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The Impact of AI-Assisted Learning in Process Writing on Learners' Well-being

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Abstract
The paper discussed the effects of using AI-assisted learning in a Process Writing Approach on writing performance and psychological well-being of EFL students. The value of the work is that the paper will examine the lack of consideration of both cognitive and emotional products in AI-assisted-writing studies. The quasi-experimental design used is a pre-test/post-test over 6 weeks, with a sample of 60 level A2 EFL students. Data were collected using the Warwick-Edinburgh Mental Well-being Scale, a well-being scale based on the PERMA framework, a Writing Anxiety Scale, and a test of writing skills. The findings indicated statistically significant positive changes in writing and psychological well-being and a large negative change in writing anxiety ($p < .001$) with moderate to large effect sizes. The findings reveal that an AI-assisted process writing has the potential to promote emotional well-being and academic development. The absence of a control group, however, does not allow for causal interpretation of the results. The study attracts an accent on the need to introduce AI in pedagogically informative writing training to enhance performance and well-being within the EFL classroom. More research is required with controlled experimental and longitudinal designs that will establish cause and effect relationships and explore long-term effects.

Keywords: AI-assisted learning, EFL writing, learner well-being, PERMA model, process writing, writing anxiety

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Introduction

Process Writing Approach is one of the most popular pedagogical approaches that is still used in teaching writing in the second language and in foreign languages. It also allows learners to practice writing by applying cyclical processes of planning, drafting, revising, and reflecting, and surpasses the products-driven approach (Abed, 2024; Wang & Kew, 2025). It is a learning strategy that focuses on autonomy of the learner, skill building, and improvement. With the increased adoption of Artificial Intelligence (AI) technologies in the educational process, process writing has been refined further with tools that can provide quick and personalised feedback according to the needs of a large group of learners.

It has been demonstrated in recent research studies that the writing performance, motivation, and engagement of learners can be improved by using AI assistance (Woo et al., 2023; Kim & Tan, 2023; Othman, 2023). These tools enable the learners to arrange ideas, perfect the linguistic precision, and write a draft more effectively. Nonetheless, most of the current studies have primarily been concerned with cognitive and performance related factors at the expense of the affective and psychological aspects, like writing anxiety (Cheng, 2004) and the general well-being of learners. This asymmetry restricts the overall interpretation of how AI is affecting not only the written work of learners but also the emotional experiences of learners in the process of writing.

In particular, the concept of writing anxiety, performance, and psychological well-being (conceptualized with the assistance of the PERMA framework (Positive Emotions, Engagement, Relationships, Meaning, Accomplishment) is under-researched in the realm of AI-assisted writing (Biju et al., 2024; Lai, 2025). Although the unified theory of acceptance and use of technology (UTAUT) can be applied to examine the adoption of AI tools, very few studies have presented this behavioral and emotional lens of the framework (Xue et al., 2024; Jadil et al., 2021). To fill this gap, the current research integrates UTAUT with PERMA. UTAUT is applied to comprehend the acceptance of AI writing tools by learners based on its central constructs, i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions. The psychological outcomes of AI-assisted writing are assessed with the help of PERMA, which has five dimensions of well-being. This design enables the research to both describe the behavioral motivation of technology acceptance and the affective implications of the research on learners.

Hence, the proposed research will examine how AI-based learning in the Process Writing Approach affects the writing performance, writing anxiety, and psychological well-being of EFL learners. In particular, the paper investigates the effect of AI tools integration on the emotional experience of learners and academic progress in parallel.

This study is important as it contributes to theory and practice. In theory, it combines the UTAUT and PERMA frameworks to give a cognitive comprehension of AI adoption and the psychological impact of its application in writing instruction. In practice, it can provide educators with an understanding of how AI tools can be applied in a pedagogically sensitive way to improve the outcomes of the learning process and the well-being of the students.

The study will be guided by the subsequent objectives in order to reach these aims:

1. To explore how AI-supported process writing can impact the psychological well-being of learners according to the PERMA model.
2. To determine the effect of AI-assisted writing on the writing performance of learners.
3. To examine how AI-assisted learning can lessen writing anxiety.

4. To explore learners' acceptance and use of AI tools based on the UTAUT framework.

Accordingly, the study addresses the following research questions:

1. How does AI-assisted process writing influence learners' psychological well-being as measured by the PERMA framework?
2. What is the impact of AI-assisted writing on learners' writing performance?
3. To what extent does AI-assisted learning affect learners' writing anxiety?

Based on the research questions, the following hypotheses are formulated:

1. H1: There is a statistically significant difference ($\alpha \leq 0.05$) between the pre-test and post-test mean scores of the experimental group on the Warwick–Edinburgh Mental Well-being Scale (WEMWBS), favoring the post-test.
2. H2: There is a statistically significant difference ($\alpha \leq 0.05$) between the pre-test and post-test mean scores of the experimental group on the PERMA scale, favoring the post-test.
3. H3: There is a statistically significant difference ($\alpha \leq 0.05$) between the pre-test and post-test mean scores of the experimental group on the Writing Anxiety Scale, favoring the post-test.
4. H4: There is a statistically significant difference ($\alpha \leq 0.05$) between the pre-test and post-test mean scores of the experimental group on the Writing Skills Test, favoring the post-test.

Theoretical Framework

Two complementary concepts the Unified Theory of Acceptance and Use of Technology (UTAUT) and the PERMA model of well-being are the foundation of the current study. These models were selected with the aim to receive an in-depth image of behavioral and psychological features of AI-assisted writing.

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a well-known theory that has been used to explain user behavior intention towards the adoption of new technology. It addresses four major constructs, including performance expectancy, effort expectancy, social influence, and facilitating conditions (Xue et al., 2024; Jadil et al., 2021; Philippi et al., 2021). UTAUT can be used in the context of AI-assisted writing to demonstrate the motivations of the learners to use AI tools that are perceived to be useful, easy-to-use, socially encouraged, and supported by the institution. However, UTAUT is not sufficient on its own to predict the emotional and psychological outcomes of learners.

To overcome this shortcoming, the PERMA model (Positive Emotions, Engagement, Relationships, Meaning, and Accomplishment) is used to study the psychological welfare of learners. The multidimensional approach of well being through PERMA, both summarizes emotional states, motivation, social interaction, purpose and achievement in the learning process. This framework is especially applicable to the context of AI-assisted writing studies of how technological assistance affects the confidence of learners, the level of anxiety, engagement, and the emotions they experience in general.

UTAUT and PERMA integration can enable this study to fill a significant gap in the literature by bringing together behavioral and psychological viewpoints. Whereas UTAUT reveals how learners accept and use AI-writing tools, PERMA assesses the subsequent effect of such tools on the well-being of the learners. The implementation of such a combined approach allows getting

a more holistic vision of the way AI technologies are going to impact the adoption process and the learning experience.

In this paper, UTAUT is employed to understand how learners interrelate with AI tools and how they are willing to embrace them, whereas PERMA is employed to evaluate psychological well-being shifts. Collectively, these frameworks direct the choice of variables, the design of research instruments, and the meanings of results to align the technological adoption and learner-centered outcomes.

Literature Review

Process Writing Approach

The Process Writing Approach conceptualizes writing as a recursive process including planning, drafting, revising, and editing, concentrating more on the skill growth than on the final product (Abed, 2024; Wang & Kew, 2025). Empirical studies indicate that such a strategy improves the writing proficiency, coherence, and student engagement under both ESL and EFL settings (Aljasir, 2025; Wang & Kew, 2025). Moreover, this suggests that collaborative learning and motivational support considerably enhance writing quality, where the writing performance tends to be higher in a group setting compared to when the same practice is carried out individually (Rahimi, 2024; Cahyono et al., 2021).

Although these results suggest the usefulness of process writing, they also show that its relevance is largely conditional upon the consistent feedback and interaction between learners. Technology-based learning, such as MOOCs and Google Classroom, has been demonstrated to improve process-based instruction provision by supporting a learner feedback mechanism and autonomous learning (Wang & Kew, 2025; Peungcharoenkun & Waluyo, 2023). Nevertheless, the benefits of traditional instructional environments are sometimes intertwined with the inability to offer personalized and prompt feedback, which necessitates increased adaptability and scalability.

AI-Assisted Learning in Writing

According to recent studies, writing instruction has been reconceptualized according to the AI-assisted learning that enables real-time feedback that is more tailored and encouraging of the writing behavior to be an iterative process. With generative AI, such as ChatGPT, writing processes, such as brainstorming, organization, drafting, and revision, are augmented, making learners more autonomous and active (Nguyen et al., 2024). Empirically, it is proven that AI-assisted learners produce better structured, coherent, and developed writing compared to their counterparts, who do not use it (Tran, 2025; Sung & Kang, 2025).

However, the literature on the research has contradictory findings regarding the use of AI in writing pedagogy. On the one hand, researchers mention gains of motivation and less cognitive load, as well as self-efficacy (Lai, 2025; Song & Song, 2023; Marie Balraj, 2025). Conversely, issues with over-reliance on AI, less critical thinking, and loss of the authentic voice of learners have been raised (C. Wang, 2025; Kim et al., 2024). This implies that AI is to be incorporated as an aid and not a replacement to human teaching.

AI in Writing Pedagogy and Learner Engagement

The combination of AI in writing pedagogy has presented a dynamic, human-AI collaborative strategy that promotes both cognitive and affective components of learning. AI technology can be used to support self-directed learning through instant, personalized feedback

of grammar, coherence, and argumentation (Deep & Chen, 2025; Zhang et al., 2025). Simultaneously, they help to boost learners' engagement by providing engaging and flexible learning experiences (Hastomo et al., 2025; Malik et al., 2023).

It was also found that AI-generated feedback with teacher guidance provides more effective learning results because it is more efficient in technologies and supportive in pedagogy (Zhang & Wang, 2025; Nguyen et al., 2024). However, academic integrity, ethical usage, and learner dependency issues still present a significant concern that needs to be taught attentively (C. Wang, 2025; Song & Song, 2023). Hence, it can be concluded that AI has an exceptionally promising future in the writing pedagogy and engagement, but its inclusion is only feasible through its proper and balanced incorporation. These findings are also supported by recent studies published in the Arab World English Journal. Al-Azzawi and Saeed (2026) have noted that Arab EFL teachers view AI chatbots to be effective as complementary tools in generating ideas and linguistic support in teaching writing. Likewise, Ali (2024) discovered that even though the developed AI-generated texts are characterized by high grammatical correctness, they do not necessarily include the characteristic voice and the critical depth of a text created by human authors. These results support the notion of a harmonized approach to the use of AI in writing pedagogy.

AI and Psychological Well-being in Writing

Besides cognitive and performance consequences, new studies have started to examine the psychological nature of AI-aided writing. Research shows that AI tools may assist in alleviating writing anxiety through non-judgmental and instant feedback and systematic direction, which can instill more confidence in the learner (Lai, 2025; Biju et al., 2024). Moreover, AI-based environments have been linked to better motivation and emotional involvement as well as well-being.

Although these findings are promising, the current literature is limited in many aspects. Numerous studies are based on self-reported information and short-term interventions and, therefore, cannot determine long-term psychological outcomes. Furthermore, previously, no studies investigated a set of theoretical frameworks, such as the PERMA model, to analytically consider various aspects of well-being in AI-assisted writing scenarios.

Even though all the existing studies show that AI-assisted writing is better when it comes to performance, writing engagement, and motivation, a great gap has been left in comprehending its synergistic effects on writing performance, writing anxiety, or even psychological well-being in a single framework. Current literature is more likely to discuss these variables separately and does not combine the technology adoption with emotional consequences. Moreover, there is not much focus on AI-assisted learning as part of the Process Writing Approach.

Thus, the proposed study fills this gap by discussing AI-assisted process writing based on the behavioural (UTAUT) and psychological (PERMA) frameworks. It offers a more detailed approach by showing the impact that AI has on not only the writing performance but also the emotional experiences and the well-being of learners.

Methodology

Research Design

The current research involved a one-group pretest/ posttest quasi experimental design. This type of design was chosen because of practical and ethical limitations in the institutional context, in which it was not possible to randomly assign participants. The purpose of the study was to

investigate the change in the writing performance, performance writing anxiety, and psychological well-being of learners after the implementation of AI-assisted process writing in a six-week time frame.

Participants

The research was done on 60 EFL students who were in a course at an English language institute at the A2 level. Participation was dependent on convenience sampling because the participants belonged to intact classroom groups. Both male and female learners were involved in the sample, with ages ranging between 18 and 22 years, and a common educational background in English as a foreign language.

Each participant was included according to the genre of enrollment into the same level, basic knowledge of the digital tools, and informed consent to engage in the study. This quasi-experimental research design was appropriate for detecting significant differences between pre-test and post-test results within the selected sample.

Program session details and procedure

The intervention took place during six weeks and incorporated the AI tools, e.g., Grammarly and Quillbot, into the process of writing. The tools were generated to give automated feedback of grammar, coherence, and paraphrasing in the drafting and revision processes. The balance of support provided by AI and the teacher pedagogue was supported with human instruction sustained through teacher control, feedback, and classroom discussions. The week-by-week covered various phases of the writing process and included sentence building, paragraph writing, and short essay writing. The activities were planned to resonate with the elements of the PERMA, with reflection activities, collaborative work, and confidence-building activities, intended to positively impact the emotional involvement and the well-being of the learners.

- Thus, the six-week plan maintains a logical order of progressing from sentence writing to more complex paragraph and essay writing that is anchored on the cognitive and language abilities of learners in every step.
- The writing process begins with ideas and drafts created by the student, and AI tools are shown as one more tool that will assist the student instead of taking away their creativity
- The structure of the program incorporates several phases of process writing every week so that students can develop the skills through repetition
- The program activities are focused on affective development through reflection and teamwork, and the use of confidence-building activities, which involve PERMA components (Positive Emotion, Engagement, Relationships, Meaning, Accomplishment).
- The chosen themes of A2-level writing include basic language patterns and appeal to the students, as one can connect the already known information with real self-expression.
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Research Instruments

The First Tool: A Questionnaire for Assessing the Impact of AI-Assisted Learning on Learners' Well-being

The study utilized a composite questionnaire consisting of adapted standardized instruments, including the Warwick–Edinburgh Mental Well-being Scale (WEMWBS) and a PERMA framework-based well-being scale. These validated instruments were combined to assess different dimensions of learners' psychological well-being in the context of AI-assisted writing. The final version is the one adopted, including 39 items and consisting of two major parts

according to the expert response. It was performed on a small number of students to be able to determine the clarity and practicality of the tools before the actual data collection.

First Dimension: The Warwick–Edinburgh Mental Well-being Scale (WEMWBS)

The dimension can be used to measure the psychological well-being of students as they learn. The Pearson correlation coefficient has been employed by the researcher in assessing the internal consistency by relating each item (score) to the total of the scores of the dimension. The value of the statistical tests was 0.620-0.832, and the coefficients of the model were significant at the level of 0.01, which verifies a high level of internal consistency.

The reliability analysis employed the alpha of Cronbach, which also gave 0.930 meaning that the dimension was reliable and could be used in the main research.

Second Dimension: PERMA Scale

This dimension operates on the PERMA model that measures well-being using five basic elements. The Pearson correlation coefficients obtained during the internal consistency analysis had a range between 0.630 and 0.903 with all of them being statistically significant at the significance level of 0.01. Furthermore, the extent of the questionnaire indicated high structural validity, with the individual correlations being between 0.809 and 0.955 with the total score.

This dimension had an alpha of 0.931, which implies high internal reliability. It means that the questionnaire can be considered a valid and reliable instrument to study the emotional response and interests of students towards AI-based writing.

The Second Tool: Writing Anxiety Scale

The Writing Anxiety Scale, which has been modified after Cheng (2004), was applied to investigate the level of emotional reaction of the students during the process of writing, as well as to measure their anxiety level and trust in following the tasks that involve AI.

The internal consistency was determined by Pearson correlation scores between the scores of the items and the scores of the total dimensions, with a value ranging between 0.647 and 0.780, with all scores found to be significant at 0.01. The Cronbach's alpha of the scale was 0.898, which is very high.

The scale consisted of a five-point Likert scale between Strongly Disagree (1) and Strongly Agree (5) and helped the participants to indicate subtle variations in their emotional responses. This design provided the ability to equally test their feelings.

This instrument is an addition to the first one, as it assesses two key psychological domains of process writing: anxiety alleviation and confidence building.

The Third Tool: Writing Skills Test

It is to assess students' academic writing skills by evaluating their ability to write structured, systematic essays. Students were expected to compose a short essay on either of the two topics in 40 minutes, in the standard essay format (i.e., an introduction, body, and conclusion), with correct grammar, punctuation, and cohesiveness.

The test had good psychometric characteristics:

- Cronbach's alpha: 0.82, which is a high internal consistency.
- There was high inter-rater reliability, with a correlation between the scores of the raters of 0.84 in the first task and 0.79 in the second task.

- The index of item difficulty was 0.36 to 0.72, indicating that the test materials were not too difficult or too easy for A2-level EFL students.
- The scores on the discrimination index were 0.42 to 0.65, indicating the validity of the test in discriminating against the students with the different levels of proficiency.

The writing test demonstrates high reliability and fairness, which is a positive indicator of the language skills and writing growth of EFL students whose process is taught using AI. The performance of the students on writing was evaluated using an assessment rubric.

Construct Validity

A systematic modification and validation of the study were done to ascertain a high degree of methodological rigor and clarity of construct validity. The analysis of the instruments that were measured (WEMWBS, PERMA-based scale, and Writing Anxiety Scale) comprised a number of stages:

- **Expert Review**: 5 subject-matter experts in Applied Linguistics and Educational Psychology evaluated the items in terms of their clarity, relevance, and cultural suitability in the A2 EFL context. To make sure that the constructs are represented well, slight modifications were introduced to the text based on their recommendation.
- **Pilot testing**: A single pilot study with 10 learners tested the instruments for feasibility and possible problems with understanding items (the participants were not included in the final sample).
- **Statistical Reliability**: The internal consistency of each scale was tested strictly with the help of Cronbach's alpha to check whether the scales were reliable, and the reliability coefficients were high (between 0.82 and 0.93). Moreover, construct validity was supported by Pearson correlation coefficients, which indicated that each item was significantly associated with its respective dimension.
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Results

Besides statistical significance testing, effect sizes were computed to estimate the magnitude of change between pre- and post-tests. The (d) of paired samples (dz) calculated by Cohen using the difference between the mean and standard deviation of the difference scores gave a value that is easily interpretable of practical significance, in addition to p-values. Reporting effect sizes is particularly important in intervention research to clarify whether statistically significant findings correspond to meaningful educational and psychological improvements.

Results for Hypothesis 1

The hypothesis reads: There are statistically significant differences ($p < 0.05$) between the pre- and post-performance mean scores of the experimental group on the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), in support of the latter.

To test this hypothesis, the mean and standard deviation of the pre- and post-test scores of the experimental group regarding the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) were calculated. Table 1 shows the results.

Table 1. *Paired t-test results for WEMWBS scores*

	Scale	Number	Mean	Standard Deviation	Calculated T-value	Degrees of Freedom	Significance Level	Significance
The Warwick-Edinburgh Mental Well-being Scale	Pre-test	60	29.18	14.663	-5.241	59	.000	Significant

(WEMWBS)	Post-test	60	43.27	14.438

The mean score for the experimental group on the WEMWBS pre-performance was 29.18, with a standard deviation of 14.663, as shown in the table. Conversely, the post-test average was 43.27, and the standard deviation was 14.438. These findings show a statistically significant difference between the pre-test and post-test scores, with the post-test scores being higher.

To check the size difference, the researcher calculated Cohen's d. With d = 0.67, the effect is between medium and large according to Cohen's (1988) criteria. The finding is important: the AI-assisted process writing intervention not only improved participants' mental well-being but also had a significant practical impact, which can now be recognized beyond statistical significance.

Results for Hypothesis 2

The hypothesis states, "There are statistically significant differences at a significance level of 0.05 between the mean scores of the pre- and post-tests of the experimental group on the Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment Scale (PERMA)" in favor of the post-test.

Table 2. *Paired t-test results for PERMA scores*

Dimensions	Scale	No.	Mean	SD	Calculated T Value	Degrees of Freedom	Significance Level	Significance
First dimension: Positive Emotions	Pre test	60	9.17	3.475	-10.678	59	.000	Significant
	Post test	60	15.50	5.147				
Second dimension: Engagement	Pre test	60	9.47	3.500	-8.357	59	.000	Significant
	Post test	60	16.97	5.997				
Third dimension: Relationships	Pre test	60	9.07	2.979	-11.112	59	.000	Significant
	Post test	60	15.47	4.032				
Fourth dimension: Meaning	Pre test	60	9.43	2.988	-11.232	59	.000	Significant
	Post test	60	16.23	5.726				
Fifth dimension: Accomplishment	Pre test	60	10.17	5.412	-7.976	59	.000	Significant
	Post test	60	16.33	5.865				
Overall average	Pre test	60	47.30	15.836	-15.657	59	.000	Significant
	Post test	60	80.50	17.981				

Table 2 indicates that the mean score for the experimental group in the pre-test stage on the PERMA scale was 47.30 (SD = 15.836). The post-test mean score rose to 80.50 (SD = 17.981). The post-test scores differ significantly from the pre-test scores on the PERMA scale, favoring the post-test.

Effect sizes (Cohen's d) were further calculated to assess the intervention's real-life impact on the five dimensions of well-being. The total scale revealed a very large effect size (d = 2.02). Separate analyses showed that each of the five factors (Positive Emotions, Engagement, Relationships, Meaning, and Accomplishment) yielded effect sizes ranging from 1.03 to 1.45, all exceeding the minimum value for a large effect. Such statistics illustrate how influential the AI-assisted educational strategy can be in many areas of the development of learners.

Results for Hypothesis 3

The hypothesis is as follows: "The mean scores of the experimental group of pre-test and post-test of the Writing Anxiety Scale differ statistically significantly at the significance level 0.05 in favour of the post-test mean scores."

Table 3. *Paired t-test results for writing anxiety*

	scale	No.	Mean	SD	Calculated T Value	Degrees of Freedom	Significance Level	Significance
Writing anxiety scale	pre-test	60	30.13	6.681	-8.854	59	.000	Significant
	post-test	60	18.9	10.792				

The average of the experimental group in the Writing Anxiety Scale in pre-test was 30.13, and the standard deviation was 10.792, as indicated in Table 3. The average post-test score decreased to 18.90 (SD = 6.681). The analysis of the difference in the pre-test and post-test results indicated a statistically significant difference in the scores in favor of the post-test.

The effect size of the reduction in writing anxiety was quite large (d = 1.14). A d-value above 1 must reflect a large effect in the behavioral sciences. Such a high number indicates that the change in the anxiety scores between the pre-test and post-test levels was not just statistically significant but had a high practical value, as well. Indeed, the intervention appears to have played a key role in eliminating the psychological barrier that the participants experienced when undertaking EFL writing exercises.

Results for Hypothesis 4

The hypothesis is that mean scores of the experimental group on the writing test differ between pre- and post-test at the 0.05 level of significance, with post-test scores higher.

Table 4. Paired t-test results for writing performance

	Scale	No.	Mean	SD	Calculated T Value	Degrees of Freedom	Significance Level	Significance
Writing Test	pre-test	60	3.90	2.121	-10.975	59	.000	Significant
	post-test	60	7.43	1.419				

According to Table 4, the mean result of the experimental condition in the pre-test was 3.90 (SD = 2.121), and the post-test average of the experimental condition was also much higher (7.43, SD = 1.419). There were statistically significant differences between the pre-test and post-test scores, with a positive difference being in favor of the post-test.

Cohen's d was calculated to determine the size of the change in writing ability. The value obtained (d = 1.41) is considered large by the traditional criteria, meaning that the application of process writing with the use of AI resulted in a very significant and rather noticeable increase in the quality of writing among students. Such a result further confirms how well the teaching method has achieved its main educational goals.

Discussion

This research uses the UTAUT and PERMA frameworks to interpret the results of this study and gain a holistic picture of technological adoption and psychological consequences.

Research Question 1 posed the question of the effects of using AI-assisted process writing on the psychological well-being of learners. The results show that well-being has significantly improved according to both the WEMWBS and the PERMA scales. The effect size of the PERMA scale was highly significant (d = 2.02), with WEMWBS having a moderate to large effect (d = 0.67), which denotes practically significant increases in the well-being of learners. The results are aligned with the past literature (Lai, 2025; Biju et al., 2024), which also indicated that AI tools can positively impact the emotional experience of learners, although it offers instant and non-judgmental feedback. This finding also fits into the PERMA model, since there was an increase in well-being levels in various dimensions, such as engagement, relationships, and accomplishment.

Research Question 2 analyzed the effects of writing with AI-assistance on the writing performance of learners. The results show a significant improvement in students' writing skills following the intervention. This enhancement can be credited to the formatted assistance of AI tools in the drafting and revision levels. These results prove earlier studies (Tran, 2025; Sung & Kang, 2025), which have shown that AI writing programs improve coherence, organization, and grammatical accuracy. Moreover, these results are justified by the works published by the Arab World English Journal, which emphasizes that AI tools can enhance linguistic accuracy without losing human advice in order to preserve the natural voice of the learners.

Research Question 3 investigated how AI-assisted learning influences writing anxiety. The results indicate that there is a strong decrease in anxiety levels following the intervention. The decrease in writing anxiety delivered a very big effect size (d = 1.14), showing a substantive practical effect. This result confirms the previous studies (Lai, 2025; Kim et al., 2024) and proves that AI tools not only decrease the stress associated with writing but also have a solid practical implication. This indicates that AI-assisted writing is a supportive and low-stress environment that boosts the confidence of learners when undertaking the writing process.

Theoretically, the results demonstrate the complementary functions of UTAUT and PERMA, explaining the adoption and effects of AI-assisted writing. In line with Q. Wang (2025), the UTAUT will understand why learners would be willing to use AI tools depending on their perceptions of usefulness, ease of use, social, and institutional support. Meanwhile, PERMA offers an explanation of the attained psychological outcomes, such as enhanced well-being and less anxiety. Such an integration provides a more comprehensive conception of AI-assisted learning.

The results, however, are to be treated with caution. The nature of a one-group pre-test/ post-test prevents the determination of causal relationships since the results of the experiment may be constructed by external factors, namely familiarity to the tools or the classroom relationships. Thus, the findings suggest an association and not a causal effect. These findings need to be substantiated through future research studies, using controlled or longitudinal designs.

In sum, the research shows that the use of AI in process writing is linked to better writing performance, psychological well-being, and decreased anxiety in learners. The findings can enrich the existing knowledge on AI in education because they emphasize the significance of technological and psychological perspectives in the study of learning outcomes.

Conclusion

The purpose of this study was to consider the effect of AI-supported process writing on the writing performance, psychological well-being, and writing anxiety of EFL learners. The results suggest that process writing simplified with AI assistance makes positive contributions to writing skill, psychological well-being, and anxiety associated with writing. In general, the findings

indicate that the application of AI to process writing could facilitate both cognitive and emotional learning. The use of AI-assisted instructions seems to reinforce a sense of engagement, confidence, and autonomy in learners and helps them develop structured writing with the help of timely and personalized feedback. Nevertheless, there are some limitations that should be considered. The research design used was a one-group pre-test/ post test/ quasi- experiment with no control group, thus prohibiting the development of cause and effect relationships. So, the results neutralize a correlation, but not an impact. Also, the research period on the intervention and the context of A2-level EFL learners are rather short and might restrict the generalizability of the findings.

To sum up, the study contributes to the increasing amount of literature on AI in education by revealing that AI-supported process writing could be beneficial to academic performance and the well-being of learners when well-introduced to the instructional practice.

Recommendations and suggestions for further research

Based on the findings of this study, several practical and research-oriented recommendations can be made. First, since the results demonstrated significant improvements in writing performance and psychological well-being, it is recommended that educators integrate AI-assisted tools into the process of writing instruction in a structured and pedagogically guided manner. Teacher training programs should therefore be developed to support the effective use of AI technologies, with particular attention to balancing technological support with human feedback. Second, given the observed reduction in writing anxiety, future instructional practices should incorporate AI tools as supportive mechanisms to create low-pressure and confidence-enhancing writing environments. This is especially relevant for learners who experience high levels of writing-related stress. Third, as the findings indicated strong positive outcomes across PERMA dimensions, future research should further explore the relationship between AI-assisted learning and psychological well-being using longitudinal designs to assess long-term effects.

In addition, future studies are encouraged to include control groups and mixed-method approaches to strengthen the validity of findings and provide deeper insights into learners' experiences. Qualitative methods such as interviews and observations may help explain how and why AI tools influence writing anxiety and learner engagement. Finally, future research should examine the role of contextual factors such as cultural background, language proficiency, and institutional support in shaping the effectiveness of AI-assisted writing, in order to enhance the generalizability of findings.

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