



A factor analysis of ChatGPT-based feedback: Focusing on EFL college learners^{*}

Sun-Young Kim

(Mokpo National University)

Kim, Sun-Young. 2026. A factor analysis of ChatGPT-based feedback: Focusing on EFL college learners. *Linguistic Research* 43(Special Edition): 157-177. This study explores how EFL college students employ ChatGPT as a feedback tool by examining the types of ChatGPT-based feedback they engage in during writing practices. Additionally, it develops an empirical model to explain the learning process in which ChatGPT self-efficacy influences learner satisfaction through two mediating TAM variables: perceived usefulness and perceived ease of use. To investigate the role of AI technology competence in ChatGPT-based writing practices, survey data from 68 EFL college writers (N = 68) were analyzed using exploratory factor analysis (EFA) and structural equation modeling (SEM). The study found that EFL college writers used ChatGPT not only for feedback but also as a composing tool. Moreover, ChatGPT self-efficacy positively influenced learner satisfaction through perceived usefulness and perceived ease of use. These results highlight the need to integrate AI technology proficiency into ChatGPT-based instructional designs. (Mokpo National University)

Keywords ChatGPT-based feedback, EFL writing classes, AI technology acceptance, learner satisfaction, perceived usefulness, perceived ease of use

1. Introduction

Driven by the proliferation of generative AI, the application of ChatGPT in EFL writing contexts has surged exponentially. While recent evidence highlights its efficacy in delivering rapid, accessible, and form-focused feedback (Zhu et al. 2020; Kohnke et al. 2023), an emerging body of literature cautions against pedagogical risks. Researchers warn that misuse or overreliance on AI can disrupt the learning process, leading to

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academic dishonesty or a tendency among students to utilize ChatGPT merely as a composition tool rather than a critical feedback tool (Su et al. 2023; Kim 2024). Given this duality and the inherently opaque nature of learner-AI interactions, generalizing the overall efficacy of ChatGPT is problematic. Consequently, there is an urgent need to understand how learners' internal psychological factors—specifically their technology acceptance—dictate their actual utilization of the tool.

To examine this dynamic, this study employs the Technology Acceptance Model (TAM), which posits that learners' decisions to adopt new technology are mediated by two core variables: perceived ease of use and perceived usefulness. Previous TAM studies highlight that technology self-efficacy significantly influences these mediators, ultimately driving learning satisfaction (Compeau and Higgins 1995; Bandura 1997; Hong et al. 2003). Despite its growing prevalence, research on ChatGPT in English education has largely overlooked this technology efficacy—defined here as learners' perceived competence in deploying ChatGPT for specific tasks, such as prompt engineering for feedback generation. Addressing the critique that studies often falsely presuppose college students uniformly possess requisite technological skills (Jones and Gable 2004; Kim 2024), this study hypothesizes that in EFL writing contexts, students' ChatGPT self-efficacy dictates both their decision to adopt the tool and the cognitive effort they invest in using it.

The primary objective of this study is to assess the efficacy of ChatGPT as a feedback tool in EFL college writing contexts by exploring these internal mechanisms. Specifically, this study unfolds in two phases. First, it categorizes the nature of ChatGPT interactions during writing practices, distinguishing between its use as a feedback mechanism and as a composition tool. Second, utilizing factor analysis and structural equation modeling (SEM), it investigates how ChatGPT-related self-efficacy impacts overarching learning satisfaction via the aforementioned TAM mediators. To guide this empirical investigation, this study examines how college students interact with ChatGPT during writing practices by classifying ChatGPT-based feedback into two categories: corrective feedback and composing feedback. Subsequently, a set of hypotheses is proposed to test the impact of ChatGPT self-efficacy on perceived usefulness and perceived ease of use. These hypotheses are detailed in the Research Methods section.

2. Literature review

Recent advances in generative AI technology are accelerating a paradigm shift in foreign language education, moving from instructor-centered feedback toward AI-mediated individualized feedback. Large language models (LLMs), particularly ChatGPT, have demonstrated considerable potential as real-time feedback tools across multiple domains of language learning, including writing, reading, and speaking. Previous studies suggest that immediate and detailed feedback can help correct learners' linguistic errors and contribute to a self-directed learning environment by lowering physical and psychological barriers (Anderson and Ayaawan 2023; Barrot 2023). Unlike traditional automated essay scoring (AES) systems, ChatGPT holds distinct educational value due to its ability to process context and explain the rationale behind its feedback through a conversational interface (Kohnke et al. 2023). Empirical studies report that these technological characteristics can reduce learners' cognitive load and improve linguistic fluency, suggesting that AI feedback has reached a level where it can effectively supplement instructor feedback in specific domains (Zhu et al. 2020; Tai et al. 2023).

2.1 The paradigm shift toward generative AI-based English learning

From the perspective of AI technology, a growing body of research converges on the idea that ChatGPT serves as an effective, yet complementary, feedback tool in ESL/EFL writing practices (Jeon and Lee 2024; Yan and Zhang 2024; Cao and Zhou 2025; Lee 2025; Le and Nguyen 2026). On the one hand, ChatGPT is highly praised for its immediacy, interactive dialogue, and ability to improve surface-level linguistic features. Several studies have found that AI-generated feedback excels at identifying grammatical and lexical errors, providing alternative paraphrasing, and increasing learner engagement and revision quality (Zhai 2022; AlAfnan et al. 2023; Wang and Guo 2025).

On the other hand, researchers consistently caution against over-relying on AI, highlighting its pedagogical limitations. Comparative studies reveal that while ChatGPT improves lexical richness and provides structural feedback efficiently, it often lacks the pedagogical sensitivity, personalization, and authority inherent in human teachers (Jeon and Lee 2024; Lee 2025). Furthermore, it underperforms in areas requiring deep

rhetical awareness, advanced discourse-level feedback, and syntactic accuracy (Cao and Zhou 2025; Le and Nguyen 2026). Consequently, the consensus in recent literature is that effective learning depends on learners' ability to critically evaluate AI-generated suggestions, advocating for a mixed approach that combines ChatGPT with traditional teacher feedback.

To bridge this gap in the literature, which has predominantly focused on comparing the linguistic accuracy of AI versus human feedback, it is necessary to shift the focus to the learners themselves. Although previous studies emphasize the utility of ChatGPT, little empirical attention has been paid to the specific types of corrective feedback EFL college students actually seek out and engage with during their independent writing processes. Therefore, this study differentiates itself by empirically investigating the actual usage patterns of EFL students, specifically analyzing the extent to which they employ ChatGPT merely as a feedback tool versus actively using it as a composing tool.

2.2 Structural relationship between technology acceptance and learning satisfaction

Alongside the positive aspects of AI technology, concerns persist regarding side effects stemming from learners' misuse or overuse. Su et al. (2023) warned that excessive reliance on ChatGPT-generated output can negatively affect higher-level cognitive development, such as independent thinking and sentence construction, often leading to academic dishonesty. In the specific context of English education in Korea, Kim (2024) revealed that learners in actual writing classrooms tend to treat ChatGPT as a simple "ghostwriting or composition generation tool" rather than as a "critical feedback tool." This implies that the internal variable—how and for what purpose a learner accepts the technology—is the core mechanism determining actual learning outcomes, rather than the objective performance of the AI tool itself.

For new educational technologies to take root effectively, they must be supported by learners' psychological acceptance. The Technology Acceptance Model (TAM; Davis 1989) explains that perceived usefulness (the degree to which a user believes technology will enhance performance) and perceived ease of use (the degree to which a user believes using technology will be effortless) are key factors determining usage intention and learner satisfaction. As Chau and Hu (2001) and Gefen et al. (2003) posited,

students' technology acceptance is primarily driven by their perceptions of the tool's practical consequences.

This theoretical framework provides a crucial lens for re-evaluating generative AI in English education, establishing the distinct academic contribution of this study. While existing literature has primarily treated AI feedback as an external technological intervention evaluated by its linguistic output, this study introduces technology acceptance as a mediating variable. By examining how learners perceive ChatGPT as a practical aid (perceived usefulness) and how easily they can navigate its operational processes, such as prompt engineering (perceived ease of use), this study explicitly models the psychological mechanisms of technology adoption. Grounded in TAM theory, this paper develops an empirical model to test the structural path of self-efficacy → technology acceptance → learning satisfaction, offering a novel perspective that prioritizes learners' subjective acceptance over the mere functional performance of the technology.

3. Research methods

3.1 Analysis of ChatGPT-based feedback types

While research into learner-centered ChatGPT-based feedback has increased rapidly, generalizing its effectiveness remains difficult due to variations in learning contexts (e.g., reading versus writing) and learner proficiency (Kim and Paek 2019; Olsen and Hunnes 2024). As previous literature notes, learning satisfaction and achievement differ significantly depending on whether students employ ChatGPT as a simple composition tool or as a critical review tool. To capture these behavioral differences, this study utilized a survey methodology to collect and analyze data on the specific types of ChatGPT interactions college students engage with during writing practices. The collected data were categorized into two primary modes of usage: corrective feedback and composition generation. By analyzing these survey responses, this study empirically investigates which feedback types learners request most frequently and how each distinctively influences their underlying psychological mechanisms.

3.2 Structural causal analysis using TAM mediating variables

Drawing upon the Technology Acceptance Model (TAM) as a theoretical framework, this study analyzes the mechanisms through which a learner's ChatGPT feedback self-efficacy (independent variable) influences learning satisfaction (dependent variable) via perceived technology acceptance (mediating variables). To address the usage proficiency gaps and technology acceptance disparities among students highlighted by Kim (2024), the variables are operationally defined as follows (see 2):

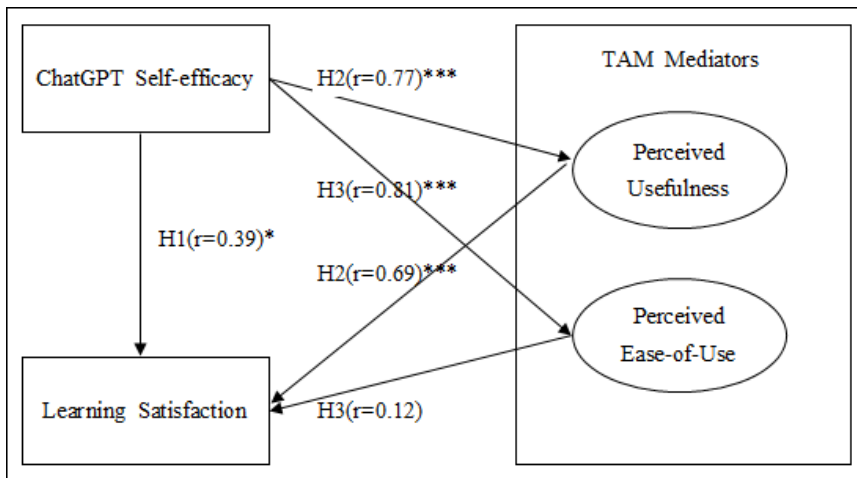
- (2) a. Independent variable (ChatGPT-based feedback self-efficacy): A learner's subjective confidence in their ability to improve their English proficiency through ChatGPT-based feedback.
- b. Mediating variable 1 (Perceived usefulness): The degree to which a learner believes that ChatGPT-based feedback contributes to practical learning outcomes, such as reduced learning time and improved grades.
- c. Mediating variable 2 (Perceived ease of use): The degree to which a learner feels that the process of inputting prompts into ChatGPT and understanding its feedback is mentally and physically effortless.
- d. Dependent variable (Learning satisfaction): The learner's sense of educational fulfillment regarding ChatGPT-based feedback activities and their intention for continued future use.

To empirically examine the role of ChatGPT-based feedback self-efficacy in English education, this study develops an empirical model grounded in existing literature and TAM theory. This model conceptualizes how ChatGPT-based feedback self-efficacy affects students' learning outcomes through mediating channels—specifically, the TAM variables. The relationships among ChatGPT-based feedback self-efficacy, the TAM variables (i.e., perceived usefulness and perceived ease of use), and learner satisfaction have not been widely explored in the literature. The conceptual model elucidating these relationships is presented in Figure 1.

In Hypothesis 1, learners' perceived ChatGPT self-efficacy is expected to directly affect their learning satisfaction. As reviewed in the literature, ChatGPT-related technology self-efficacy plays a crucial role in determining the extent of students'

satisfaction with AI-based learning practices. In the model presented in Figure 1, the ChatGPT self-efficacy and learner satisfaction variables are correlated, and a correlation coefficient of 0.39 supports a possible causal relationship between these constructs.

Hypotheses 2 and 3 test the mediating roles played by the two TAM variables. Specifically, ChatGPT self-efficacy is expected to have a significant, positive impact on learner satisfaction through learners' perceived ease of use and perceived usefulness. This indicates that ChatGPT-based learning practices are closely linked to students' evaluations of the AI technology, as their experiences interact with the technology adoption process. As theoretically expected, perceived usefulness is highly correlated with learner satisfaction ($r = 0.69$). However, the relationship between perceived ease of use and learner satisfaction was relatively weak ($r = 0.12$). Based on this structural framework, the proposed hypotheses are as follows:



Note: "***" and "*" denote the statistical significance of the correlation coefficient (r) at the 1% and 5% levels, respectively.

Figure 1. A structural model with correlation coefficients

- H1 [Direct effect]: Learners' self-efficacy regarding ChatGPT feedback will have a significant direct positive (+) effect on learning satisfaction.
- H2 [Mediating effect of usefulness]: Self-efficacy regarding ChatGPT-based feedback will have an indirect positive effect on learning satisfaction, mediated by "perceived usefulness."

H3 [Mediating effect of ease of use]: Self-efficacy regarding ChatGPT-based feedback will have an indirect positive effect on learning satisfaction, mediated by "perceived ease of use."

3.3 Analytic procedures and model verification

The present study developed a questionnaire to assess learners' perceptions of ChatGPT-based practices across four categories: ChatGPT self-efficacy, the two TAM variables, and learner satisfaction. Responses were measured on a 5-point Likert scale. The self-report survey, comprising a total of 20 items (5 items per category), was distributed to Korean college students majoring in English education at an urban university. Given the study's focus on EFL writing, participation was limited to students who had prior experience taking an English writing course at the university level. Out of 88 returned surveys, 68 valid observations with complete responses were used for the final analysis.

To measure learners' satisfaction with ChatGPT-based feedback, five items (e.g., willingness to recommend ChatGPT-based writing practices to others) were utilized. These items measured overall satisfaction with responses ranging from 1 (least likely) to 5 (most likely). Conversely, the two TAM variables—perceived usefulness and perceived ease of use—measured the extent to which students decided to adopt the AI technology. These constructs, comprising a total of 10 items, were similarly measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). To assess ChatGPT self-efficacy, participants were asked to evaluate the technical skills and knowledge required for using ChatGPT in their writing practices, with responses recorded on a continuum from 1 (very poor) to 5 (very good).

Table 1. Profiles of participants

Sample characteristics		N	%
Gender	Male	30	44.1
	Female	38	55.9
Age	19-23	40	58.8
	24-29	18	26.5
	Above 30	10	14.7
Previous education	Secondary (high school)	58	85.3
	Other College/University	10	14.7

Table 1 summarizes the key demographic characteristics of the participants, including gender, age, and educational background. The participants exhibited homogeneous traits typical of traditional university cohorts in terms of age and educational experience. Specifically, the majority of students were under 30 years old and pursuing academic careers as English teachers. Regarding their educational background, a significant proportion enrolled in university immediately after high school graduation, while a few participants had prior experience attending other tertiary institutions, as detailed in Table 1.

The collected data were analyzed according to the following procedures. First, to analyze the types of ChatGPT-based feedback, students' self-reported behaviors regarding ChatGPT usage during writing practices were coded. These descriptions were grouped into two categories: usage as a feedback tool and usage as a composing tool. Descriptive statistics were then utilized to analyze the range of ChatGPT-based feedback students engaged with during their writing practices. Second, prior to testing the three hypotheses, an exploratory factor analysis (EFA) with a Varimax rotation procedure was conducted to identify the underlying dimensions of perceived usefulness and perceived ease of use. The internal consistency of the extracted constructs was subsequently examined through reliability analysis. The EFA of the two TAM variables yielded two factors based on the eigenvalue-greater-than-one criterion. The rotated sums of squared loadings for the two components indicated that the model explained 80.55% of the total variance. Additionally, item-to-total correlations were examined for scale refinement to enhance reliability. The outcomes of the factor analysis are summarized in Table 2.

Table 2. Results of factor analysis for perceived usefulness and perceived ease of use

Items	Factor loadings	Eigen-value	Extrac- ted variance	TAM Factor	Item- total correla- tion	Cronbach alpha
Enhancing effective-ness	0.85	4.09	46.77	Perceived usefulness	0.72	0.91
Increasing producti- vity	0.88				0.81	
Improving ability	0.80				0.86	
Accompli- shing quickly	0.87				0.80	
Overall	0.80				0.82	
Easy to use ChatGPT	0.84	3.10	33.78	Perceived ease of use	0.80	0.86
Interacting clearly with ChatGPT	0.87				0.73	
Becoming a skillful user	0.80				0.75	
Understan-d ing device operation	0.83				0.75	
Total			80.55			

Note: An analysis employed the Principal Component as an extraction method and Varimax with Kaiser Normalization was used as rotation method.

Regarding the two TAM factors, eight of the original ten items were retained for analysis. As shown in Table 2, *perceived usefulness*, measured by four items, demonstrated high internal consistency with a Cronbach's alpha of 0.91. The perceived ease of use variable, also comprising four items, retained a high level of internal consistency ($\alpha = 0.86$). Furthermore, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) remained within an acceptable range. These metrics support the validity of these items as indicators of the TAM variables. Similarly, the other two constructs included in the model demonstrated robust reliability. Specifically, the internal consistency scores for learning satisfaction ($\alpha = 0.89$, four items) and ChatGPT self-efficacy ($\alpha = 0.90$, four items) confirm that the individual items are reliable

measures of the four variables.

This study utilized Analysis of Moment Structures (AMOS; Arbuckle 2006) to empirically test the structural model and estimate numerical values for its components via maximum likelihood estimation. Additionally, potential distributional issues and their effects on parameter estimates were addressed using the bootstrapping method (Stine 1989), generating 200 bootstrap replications. The hypothesized causal relationships were verified through confirmatory factor analysis (CFA) and structural equation modeling (SEM). During the CFA, the validity of the scales for the specific constructs of the measurement model was assessed following the procedure outlined by Fornell and Larcker (1981). Finally, model fit was evaluated using multiple goodness-of-fit indices: the chi-square statistic (CMIN), degrees of freedom (DF), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), root mean square residual (RMR), and root mean square error of approximation (RMSEA).

4. Results

4.1 Study on ChatGPT-based feedback

The analysis reveals that most college students are actively using AI technology as feedback or composing tools during their writing practices. The students' responses from the questionnaires were categorized into 'Corrective Feedback' and 'Composing Feedback,' and the frequency of specific feedback usage was analyzed for each type. The ChatGPT-based feedback types students engage in are defined in (3):

(3) a. ChatGPT-based corrective feedback

- Explicit correction: Directly providing the correct answer for an error.
- Elicitation: Prompting the student to discover the error themselves through questioning.
- Clarification request: Asking ChatGPT to re-explain when its initial response is unclear.
- Metalinguistic feedback: Asking questions about or providing

explanations regarding the language itself.

- Repetition: Requesting the repeated correction of erroneous parts.

b. ChatGPT-based composing feedback

- Drafting: Requesting the generation of an initial writing draft.
- Summarizing: Instructing the AI to summarize texts or passages.
- Translation: Translating Korean into English or vice versa.
- Paraphrasing: Instructing the AI to rephrase the original content.
- Revising: Directing the AI to correct specific parts or the entirety of a text.

Table 3. Two categories of ChatGPT feedback: Correct written feedback vs. composing tool

	ChatGPT-based Feedback	Key Characteristics	Number of Learners (N=68)
Corrective Feedback	Explicit Correction	Explicitly provide the correct form/ word/phase/sentence	60 (88.2%)
	Elicitation	Induce ChatGPT to produce the correct writing	58 (85.3%)
	Clarification/ Elaboration	Require additional instructional information (example, explanation)	51 (75.0%)
	Metalinguistic	Ask for comments or questions to ChatGPT related to the correct writing	30 (44.1%)
	Repetition	Repeating the same activity to gradually improve accuracy of writing	55 (80.9%)
Composing Feedback	Drafting	Input writing task and let ChatGPT to produce a learner's writing draft	60 (88.2%)
	Summarizing	Let ChatGPT to summarize books or reading articles	55 (80.9%)
	Revising	Let ChatGPT to revise a learner's writing under a certain condition	59 (86.8%)
	Translating	Write Korean first and then let ChatGPT to translate it in English	62 (91.2%)
	Paraphrasing	Restructure a draft using ChatGPT device	21 (30.9%)

The results show that ChatGPT-based feedback is already deeply incorporated into college students' writing practices, as shown in Table 3. Regarding their experience

with corrective feedback, the types were utilized in the following order: explicit correction (n=60/68), elicitation (n=58/68), repetition (n=55/68), clarification request (n=51/68), and metalinguistic feedback (n=30/68). Among these, metalinguistic feedback, which requires learners to build the mental architecture to recognize their own errors, was used less frequently compared to the other types. This suggests that students dynamically interact with AI technology to improve their writing while performing tasks.

In contrast, the composing feedback category showed greater variation across types compared to corrective feedback. Nearly all students reported experience with translation (n=62/68), drafting (n=60/68), revising (n=59/68), and summarizing (n=55/68). However, a relatively small number of students (n=21/68) utilized paraphrasing, which involves reinterpreting English text from the writer's perspective. Furthermore, when students engage with composing feedback, it is not always clear whether they are utilizing ChatGPT genuinely as a feedback tool or merely as a composition tool. If students rely on ChatGPT primarily to produce their own writing, it can serve as an obstacle to their cognitive interaction in both individual and social learning domains.

4.2 Role of the TAM variables in ChatGPT-based writing practices

The results from the structural equation modeling (SEM) rejected Hypothesis 1, which tested the direct impact of ChatGPT self-efficacy on learner satisfaction in writing practices. Specifically, AI technology competence had no significant direct effect on learner satisfaction, yielding an estimated coefficient of 0.33 ($p > 0.05$). This indicates that the causal relationship between these two variables is not direct. Nevertheless, this does not imply that AI technological competence is irrelevant to students' satisfaction with ChatGPT-based writing practices. Rather, the rejection of Hypothesis 1 suggests that AI technology competence affects satisfaction through specific mediating channels rather than a direct path.

Conversely, the analysis supported Hypothesis 2, testing the mediating role of *perceived usefulness*. It was expected that ChatGPT self-efficacy would have a significant and positive indirect effect on learner satisfaction through perceived usefulness. The test supported this hypothesis, revealing that AI technology competence had a

significant positive effect on perceived usefulness, yielding an estimated coefficient of 0.79 ($p < 0.01$). Furthermore, a significant causal relationship was found between perceived usefulness and learner satisfaction with an estimated value of 0.55 ($p < 0.05$). This demonstrates that students' technology acceptance exerts a positive influence on their learning outcomes through the mediator of perceived usefulness.

Similarly, the third hypothesis (H3) was also supported, demonstrating the mediating path of *perceived ease of use*. Specifically, ChatGPT self-efficacy had a significant and positive effect on perceived ease of use with an estimated value of 0.89 ($p < 0.01$). There was also a significant causal relationship between perceived ease of use and learning satisfaction (coefficient = 0.45, $p < 0.05$). These findings are consistent with Kim (2024), indicating that technological competence impacts students' learning outcomes through TAM mediators. Thus, the results for Hypotheses 2 and 3 reinforce the critical role of TAM variables in understanding the ChatGPT-based writing practices in which students engage.

Table 4. Outputs of structural equation model (SEM) estimates

Path diagram				Proposed model	Bootstrapping #
				Estimate (S.E.)	Estimate (bias)
H1	ChatGPT Self-Efficacy	→	Learner Satisfaction	0.33(0.211)	0.59(0.023)
H2	ChatGPT Self-Efficacy	→	Perceived Ease of use	0.89(0.009)***	0.83(0.014)
	Perceived Ease of use	→	Learner Satisfaction	0.45(0.047)**	0.49(0.0239)
H3	ChatGPT Self-Efficacy	→	Perceived Usefulness	0.79(0.007)***	0.79(0.015)
	Perceived Usefulness	→	Learner Satisfaction	0.55(0.031)**	0.51(0.014)

Note: The statistical significance of the estimated coefficients at the 1% and 5% levels were denoted by "***" and "**" respectively. A set of measures are as follows: Chi-square = 250.24, $df = 39$, RMR = 0.055, RMSEA = 0.088, GFI = 0.90, Adjusted GFI = 0.90, and NFI = 0.93.

In summary, the results for the proposed hypotheses elucidate the specific mechanisms through which ChatGPT-based practices influence students' learning satisfaction via TAM mediators. In particular, the two mediating variables—perceived usefulness and perceived ease of use—interact with the students' technology adoption process, thereby facilitating the incorporation of ChatGPT-based feedback into their writing routines. Ultimately, learners' subjective perceptions of AI technology are

instrumental in explaining individual differences in the utilization of ChatGPT as a feedback tool. Nevertheless, the results should not be generalized across the various learning contexts because the sample used in this study is small.

5. Discussion and implications

This study offers several pedagogical implications applicable to EFL writing instruction. First, given that a majority of students already utilize ChatGPT as a primary feedback mechanism, its integration into teaching practices should be considered essential. As AI technology advances, distinguishing between human teacher feedback and AI-generated feedback may become increasingly difficult. The findings indicate that ChatGPT can perform functions traditionally associated with teacher feedback, such as explicit correction, elicitation, clarification requests, and metalinguistic feedback. Although the quality of ChatGPT-based feedback is highly learner-specific, the prevalence of its use in writing practices continues to grow. This paradigm shift raises critical pedagogical questions regarding how to effectively incorporate ChatGPT into traditional writing curricula.

Another emerging issue pertains to how students' usage patterns may either facilitate or constrain interactive learning opportunities. As demonstrated in the results, most students elicited various types of corrective feedback. More importantly, however, a significant proportion of interactions involved composing feedback, such as drafting, summarizing, revising, and paraphrasing. Consequently, instructors often struggle to determine whether students are legitimately using ChatGPT as a feedback scaffold to improve their writing, or merely using it as a composing tool to outsource their written work. If ChatGPT executes the entire writing process—spanning planning, drafting, and revising—without cognitive engagement from the student, it is likely to severely constrain the development of foundational writing skills. A primary concern is that ChatGPT often assumes the role of the writer, circumventing the cognitive struggle necessary for language acquisition. Therefore, future research must carefully investigate instructional designs that mandate cognitive interaction with AI feedback in the classroom.

These concerns align with recent literature (Bozorgian and Yazdani 2021; Gayed et al. 2022; Su et al. 2023; Kim 2024). Specifically, Su et al. (2023) warned that

overreliance on ChatGPT could impair higher-order cognitive development, while Kim (2024) observed that EFL learners' tendency to treat ChatGPT as a text generator rather than a critical feedback tool often precipitates academic dishonesty, including plagiarism. To safely integrate AI into instructional practices, educators must establish clear boundaries between a "composing tool" and "composing feedback," even if this operational criteria remains conceptually fluid. From an EFL perspective, AI usage can only be deemed valid composing feedback when students remain actively engaged in the writing process through sustained cognitive interaction with the AI across both individual and social domains. In this respect, when practitioners use AI as a feedback tool, they need to teach students the specific criteria for determining plagiarism.

Regarding the TAM variables, the results from the structural equation modeling (SEM) underscore the critical role of students' perceived usefulness and ease of use. The findings demonstrate that ChatGPT self-efficacy positively influences learning satisfaction, provided students possess the requisite skills to communicate effectively with the AI technology. Consequently, explicitly teaching students how to utilize ChatGPT as a corrective feedback tool enhances their TAM perceptions, thereby fostering productive engagement. Specifically, when students feel confident in navigating hybrid writing environments, they form more positive appraisals of the technology and actively attempt to incorporate AI assistance into their writing processes. This corroborates the postulation that task-specific technology self-efficacy is a decisive factor in learners' willingness to interact constructively with generative AI.

Because ChatGPT self-efficacy strongly predicts student satisfaction via TAM mediators, several practical implications emerge. First, practitioners must provide opportunities for students to develop the specific skills required to use ChatGPT as a feedback tool. A viable approach is designing a hybrid curriculum that synthesizes teacher-directed instruction with AI-generated feedback. Instructors must not operate on the assumption that all digital natives inherently possess the technological competencies required to generate and evaluate AI feedback. Students with lower AI proficiency may feel marginalized in a ChatGPT-integrated environment, potentially widening the achievement gap in writing practices. Therefore, classroom teachers must implement context-specific training programs to equip all learners with the operational and critical skills necessary for ChatGPT-assisted writing.

While this study underscores the significance of AI-assisted feedback in EFL

writing, further research is required to validate and expand upon the proposed empirical model. First, as this study was confined to EFL writing, future investigations should explore other linguistic domains, such as reading comprehension or integrated reading-to-writing courses. Second, although survey data revealed a wide array of feedback types, the precise qualitative nature of how students utilize ChatGPT to improve their writing remains obscured. Future research should employ qualitative methods to trace students' specific interactional behaviors. Finally, the findings cannot be considered definitively conclusive, given that the sample was restricted to English-major students at a single urban university. Subsequent research involving more diverse learner populations and educational contexts is essential to generalize these findings.

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Appendix

Questionnaire on ChatGPT Utilization

The purpose of this survey is to investigate learners' perceptions of ChatGPT feedback based on their experiences using it for English learning and assignments. Specifically, it aims to examine how technological self-efficacy regarding ChatGPT affects learning satisfaction through perceived ease of use and perceived usefulness. Your responses will be used strictly for research purposes related to teaching and learning, so we kindly ask for your sincere and thoughtful answers. Thank you.

Demographic Information

■ Gender: Male · Female	■ Age:
■ Major:	■ Grade:
■ School Location: (Urban / Rural)	
■ Self-assessment of ChatGPT proficiency: (Beginner / Intermediate / Advanced)	
■ Prior experience with ChatGPT for English learning: (Yes / No)	

Please indicate your level of agreement using the 5-point scale (1-5) below:

A. Perceived Usefulness & Perceived Ease-of-use		Response (from 1 to 5)				
1	Using ChatGPT's feedback helps me complete my English tasks more quickly.	1	2	3	4	5
2	Using ChatGPT's feedback improves the quality of my English work (e.g., accuracy and completeness).	1	2	3	4	5
3	Using ChatGPT's feedback increases my productivity in English learning and assignments.	1	2	3	4	5
4	Using ChatGPT's feedback makes it easier for me to accomplish English tasks.	1	2	3	4	5
5	Using ChatGPT's feedback is useful for achieving better outcomes in English (e.g., grades, evaluations, learning goals).	1	2	3	4	5
6	It is easy for me to request what I need from ChatGPT and receive appropriate feedback for English tasks.	1	2	3	4	5
7	Interacting with ChatGPT to obtain feedback is clear and easy to understand.	1	2	3	4	5
8	It is easy for me to learn and become skillful at using ChatGPT as a feedback tool for English.	1	2	3	4	5
9	Iterating and refining my prompts to get the feedback I want is easy.	1	2	3	4	5

A. Perceived Usefulness & Perceived Ease-of-use		Response (from 1 to 5)				
10	Using ChatGPT for English learning requires little effort or time.	1	2	3	4	5
B. Perceived Academic Achievement & Technology Self-Efficacy						
11	Using ChatGPT's feedback improves my grades or evaluation results on English assignments.	1	2	3	4	5
12	Using ChatGPT's feedback enhances the accuracy and completeness of my English work.	1	2	3	4	5
13	Using ChatGPT's feedback deepens my understanding of English concepts (e.g., grammar, vocabulary, structure).	1	2	3	4	5
14	Using ChatGPT's feedback helps me perform better on English assessments (e.g., standardized tests).	1	2	3	4	5
15	With the same amount of study time, using ChatGPT's feedback leads to better learning outcomes for me.	1	2	3	4	5
16	I can craft effective prompts to obtain the feedback I need from ChatGPT.	1	2	3	4	5
17	I can evaluate ChatGPT's responses and follow up with revisions or clarifying questions when needed.	1	2	3	4	5
18	I can adjust how I use ChatGPT to fit the requirements of different English learning tasks.	1	2	3	4	5
19	When issues arise (e.g., errors, misunderstandings, access problems), I can troubleshoot and continue using ChatGPT.	1	2	3	4	5
20	I am confident in using ChatGPT reliably within online learning environments.	1	2	3	4	5

Sun-Young Kim

Professor

Department of English Education

Mokpo National University

1666 Yeongsan-ro, Muan-gun,

Jeollanam-do, 58554, Korea

E-mail: sunyoung0412@mokpo.ac.kr

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