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Article

# The Effect of AI-Assisted Feedback Using Ginger Software on Students' Writing Fluency and Writing Motivation

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**A B S T R A C T**

The integration of artificial intelligence (AI) in writing instruction is expanding, yet prior research has largely focused on linguistic accuracy rather than writing fluency and motivation. Furthermore, empirical evidence regarding the effectiveness of Ginger Software among university students in Indonesia remains limited. This study aimed to analyze differences in writing fluency and motivation between students receiving feedback via Ginger Software and those receiving feedback from lecturers. A quantitative approach with a quasi-experimental post-test-only design was employed. The sample consisted of 46 English Education students divided into an experimental group (22 students) and a control group (24 students). Data were collected through writing tests and the Academic Writing Motivation Questionnaire, then analyzed using an independent-samples t-test. The results of an independent-samples t-test revealed a significant difference in writing fluency (sig. value =.001) in which the experimental class performed better, but not in writing motivation (sig. value = 0.467). Thus, Ginger Software is more effective at supporting writing fluency than at enhancing student motivation.

**Keywords**: *Feedback, Ginger Software, Writing Fluency, Writing Motivation*

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## INTRODUCTION

The integration of artificial intelligence (AI) in English language teaching has transformed the teaching and learning of writing, particularly in the context of English as a Foreign Language (EFL). Writing is generally recognized as one of the most complex language skills, requiring not only linguistic competence but also ongoing motivation to revise and improve (Hyland et al., 2022). Many students experience low motivation due to difficulties generating ideas, organizing text, and avoiding linguistic errors. Furthermore, writing fluency, defined as the ability to produce text easily and efficiently, is often hampered by students' fear of making mistakes or constant self-correction.

Writing fluency is an essential component of effective written communication and an important dimension of second and foreign language (L2) writing development. In L2 writing research, fluency is commonly examined alongside complexity and accuracy as one of the core dimensions of writing performance and language proficiency (Barrot & Agdeppa, 2021; Phuoc & Barrot, 2022). Writing fluency generally refers to learners' ability to produce written language efficiently and continuously, often measured by the amount of language produced within a specified period of time (Sasayama et al., 2021). Developing fluency is important because it enables learners to generate and express ideas with greater ease while reducing excessive hesitation and the cognitive burden associated with language production. Moreover, writing fluency has pedagogical and assessment implications because learners are frequently required to produce meaningful texts within limited periods of time, particularly in academic and examination contexts (Pusey & Butler, 2024).

Recent studies have shown that learners often lack independent learning skills and self-confidence, which further reduces their engagement in writing activities (Hongxia & Razali, 2026). In response, AI-based tools are increasingly being adopted to support writing

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instruction. Anjarwati & Hentasmaka (2025) specifically found that the AI-based Grammarly and ProWritingAid can improve students' writing skills. Furthermore, a systematic review by Lim et al. (2026) highlighted that AI can significantly enhance learner motivation by increasing engagement, improving writing fluency, autonomy, and reducing writing anxiety, making it a promising solution in modern writing pedagogy.

Among various AI-based tools, automated feedback systems like Ginger Software play a crucial role in assisting learners during the writing process. These tools provide real-time, immediate, and individualized feedback, enabling students to efficiently identify and correct their errors. Research shows that AI-based feedback helps improve grammatical accuracy, sentence structure, and vocabulary usage, while also encouraging self-directed learning (Setiawan & Alkhowarizmi, 2025). Furthermore, AI-generated feedback creates a supportive learning environment, encouraging students to continually revise their work. Studies on AI-mediated writing also show that such feedback improves key motivational constructs such as autonomy, competence, and engagement over time (Mohammed & Khalid, 2025; Zhou, 2026). These findings suggest that AI tools not only improve writing performance but also positively influence students' psychological readiness and motivation to write.

For a writing course, Ginger Software can be positioned as a particularly useful AI-assisted writing tool because it combines grammar correction, contextual error detection, sentence rephrasing, vocabulary support, and text-to-speech/reading functions in one platform. Unlike QuillBot, which is particularly strong in paraphrasing, and Grammarly and ProWritingAid, which are primarily oriented toward proofreading, grammar, style, and detailed writing analysis, Ginger analyzes the full sentence context when generating corrections and allows students to revise their sentences through alternative formulations. This makes Ginger potentially more suitable for a process-oriented writing course in which students are expected not merely to correct errors but also to notice problems, revise their sentences, experiment with alternative expressions, and develop independent writing skills. Recent EFL research provides direct support for this pedagogical potential: Setiawan & Alkhowarizmi (2025) compared Grammarly, QuillBot, and Ginger Software in Indonesian undergraduate EFL writing and found differences in their error detection, correction suggestions, and efficiency while Chusnul Chotimah et al. (2026) reported that combining pre-task planning with Ginger Writer significantly improved tertiary EFL students' overall writing performance. Therefore, Ginger's main strength for a writing course is not that it is universally "better" than Grammarly, QuillBot, or ProWritingAid, but that its integrated contextual correction and sentence-revision functions can support an iterative writing-and-revision process, particularly when the tool is used as a scaffold alongside teacher and peer feedback. A meta-analysis by Cen & Zheng (2024), for example, found that feedback practices can have a significant positive effect on L2 learners' writing motivation, with commentary feedback playing an important role. More specifically, Yuan et al. (2021) found that integrating automated writing evaluation into peer assessment was associated with stronger growth mindsets and sustained motivation among EFL learners.

By automating the mechanical aspects of writing, such as spelling and basic grammatical structures, these AI-based tools allow learners to focus more on content creation and the flow of ideas. This shift is predicted to improve writing fluency—the ability to produce a certain number of words in a given time and the ease of transitioning between ideas—by minimizing the "writer's block" often caused by linguistic anxiety and a lack of immediate resource support (Junaid et al., 2024). Despite the growing popularity of these tools, research specifically addressing the long-term effects of Ginger Software on writing fluency and writing motivation remains an important area of investigation.

Research on the integration of Artificial Intelligence (AI) in writing learning has grown rapidly, particularly with a focus on the use of Automated Writing Evaluation (AWE). Previous studies have consistently shown that tools such as Grammarly and ChatGPT can help students identify grammatical errors in real time (Mekheimer, 2025; Wang et al., 2025).

However, most current literature still focuses on linguistic accuracy (grammatical correctness) rather than writing fluency, which encompasses the speed of idea production and

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logical flow of thought. Furthermore, the debate regarding the impact of AI on learning motivation remains divided; some experts argue that AI increases self-confidence through instant assistance, while others worry about digital dependency, which can actually decrease students' intrinsic motivation in the long run (Lee & Chen, 2025). Although Ginger Software is known for its unique contextual correction feature (Fitria, 2023; Widiawati et al., 2023) its specific effectiveness in influencing psychological aspects (motivation) and performance aspects (fluency) in Indonesian students remains rarely explored empirically. The novelty of this research lies in its interdisciplinary focus, measuring not only text output but also students' cognitive and affective processes through the use of Ginger Software. Unlike previous research, which generally uses generative AI (such as ChatGPT) that tends to "write" text for users, this study specifically examines Ginger Software as a support tool that provides corrective feedback without eliminating the writer's agency.

AI-generated feedback may be expected to influence students' writing motivation because it can make the writing process more immediate, interactive, supportive, and manageable. Unlike conventional teacher feedback, which may be delayed because of teachers' workload, AI tools can provide immediate responses to students' drafts, allowing learners to identify problems and revise their writing while their ideas are still active. This immediacy can give students a stronger sense of progress and control over their learning, which may increase their willingness to continue writing.

Although many studies have focused on the effect of AI on writing accuracy (Banihashem et al., 2024; Fitria, 2023; Widiawati et al., 2023), research on the use of Ginger Software on writing fluency is still rare. The use of Ginger Software's rephrasing and editing features can act as a support mechanism that builds students' confidence, encouraging them to produce higher-quality text. Therefore, this study aims to explore whether the use of Ginger Software consistently results in measurable improvements in students' writing fluency and writing motivation. Specifically, the research questions are: (1) Is there a difference in the writing fluency of students who receive AI feedback from Ginger Software and lecturer feedback? and (2) Is there a difference in the writing motivation of students who receive AI feedback from Ginger Software and lecturer feedback?

## METHOD

This study used a quantitative approach with a quasi-experimental design, specifically a post-test only design. A posttest-only quasi-experimental design was employed because the study aimed to compare students' writing fluency and motivation after the implementation of the treatment while minimizing potential testing effects associated with administering a pretest. A pretest may influence participants' subsequent responses by familiarizing them with the assessment and sensitizing them to the construct being measured. Therefore, omitting the pretest helps reduce the possibility that changes in students' post-intervention responses are attributable to prior exposure to the measurement instrument rather than to the treatment. In this design, the researcher could not perform random assignment as in the True experimental design (Ary et al., 2010). There were two research groups, namely the experimental group that received feedback using Ginger Software and the control group that received writing learning without using Ginger Software, namely receiving feedback from the lecturer. After the treatment was given in several meetings, both groups were given a post-test to measure students' writing fluency and writing motivation

### Population and Sample

The population in this study were English Language Education students taking writing courses at two private universities in Jombang Regency. The research sample was selected using a purposive sampling technique, taking into account the students' writing ability levels. The sample was then divided into two groups: an experimental group and a control group.

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The experimental group was given treatment in the form of using Ginger Software as a medium for providing feedback on student writing, while the control group was given conventional feedback by the lecturer without the assistance of an AI application. There were 22 students in the experimental group and 24 students in the control group. The participants of the study were 4th-semester students with ages ranging from 19 to 21 years old. Since the sample size is relatively small, the results should not automatically be generalized to all university students learning English, particularly those studying in different institutions or educational contexts.

**Instruments**

The research instruments used consisted of a writing test and a writing motivation questionnaire. The writing test was used to measure students' writing fluency, including aspects of idea development, writing coherence, and the number of words produced within a certain time. The writing test, in the form of a recount text, was divided into two stages. The first stage was planned to last for 30 minutes, which included the pre-writing and drafting stages. The second stage was designed to last for 60 minutes, where students carried out the revising and editing stages; the experimental group received feedback from the AI Ginger software, while the control group received feedback from the lecturer. Meanwhile, the writing motivation questionnaire was used to determine the level of student motivation after participating in learning with or without the assistance of Ginger Software. The questionnaire on academic writing motivation/Academic Writing Motivation Questionnaire (AWMQ) was compiled using a Likert scale with 5 scales, namely: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree, adapted from Payne (2012). Both research instruments were validated by experts in the form of expert judgment before being used to collect research data.

**Procedures**

The data collection technique in this study was carried out through three main stages: treatment administration, post-test administration, and distribution of writing motivation questionnaires. The study involved two groups: an experimental group that received writing instruction utilizing feedback from Ginger Software and a control group that underwent writing instruction using the same learning procedures without the use of AI-based feedback.

In the first phase, the experimental group was given treatment over three sessions. In the first session, students were given a writing assignment based on the predetermined material and learning objectives. Students first developed ideas, developed an outline, and produced a draft. Next, students were introduced to Ginger Software and its features to obtain AI-based feedback on the writing they had produced in the second and third sessions. The feedback provided by Ginger Software was used to identify and correct errors or weaknesses in the writing, particularly those related to grammar, word choice, sentence structure, spelling, and other linguistic aspects. Students were given the opportunity to examine each suggestion provided by Ginger Software and determine whether it was relevant to the context of the writing before making revisions. Thus, the use of AI was not only directed at automatically accepting each suggestion, but also at students' ability to critically evaluate and utilize the feedback.

Meanwhile, the control group participated in writing lessons for the same period without using Ginger Software. Students in the control group received the same materials, writing assignments, timeframe, and learning stages as the experimental group. The writing revision process was carried out using conventional writing learning strategies, such as rereading the text, utilizing previously learned language knowledge, and receiving guidance or corrections from the lecturer. Equal arrangements between the two groups were implemented to minimize the influence of factors other than the treatment.

After the entire treatment series is completed, both groups took the post-test to measure students' writing skills after the lesson. The post-test was given to both groups within the same 90-minute timeframe to produce a recount text. The experimental group used Ginger software for the revision and editing process, while the non-experimental group received feedback from

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the lecturer during the revision process. The last stage is the distribution of writing motivation questionnaires to students in both groups. After the post-test, a questionnaire was administered to obtain data on students' level of motivation in writing activities after participating in the learning process.

**Data Analysis**

The data that have been collected is analysed by using inferential statistic independent sample t-test with the help of SPSS verse 25 to know the difference between the experimental group and control groups. Before conducting the inferential analysis, the assumptions of normality and homogeneity of variance were examined. The Shapiro-Wilk test was used to determine whether the scores in each group were normally distributed, while Levene's test was employed to examine the homogeneity of variance between the experimental and control groups. The data were considered to meet the assumptions when the significance value was greater than 0.05. An independent-samples t-test was then conducted to determine whether there were statistically significant differences in writing fluency between the students who received AI-based feedback through Ginger Software and those who did not. The same statistical procedure was applied to the students' writing motivation scores to determine whether the use of Ginger Software resulted in a significant difference in motivation between the two groups.

## FINDINGS AND DISCUSSION

**Findings of Writing Fluency Analysis Between Students Who Use Ginger Software and Those Who Do Not**

Table 1. Descriptive Statistics

| | Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Writing_Fluency | GingerWriter | 22 | 5.4568 | 1.42894 | .30465 |
| | TeacherFeedback | 24 | 4.2354 | .38189 | .07795 |

Based on Table 1, the descriptive statistics indicate differences in students' writing fluency between the GingerWriter group and the Teacher Feedback group.

The GingerWriter group consisted of 22 students, with a mean score of 5.4568 and a standard deviation of 1.42894. Meanwhile, the Teacher Feedback group consisted of 24 students, with a mean score of 4.2354 and a standard deviation of 0.38189. These results indicate that the GingerWriter group obtained a higher mean score than the Teacher Feedback group. The mean difference between the two groups was approximately 1.22 points, suggesting that students who received feedback through GingerWriter demonstrated higher writing fluency scores than those who received teacher feedback.

In terms of standard deviation, the GingerWriter group (SD = 1.42894) demonstrated greater variability in writing fluency scores than the Teacher Feedback group (SD = 0.38189). This suggests that students' writing fluency performance in the GingerWriter group was more diverse, whereas the scores in the Teacher Feedback group were relatively concentrated around the group mean. Furthermore, the standard error mean values were 0.30465 for the GingerWriter group and 0.07795 for the Teacher Feedback group, indicating that the estimated group mean for the Teacher Feedback group had less sampling variability.

Before the data is tested using the independent sample t-test, it is necessary to first carry out an assumption test in the form of a normality test and a homogeneity test.

Table 2. Tests of Normality

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Group | Statistic | df | Sig. | Statistic | df | Sig. |
| Writing_Fluency | GingerSoftware | .110 | 22 | .200* | .956 | 22 | .408 |
| | LecturerFeedback | .171 | 24 | .066 | .936 | 24 | .132 |

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

a. Lilliefors Significance Correction

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The results of the normality test show that the writing fluency data in the Ginger software group are normally distributed, based on the Shapiro-Wilk test ($p$= .408). In the Lecturer Feedback group, the Shapiro-Wilk significance value was .132, so the data in both groups met the normality assumption.

Table 3. Test of Homogeneity of Variances

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Writing_Fluency | Based on Mean | 29.029 | 1 | 44 | .000 |
| | Based on Median | 26.218 | 1 | 44 | .000 |
| | Based on Median and with adjusted df | 26.218 | 1 | 25.754 | .000 |
| | Based on trimmed mean | 28.820 | 1 | 44 | .000 |

However, the results of Levene's Test show that the variance of the two groups is not homogeneous ($F$ = 29.029, $p$< .005). Therefore, the independent-samples $t$-test using the Equal variances not assumed option.

Table 4. 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 |
| Writing_Fluency | Equal variances assumed | 29.029 | .000 | 4.037 | 44 | .000 | 1.22140 | .30256 | .61163 | 1.83118 |
| | Equal variances not assumed | | | 3.884 | 23.747 | .001 | 1.22140 | .31447 | .57201 | 1.87080 |

The test results show the $t$ value= 3.884 with $df$= 23.747 and two-way significance value (*Sig. 2-tailed*) = .001. Thus, $H_0$ is rejected, and Ha is accepted, which means that there is a statistically significant difference in writing fluency between students who received Ginger software feedback and students who received lecturer feedback.

**Findings of writing motivation between students who use Ginger software and those who do not**

Table 5. Descriptive Statistics

| | Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Writing_Motivation | GingerWriter | 22 | 111.45 | 14.947 | 3.187 |
| | TeacherFeedback | 24 | 108.38 | 13.500 | 2.756 |

Based on Table 5, the descriptive statistics reveal differences in students' writing motivation between the GingerWriter group and the Teacher Feedback group. The GingerWriter group consisted of 22 students and obtained a mean score of 111.45, with a standard deviation of 14.947. In comparison, the Teacher Feedback group consisted of 24 students and obtained a mean score of 108.38, with a standard deviation of 13.500. The findings indicate that the GingerWriter group achieved a higher mean writing motivation score than the Teacher Feedback group. The mean difference between the two groups was approximately 3.07 points. This result suggests that students who received feedback through GingerWriter tended to report higher levels of writing motivation than those who received teacher feedback.

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Regarding the standard deviation, the GingerWriter group (SD = 14.947) had slightly greater variability in writing motivation scores than the Teacher Feedback group (SD = 13.500). This indicates that students' writing motivation scores in the GingerWriter group were somewhat more dispersed around the mean. Nevertheless, the difference in standard deviations was relatively small, suggesting that the two groups had relatively comparable variability in their writing motivation scores. Furthermore, the standard error mean values were 3.187 for the GingerWriter group and 2.756 for the Teacher Feedback group, indicating slightly greater sampling variability in the estimated mean of the GingerWriter group. However, this needs to be tested using an independent-samples t-test to determine whether the difference is significant.

Table 6. Tests of Normality

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Group | Statistic | df | Sig. | Statistic | df | Sig. |
| Writing_Motivation | GingerSoftware | .097 | 22 | .200* | .974 | 22 | .797 |
| | LecturerFeedback | .117 | 24 | .200* | .952 | 24 | .294 |

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

a. Lilliefors Significance Correction

For the writing motivation variable, the Shapiro-Wilk results show that the Ginger software group has a significance value of 0.797, while the Teacher Feedback group has a significance value of 0.294. Both are greater than 0.05 (0.797 and 0,294), so the writing motivation data in both groups can be considered normally distributed.

Table 7. Test of Homogeneity of Variances

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Writing_Motivation | Based on Mean | .029 | 1 | 44 | .866 |
| | Based on Median | .022 | 1 | 44 | .882 |
| | Based on Median and with adjusted df | .022 | 1 | 41.333 | .882 |
| | Based on trimmed mean | .023 | 1 | 44 | .881 |

Next, Levene's Test produces an F value= 0.029 with a significance of 0.866 > 0.05. This shows that the variance of the two groups is homogeneous, so the line "Equal variances assumed" is used in the interpretation of independent sample t-test.

Table 8. Independent Samples Test

| | Levene's Test for Equality of Variances | t-test for Equality of Means |
|---|---|---|

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| | | | | | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | | Lower | Upper |
| Writing_Motivation | Equal variances assumed | .029 | .866 | .734 | 44 | .467 | 3.080 | 4.194 | | -5.373 | 11.532 |
| | Equal variances not assumed | | | .731 | 42.468 | .469 | 3.080 | 4.213 | | -5.420 | 11.579 |

The results of the independent samples t-test show a t value of 0.734, *df*= 44, and Sig. (2-tailed) = 0.467 > 0.05. The mean difference between the two groups is 3.080, with a 95% confidence interval of-5,373 to 11,532. Because the p-value is greater than 0.05, $H_0$ is accepted, and Ha is rejected for the second problem formulation. This means that based on the results of this study, there is no significant difference in writing motivation between students who received Ginger software feedback and students who received lecturer feedback.

**Discussion**

The results of the study showed a significant difference in the writing fluency of students who received feedback through Ginger Software and those who received feedback from lecturers. The independent-samples t-test showed a t value of 3.884 with df = 23,747 and a significance value of 0.001 ($p < 0.05$). This finding indicates that the use of AI-based feedback through Ginger Software has a different effect on writing fluency compared to feedback provided by lecturers. Ginger Software may have improved writing fluency because its immediate feedback may allow students to identify and revise problems during the writing process. These results are in line with the view of Hyland et al. (2022) who position writing as a complex skill that requires a continuous process, including generating ideas, developing text, revising, and correcting errors. In the context of this study, the presence of Ginger Software during the revision and editing process provides direct support to students when they encounter linguistic problems in their writing. Thus, students do not have to stop the writing process for too long just to look for or wait for corrections to the errors they find.

The findings regarding writing fluency also support the research of Anjarwati & Hentasmaka (2025), which showed that the use of AI tools such as Grammarly and ProWritingAid can improve students' writing skills. Although these studies used different AI tools, they share a common principle: providing direct feedback can help writers identify problems in their text and make improvements more efficiently. In this study, Ginger Software provided feedback on grammar, word choice, sentence structure, spelling, and other linguistic aspects. This process allows students to focus on developing content and flow of ideas after identifying mechanical issues in their writing. This is consistent with Junaid et al. (2024) finding that automating the mechanical aspects of writing can reduce writing barriers and allow learners to focus more on developing content and flow of ideas.

The results of this study can also be explained by the characteristics of AI feedback, which is real-time, immediate, and individual. Setiawan & Alkhowarizmi (2025) stated that AI-based feedback can help improve grammatical accuracy, sentence structure, and vocabulary usage while supporting independent learning. In this study, students not only received suggestions from Ginger Software but were also given the opportunity to review each

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suggestion and determine its relevance before making revisions. This mechanism is important because Ginger Software functions as a support tool, not as a substitute for writing. Students retain agency in making decisions about their writing. This condition aligns with the novelty of the study stated in the introduction, namely the use of Ginger Software as a corrective feedback tool that supports the writing process without taking over the students' text production process.

The significant difference in writing fluency also supports the findings of Lim et al. (2026) who, through a systematic review, demonstrated that AI has the potential to increase learner engagement, fluency, and autonomy while reducing writing anxiety. When students receive direct assistance during the revision process, they can more quickly identify problems in their writing and move forward with text production. Thus, the use of AI has the potential to reduce barriers arising from uncertainty about linguistic aspects. This finding is also consistent with research by Mohammed & Khalid (2025) and Zhou (2026), which suggests that AI-mediated writing can support motivational constructs such as autonomy, competence, and engagement. However, in this study, these benefits were more evident in writing performance, particularly fluency, rather than in writing motivation.

In contrast to the results on writing fluency, the results of the study showed that there was no significant difference in student writing motivation between the Ginger Software group and the teacher feedback group. This might have happened because motivation may require more than automated linguistic feedback. Factors such as teacher support, task relevance, self-efficacy, and classroom interaction may influence motivation. The results of the independent-samples t-test produced a value of $t = 0.734$, $df = 44$, and Sig. (2-tailed) = 0.467 ($p > 0.05$). Thus, the use of Ginger Software cannot be proven to produce higher writing motivation compared to lecturer feedback. This finding provides a different perspective from the results of Lim et al. (2026), who stated that the use of AI can increase motivation by increasing engagement, autonomy, and writing fluency. These differences in results indicate that the benefits of AI on motivation do not always automatically appear simply because students use AI technology in learning to write.

These findings regarding motivation are also relevant to the debate raised by Lee & Chen (2025). The introduction states that research on the influence of AI on motivation still shows mixed results. On the one hand, instant assistance from AI can boost student confidence; on the other hand, overly reliant on AI technology has the potential to reduce intrinsic motivation in the long term. The results of this study tend to support the view that the use of AI does not automatically guarantee increased writing motivation. Ginger Software may provide convenience and technical support during the writing process, but motivation is a more complex psychological construct and is not solely determined by the availability of feedback. Student motivation can also be influenced by other factors, such as interest in the task, perception of self-ability, learning goals, previous writing experience, relationships with instructors, and characteristics of the learning environment.

The lack of significant differences in motivation is also understandable because the control group in this study still received feedback from the lecturer. In other words, students in both groups received equal support in the writing revision process, even though the feedback sources were different. The experimental group received feedback through Ginger Software, while the control group received corrections and guidance from the lecturer. Therefore, differences in feedback technology do not necessarily result in differences in motivation if both forms of feedback equally help students improve their writing. In this context, the advantages of Ginger Software are more apparent in its efficiency and support for the text production process, while lecturer support can still provide important pedagogical and interpersonal functions for students.

The results of this study also provide implications for previous research, which has largely focused on linguistic accuracy. Mekheimer (2025) and Wang et al. (2025), for example, show that tools like Grammarly and ChatGPT can help students identify grammatical errors in real time. Meanwhile, Banihashem et al. (2024), Fitria (2023), and Widiawati et al. (2023) also focus more on the impact of AI on writing accuracy. This study expands on this focus by

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showing that the use of Ginger Software is not only relevant for linguistic error correction but also related to the fluency of the writing process. Thus, the results of this study provide empirical support for the importance of examining the impact of AI on the performative aspects of writing, not just grammatical accuracy.

Overall, the results of the study indicate that Ginger Software has stronger potential in supporting aspects of writing performance than in increasing writing motivation. The significant difference in writing fluency indicates that AI feedback can help students go through the revision and editing process more efficiently, while the lack of a significant difference in motivation indicates that AI technology is not the sole factor determining students' motivation in writing. This finding also strengthens the research position that the use of AI in writing learning should be positioned as a learning support tools, not as a substitute for the role of the lecturer. Ginger Software can provide fast and consistent feedback, while the lecturer still plays a crucial role in providing pedagogical guidance, building motivation, and helping students understand the rationale behind decisions during the revision process. By combining the two, the use of AI can be directed towards improving the quality of the writing process while maintaining students' active engagement and agency as writers.

## CONCLUSIONS

The findings indicate that AI-based feedback through Ginger Software significantly improved students' writing fluency compared to lecturer feedback ($t$ = 3.884, $p$ = .001), while no significant difference was found in writing motivation ($t$ = 0.734, $p$ = .467). These results suggest that Ginger Software is more beneficial for writing performance than motivational development and should complement rather than replace lecturers' roles. Practically, English lecturers in Indonesian universities are encouraged to integrate Ginger Software into drafting, revising, and editing activities to help students identify grammatical errors, improve vocabulary, and refine sentence structures. However, a blended feedback approach is recommended, as lecturers remain essential in developing ideas, argumentation, organization, coherence, and critical thinking. Furthermore, universities should incorporate AI literacy into English curricula to promote critical, ethical, and responsible technology use. Students should evaluate AI-generated suggestions rather than accept them automatically, considering linguistic accuracy, communicative purposes, and academic conventions.

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## DECLARATION

**Author Contributions:** Rosi Anjarwati was involved in establishing the research design and preparing the manuscript. Lailatus Sa'adah contributed to the implementation of the study and data collection. Mindaudah participated in data analysis and interpretation, while Ghozydane Ihsan Abdullah assisted with the literature review and manuscript revision. All authors contributed to the completion of the article.

**Conflict of Interest:** The authors declare that they have no competing interests concerning this research.

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**Funding:** This study was independently conducted and did not receive a dedicated research grant.
**Ethical Approval:** The research procedures involving student participants were conducted in accordance with applicable institutional requirements and research ethics principles.
**Informed Consent:** The participants were informed about the research and their involvement was based on voluntary consent.
**Use of Generative AI:** Ginger Software served as the AI-assisted feedback tool examined in this study. Any additional generative AI assistance in preparing the manuscript was limited to language editing, where applicable.

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