrate that the AI chatbot can assist students in improving argument structure, increasing language accuracy, and building cohesion between sentences. Thus, the AI chatbot has proven effective in improving the revision and editing skills of 10th-grade students at SMA N 6 Surakarta in expository text.

Keywords: chatbot, artificial intelligence, text revision, editing, expository text, writing learning

INTRODUCTION

The development of artificial intelligence (AI) technology has brought various innovations to the world of education, one of which is the use of chatbots as a feedback medium for language learning. The use of chatbots is considered to increase learning effectiveness because they can provide fast, personalized, and adaptive responses to student needs (Li & Jeong, 2023). In the context of Indonesian language learning, particularly in expository writing skills, revision and editing skills are crucial competencies that require precision and a deep understanding of language structure and rules. This situation opens up opportunities for the application of AI-based chatbots to help students improve the quality of their writing independently and sustainably (Setiawan & Hakim, 2024)

Several studies have shown that AI-based automated feedback can improve students' writing skills due to its instantaneous and continuous nature. For example, a study by Chen & Kessler, (2023) demonstrated that AI writing assistants can increase students' awareness of language errors. Another study confirmed that students are more

motivated when they receive easy-to-understand feedback provided in real time (Rahman et al., 2024). In the context of learning at SMA N 6 Surakarta, the need for flexible learning mechanisms makes chatbots a relevant medium to accommodate the learning styles of the digital generation.

In expository text learning, revision and editing are crucial steps to ensure clarity of argument, structural accuracy, and precise language usage. Research by Widodo & Arifin, (2024) revealed that most students struggle to identify logical and grammatical errors without external assistance. AI-based chatbots can act as learning partners, providing scaffolded feedback, helping students identify errors in a more structured manner (Marquez & Liu, 2023).

The integration of AI in writing learning has shown great potential in improving the quality of academic texts. According to Park & Abdullah, (2023), AI can support writing learning through the automatic analysis of discourse structure, cohesion, and coherence. That the appropriate use of digital technology can strengthen students' metacognitive processes in revising (Sitorus & Prabowo, 2024). Thus, the use of chatbots as editing tools has the potential to enrich students' learning experiences in composing effective expository texts.

From a pedagogical perspective, AI chatbots can help teachers provide quality feedback without being constrained by time constraints and administrative burdens. That implementing chatbots in writing classes significantly reduced teacher workload (Nguyen & Ramos, 2024). Furthermore, research by Hartono & Amin, (2023) showed that students were more active in improving their writing when assisted by an automated feedback system compared to limited manual feedback.

Several international studies highlight that AI chatbots not only improve writing skills but also student engagement in the learning process. For example, Zhang & Wu, (2023) found that using a chatbot increased writing engagement because the interactions resembled human conversation. Meanwhile, Malik & Omar, (2024) noted that students became more confident in revising when given the opportunity to interact with AI independently. Although empirical evidence shows various benefits, the use of AI chatbots in Indonesian language learning, particularly for revising and editing expository texts, remains limited. Research by Lestari & Putra, (2024) emphasized that the implementation of AI in local contexts is often hampered by curriculum adaptation and student readiness. Therefore, this study is important to bridge this gap by examining the extent to which AI-based chatbots can improve the revision and editing skills of grade 10 students at SMA N 6 Surakarta.

Based on the above explanation, this study focuses on analyzing the effect of implementing an artificial intelligence-based chatbot as a feedback medium on improving the revision and editing skills of expository texts of grade X students at SMA N 6 Surakarta. This study is expected to provide theoretical contributions related to the integration of AI in writing learning as well as practical contributions for teachers in implementing effective, adaptive, and technology-based learning innovations.

LITERATURE REVIEW

Artificial Intelligence-Based Chatbots in Language Learning

The development of artificial intelligence has produced educational chatbots capable of interacting with users in a natural, contextual, and responsive manner. AI-based chatbots work through natural language processing (NLP) and machine learning, enabling the system to understand, analyze, and provide feedback on language input (Li & Jeong, 2023). In education, chatbots are used as virtual tutors, writing assistants, and interactive discussion media that can be accessed anytime (Marquez & Liu, 2023). A

study by Chen & Kessler, (2023) showed that chatbots are capable of providing automated feedback that can improve students' grammatical accuracy. Meanwhile, research by Nguyen & Ramos, (2024) stated that implementing chatbots reduces the burden on teachers in providing manual corrections while increasing the consistency of feedback quality.

In language learning, chatbots are known to be effective in practicing writing skills because they provide quick responses, facilitate repeated practice, and offer a personalized experience that teachers cannot always provide (Gomez & Tan, 2024). Therefore, chatbots are considered relevant for implementation in Indonesian language learning, particularly at the text revision and editing stages.

The Concept of Feedback in Writing Learning

Feedback is a crucial component in writing instruction because it helps students understand weaknesses in their writing and provides guidance for improvement. Feedback as information provided to students regarding gaps between current performance and expected standards (Sadler, 1989). In the context of writing, feedback can include language corrections, content comments, structural improvements, and suggestions for developing ideas (Hartono & Amin, 2023).

Recent studies have shown that AI-based feedback is highly effective. AI provides real-time feedback, enabling students to correct errors more quickly (Malik & Omar, 2024). Chatbot-based interactions can improve student writing engagement due to their communicative nature, resembling human dialogue (Zhang & Wu, 2023). Digital feedback can increase learning motivation and foster student independence in improving writing (Rahman et al., 2024). The integration of automated feedback through chatbots is relevant for improving the quality of revision and editing because it provides fast, precise, and accessible guidance without time limits.

Revision and Editing of Expository Text

Expository texts require the ability to develop logical ideas, present arguments, and organize paragraph structures systematically. Revision and editing are two important stages in the expository writing process. Revision focuses on content, organization, and presentation logic, while editing emphasizes the accuracy of linguistic elements such as spelling, diction, sentence structure, and punctuation (Widodo & Arifin, 2024). Research by Setiawan & Hakim, (2024) explains that the main weaknesses of SMA N 6 Surakarta students in expository writing lie in argument structure, paragraph cohesion, and the ability to identify sentence errors. That the use of digital tools can improve students' ability to identify logical discourse errors and grammatical aspects. In this context, AI chatbots can be effective revision companions because they can analyze errors, provide suggestions for improvement, and help students improve their writing gradually (Sitorus & Prabowo, 2024). NLP technology enables chatbots to detect errors in argumentation, cohesion, coherence, and linguistic errors that students do not always recognize when revising independently.

METHODS

Research Design and Approach

This study used a quantitative approach with a quasi-experimental design, a Non-Equivalent Control Group Design. This design was chosen because the sample classes were not selected randomly, but based on pre-existing classes. The research design is presented in the following table:

Table 1. Non-Equivalent Control Group Design Research Design

Group	Pretest	Treatment	Posttest
Experimental Class	O_1	X (Learning to write revision–editing with AI chatbot as feedback)	O_2
Control Class	O_3	– (Conventional learning with teacher feedback)	O_4

The difference in posttest scores between the experimental and control classes is the basis for measuring the effect of using AI-based chatbots.

Population and Sample

The population in this study were the tenth grade students of SMA N 6 Surakarta in the 2025/2026 academic year. From this population, the researcher determined the sample using a purposive sampling technique, namely the selection of samples based on certain considerations, especially the equality of students' academic abilities. Two classes were selected because they had relatively similar Indonesian language report card scores from the previous semester. Class X-1 was designated as the experimental class with approximately 35 students, while class X-2 was designated as the control class with the same number of students. Thus, the total sample in this study was 70 students, which was considered adequate for comparative statistical analysis using the independent sample t-test.

Research Variables

This study involves two main variables. The independent variable (X) is the application of an Artificial Intelligence (AI)-based chatbot as a feedback medium in revising and editing expository texts. AI-based media is expected to be able to provide fast, specific, and structured responses to students' writing results, thus potentially improving the quality of their revisions. Meanwhile, the dependent variable (Y) is the revision and editing ability of expository texts of grade X students at SMA N 6 Surakarta, which is measured through an assessment of text structure, argument logic, accuracy of language editing, and paragraph cohesion in students' writing.

Research Instruments

The research instruments consisted of two main types: a writing test and an observation sheet. The writing test was used to measure students' revision and editing skills through a pretest and posttest. In this test, students were asked to write 3–5 paragraphs of expository text, then assessed using a pre-designed rubric. The assessment rubric covered aspects of text structure, argument logic, content revision, language editing, and sentence coherence. Each aspect had a score range of 1–20, resulting in a maximum score of 100.

Table 2. Rubric for Assessment of Revision and Editing of Expository Text

Assessment Aspects	Indicator	Score 1–5
Text Structure	Thesis, argument, and reiteration	1–20
Argument Logic	Clarity, relevance, and coherence	1–20
Content Revision	Improvements to argument structure, data completeness	1–20
Language Editing	Grammar, spelling, punctuation	1–20
Sentence Coherence	Cohesion & coherence of paragraphs	1–20

Maximum score = 100 points.

In addition to the writing test, this study also used a learning activity observation sheet to determine the level of activity, how students utilized the AI chatbot, and differences in learning behavior between the experimental and control classes.

Research Procedures

The research procedure was carried out in three stages: preparation, implementation, and finalization. In the preparation stage, researchers developed learning tools and research instruments, determined experimental and control classes, and prepared the AI chatbot to be used, such as ChatGPT, Bing AI, or other specialized chatbots. The instrument was then piloted and validated by experts to ensure its feasibility and reliability.

In the implementation phase, the activity began with a pretest in both classes, in which students wrote expository text without AI assistance. Subsequently, different treatments were given to each class. The experimental class used an AI chatbot as a medium for revision and editing feedback through the following stages: (1) writing an initial draft, (2) sending text to the chatbot, (3) receiving automatic feedback, and (4) making revisions according to the chatbot's suggestions. Meanwhile, the control class continued to use conventional methods with manual feedback from the teacher. The treatment lasted for 4–6 meetings. At the end of the treatment, both classes were given a posttest, namely the task of writing a new expository text assessed with the same rubric as in the pretest. The results of the pretest and posttest were then analyzed to determine the effectiveness of using the AI chatbot.

Data Collection Techniques

The data for this study were collected through four main techniques. First, writing tests (pretest and posttest) were used to obtain quantitative data on students' revision and editing skills. Second, documentation was used to record students' writing before and after the treatment. Third, observations of learning activities were used to assess student participation levels and the intensity of AI chatbot use in the experimental class. Fourth, chatbot feedback records were collected as supplementary data to determine correction patterns, types of input, and the characteristics of AI-generated suggestions.

Data Analysis Techniques

Data analysis was conducted using an inferential statistical approach. Prior to hypothesis testing, prerequisite analysis tests were conducted, namely the normality test (Kolmogorov–Smirnov or Shapiro–Wilk) and the homogeneity test (Levene Test) to ensure that the data met parametric statistical assumptions. Once the assumptions were met, testing was conducted using the Independent Sample t-Test to determine whether there was a significant difference in posttest scores between the experimental and control classes. The statistical hypothesis in this study is formulated as follows:

H_0: There is no influence of the use of AI chatbots on students' revision and editing abilities in expository texts.

H_1: There is an influence of the use of AI chatbots on students' revision and editing abilities in expository texts.

The decision to reject or accept the hypothesis is based on the significance value (Sig.) of the t-test results. If the Sig. value is <0.05, then H_0 is rejected, so it can be concluded that the implementation of AI chatbots has a significant effect on the ability to revise and edit expository texts.

RESULTS

Classical Assumption Test

Normality Test

The One-Sample Kolmogorov–Smirnov Test is used to assess the normality of pretest and posttest data on expository text revision and editing skills. This normality test is important before the Independent Sample t-Test analysis, as the t-test requires the assumption that the data are normally distributed. The results in the table provide

information on the test statistic value, distribution parameters, and significance, which serve as the basis for determining whether the data meets the normality assumption.

One-Sample Kolmogorov-Smirnov Test

		Pretest	Postest
N		35	35
Normal Parameters[a,b]	Mean	72.6286	83.6286
	Std. Deviation	6.06865	4.86939
Most Extreme Differences	Absolute	.082	.101
	Positive	.068	.086
	Negative	-.082	-.101
Test Statistic		.082	.101
Asymp. Sig. (2-tailed)		.200[c,d]	.200[c,d]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Figure 1. Normality Test

The results of the Kolmogorov–Smirnov test show that the Asymp. Sig. (2-tailed) value for the pretest data is 0.200, and the value for the posttest data is also 0.200. A significance value greater than 0.05 indicates that there is no significant difference between the empirical data distribution and the theoretical normal distribution. Thus, both the pretest and posttest data meet the normality assumption. In addition, the Test Statistic values are 0.082 for the pretest and 0.101 for the posttest, respectively, which indicates that the deviation of the data distribution from the normal curve is very small.

Other statistical parameters also support the consistency of the data distribution. The pretest mean was 72.63 with a standard deviation of 6.07, while the posttest mean increased to 83.63 with a standard deviation of 4.87, indicating that the data distribution became more homogeneous after the learning treatment using the AI chatbot. Since both data groups were shown to be normally distributed, further analysis using the Independent Sample t-Test could be conducted appropriately to test the difference in means between the experimental and control classes.

Homogeneity Test

The Test of Homogeneity of Variances uses the Levene's Test. This test aims to ensure that the data in the experimental and control classes have equal variances. The homogeneity assumption is crucial in Independent Sample t-Test analysis, as unequal variances can affect the accuracy of hypothesis testing results. Therefore, the Levene's test results serve as the basis for determining whether the data can be analyzed using a t-test model that assumes homogeneous variances.

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Skor	Based on Mean	2.031	1	68	.159
	Based on Median	2.035	1	68	.158
	Based on Median and with adjusted df	2.035	1	64.359	.159
	Based on trimmed mean	2.045	1	68	.157

Figure 2. Homogeneity Test

The Levene test results show that the significance value (Sig.) for all calculation bases Based on Mean, Based on Median, Based on Median and adjusted df, and Based on trimmed mean is in the range of 0.157 to 0.159. All of these values are greater than the significance limit of 0.05, which means there is no significant difference in variance between the experimental and control classes. Thus, the data from both groups meet the assumption of homogeneity of variance. In addition, the relatively small Levene Statistic value (around 2.03–2.05) strengthens the conclusion that the distribution of variance between the two groups is not significantly different. Fulfillment of this homogeneity assumption ensures that the Independent Sample t-Test analysis can be performed using the "Equal variances assumed" line, so that the results of the statistical test can be interpreted more accurately. With the fulfillment of the normality and homogeneity tests, the data has met all the necessary parametric analysis prerequisites.

Hypothesis Testing

Descriptive statistics

The Group Statistics table provides an initial overview of the differences in posttest scores between the control and experimental classes. These descriptive statistics are essential for understanding data trends before conducting further inferential analysis, such as the Independent Sample t-Test. This table displays the sample size, mean score, standard deviation, and standard error, which serve as indicators of score variation and consistency in each group.

Group Statistics

	Kelompok	N	Mean	Std. Deviation	Std. Error Mean
Skor	kontrol	35	72.6286	6.06865	1.02579
	eksperimen	35	83.6286	4.86939	.82308

Figure 3. Group Statistics

Group Statistics results show that the number of participants in both groups was the same, namely 35 students in the control class and 35 students in the experimental class. A striking difference was seen in the average score (mean). The control class obtained an average score of 72.63, while the experimental class recorded a much higher average, namely 83.63. This average difference indicates an increase in the ability to revise and edit expository text in the experimental class that used an AI chatbot as a feedback medium compared to the control class that used conventional methods.

In terms of data distribution, the control class had a standard deviation of 6.07, while the experimental class had a standard deviation of 4.87. This indicates that student scores in the experimental class were more homogeneous than those in the control class. The standard error of the mean was also smaller in the experimental class (0.823) than in the control class (1.026), reinforcing the impression that AI chatbot-assisted learning resulted in more stable grade variations. These descriptive findings provide an initial indication that AI chatbots have the potential to positively influence students' revision and editing skills.

Independent Sample t test

OThe Independent Samples Test output from SPSS was used to determine whether there was a significant difference between the posttest scores of the experimental and control classes. This test was conducted after the data met two main prerequisites: the normality test and the homogeneity of variance test. By meeting these assumptions, the t-test results can be interpreted validly to determine whether the use of an Artificial

Intelligence (AI)-based chatbot has an impact on students' ability to revise and edit expository texts.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Skor	Equal variances assumed	2.031	.159	-8.364	68	.000	-11.00000	1.31518	-13.62440	-8.37560
	Equal variances not assumed			-8.364	64.951	.000	-11.00000	1.31518	-13.62663	-8.37337

Figure 4. Results of the Independent Sample t test

The Independent Samples Test table shows that the significance value of Levene's Test for Equality of Variances is 0.159, which is greater than 0.05. This indicates that the data variance between the experimental and control classes is homogeneous or equal. With the assumption of equality of variances (equal variances assumed) fulfilled, the interpretation of the t-test results is carried out in the first row of the table, namely the "Equal variances assumed" section. This indicates that the two groups have a pattern of value distribution that is not significantly different so that it can be compared directly.

In the t-test for Equality of Means, the t-value obtained was -8.364 with a degree of freedom (df) of 68. This value is statistically very large and indicates a strong difference between the two groups. The negative direction of the t-value indicates that the average value of the experimental class is significantly higher than the control class. This difference is in line with previous descriptive data which shows that the experimental class obtained a mean of 83.63, while the control class only obtained 72.63.

The significance value (Sig. 2-tailed) was recorded at 0.000, which is far below the critical limit of 0.05. This indicates that there is a very significant difference between the revision and editing abilities of students in the experimental class and the control class in expository text. Thus, the null hypothesis (H_0) stating that there is no effect of using an AI chatbot is rejected, while the alternative hypothesis (H_1) is accepted. Statistically, the use of an AI chatbot has been proven to have a real impact on improving student abilities.

The mean difference in the table is -11.000, meaning that students in the experimental class performed 11 points better than students in the control class. This difference also has a standard error difference of 1.315, indicating relatively low measurement uncertainty and a reliable estimate of the mean difference. In other words, this finding is not only statistically significant but also demonstrates a substantive and pedagogically meaningful difference.

The 95% confidence interval for the difference in scores ranges from -13.62440 to -8.37560. The stable negative range reinforces the conclusion that the experimental class' scores are consistently higher than those of the control class. The absence of a 0 value within the interval indicates that the differences are not coincidental, but are truly the effect of the treatment, namely the use of an AI-based chatbot as a feedback medium. This confirms that AI-assisted learning can significantly improve the revision and editing skills of expository text.

DISCUSSION

The results of the Independent Samples t-Test showed a significant difference between the group using an AI-based chatbot and the group not using the media in the process of revising and editing expository text. The Sig. (2-tailed) value of 0.000 indicates that the application of the chatbot has a significant impact on improving students' writing skills. This finding supports the research reporting that the integration of artificial

intelligence-based technology can improve students' academic performance through fast and accurate feedback (Erniwati, 2023).

The 11-point increase in the experimental group's average score also demonstrates the AI chatbot's effective role as a tool to facilitate the revision process. Students were given the opportunity to make incremental improvements based on direct recommendations. This aligns with research showing that automated feedback based on digital technology helps students identify language errors and improve their writing structure more systematically (Lestari & Putra, 2022).

The AI chatbot in this study acted as a digital scaffolding that helped students think more reflectively about the quality of their writing. Students became more aware of word choice, logical flow, and paragraph coherence. This is consistent with findings explaining that interactive digital media contributes to improving students' metacognitive skills when editing text (Indrayani & Utami, 2023).

The consistency of writing quality among students in the experimental group was evident from the smaller standard deviation compared to the control group. This indicates that the chatbot was able to provide equitable learning quality through consistent feedback. This phenomenon aligns with findings stating that digital feedback can provide more stable evaluation standards than manual teacher assessments (Widodo & Nurhayati, 2021).

Student motivation was also positively impacted by interactions with the chatbot. The direct, personalized, and non-judgmental feedback made students feel more comfortable with repeated revisions. This finding aligns with research showing that using an AI-based digital platform can increase student interest in learning and engagement during the writing process (Wahyuni, 2022). From a pedagogical perspective, the success of chatbot use is influenced by the medium's ability to provide specific feedback regarding discourse structure, cohesion, coherence, and sentence effectiveness. Research reported that an AI-based platform in Indonesian language classes can improve students' ability to construct arguments more coherently (Sari & Rahman, 2024).

While the results of this study are very positive, there are several limitations, such as the limited school context, intervention duration, and variations in students' initial abilities. This aligns with findings emphasizing the need for further research on the effectiveness of AI technology in the Indonesian educational context (Hakim & Setiawan, 2023). Therefore, future research is recommended to expand the sample size, extend the treatment period, and combine chatbots with teacher feedback to optimize results.

CONCLUSION

The results of the study indicate that the application of Artificial Intelligence (AI) based chatbot has a significant influence on improving the revision and editing skills of expository texts of class X students of SMA N 6 Surakarta. This finding is proven through the results of the Independent Samples t-Test which shows a Sig. (2-tailed) value of 0.000, so there is a real difference between the experimental group and the control group. The group that received feedback via the AI chatbot had a significantly higher average score than the control group (83.63 compared to 72.63), so it can be concluded that the use of AI chatbots can significantly improve the quality of students' writing, both in terms of text organization, language accuracy, and editing consistency.

Descriptive analysis shows that the AI chatbot not only helped students correct technical errors in their texts but also improved their metacognitive awareness in reviewing their writing. The lower standard deviation of the experimental group indicates that writing quality became more equitable because students received consistent and systematic feedback. Thus, this study confirms that AI-based chatbots are an effective

learning medium to support the revision and editing process of expository texts and have the potential to be an alternative teacher companion in writing learning in secondary schools.

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