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AI-Generated Vs Teacher-Generated Emergent Feedback: Effects on EFL Learners' Writing Feedback Literacy and Perceptions

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Abstract

This mixed-methods study explored the influence of AI- and teacher-generated emergent feedback on Iranian upper-intermediate EFLlearners' writing feedback literacy and perceptions of both feedback modes. The study included 118 upper-intermediate EFL learners in the last balanced analytic sample, with 59 participants per feedback condition. The feedback literacy scale was administered twice: before IELTS writing instruction and after 10 sessions. Following an explanatory mixed-methods design, initially descriptive statistics, assumption checks, and mixed ANOVA were conducted. Next, semi-structured interviews were administered to 20 learners, and the results were analyzed using thematic analysis. The quantitative results showed that writing feedback literacy improved over time. Moreover, when scores across the two measurement points were averaged, they differed across feedback conditions. However, the Time × Feedback Condition interaction was not statistically significant. Hence, no statistical evidence was given to support and indicate different enhancements across AI- and teacher-generated emergent feedback. The qualitative results revealed different perceptions. Learners related AI feedback to receiving an instant response, to the same diagnosis more than once, and to monitoring independently. They associated teacher feedback with context-related explanations, conversation, and feeling supported. Since the study did not encompass a no-feedback comparison condition, the overall increase should be interpreted with caution and should not be ascribed to emergent feedback.

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Introduction

Having the ability to produce well-structured texts in a second or foreign language (S/FL) is a factor that largely helps learners in their quests for academic and educational growth, particularly in higher education contexts (Johnston & George, 2018; Wale & Kassahun, 2024; Zhang & McEneaney, 2020). However, becoming proficient in a S/FL is usually demanding for many language learners as it rests on their knowledge of language structure, lexis, content, organization, and rhetoric. Addressing these areas while producing a piece of text makes writing a challenging language skill (Lai, 2015; Marlina, 2024). Its complex and multi-facet nature also makes writing instruction highly demanding for language teachers (Safari & Ahmadi, 2024; Zhang & Yu, 2024).

Generating timely and relevant feedback is a widely discussed pedagogical strategy in research for helping learners address these challenges and improve their writing skill (Guo & Wang, 2024; Teng, 2024). Of its various type, corrective feedback, in particular, is largely considered as a productive approach for enhancing English as a Foreign Language (EFL) learners' writing skills (Maslucha et al., 2024; Rasool et al., 2024). Corrective feedback is usually offered in delayed mode due to teachers' busy schedule, limited classroom time, and the time-consuming nature of reviewing learners' texts. To be more efficient, corrective feedback should be generated in emergent mode, scaffolding learners through the process of writing helping them detect and address the problems in their texts (Zarei et al., 2018, 2020).

Corrective emergent feedback has just recently started to capture attentions in EFL writing research. Grounded on Vygotsky's (1978) sociocultural theory, it is suggested that social interactions and cultural experiences are essential for cognitive development (Xu & Qin, 2024). More specifically, social interactions with more capable peers are believed to play a mediating role in the process of learning as such exchanges can help learners become more independent in thought and action (Shen et al., 2024). In this sense, emergent feedback can be seen as a dynamic process that begins with more implicit forms of guidance and moves gradually toward more explicit correction. This guidance should be aligned with learners' developing level of understanding and independence (Zarei et al., 2018, 2020).

The emergence of generative artificial intelligence (AI) tools and platforms in recent years has facilitated feedback presentation process (Guo & Wang, 2024; Mahapatra, 2024; Teng, 2024). In particular, new models of generative AI, such as ChatGPT, with sophisticated large language models (LLMs), have made human-like conversations with detailed and instant analysis of written input possible (Barrot, 2023; Zafrullah et al., 2024). As the application of generative AI grows in EFL classrooms, it would be theoretically and pedagogically insightful to compare AI-generated feedback to teacher-generated one in terms of efficacy and outcomes, especially when both presentation modes are framed within the emergent feedback model.

To gain more comprehensive understanding of how AI- and teacher-generated emergent feedback works, it would be essential to explore learners' feedback literacy. This literacy is

conceptualized as learners' ability to understand and act upon the feedback through judging it, managing affective responses and taking meaningful action to improve their action based on the comment they have received (Sutton, 2012; Yu et al., 2022). Research (e.g., Han & Xu, 2021; Zhang et al., 2023) suggests that constant exposure to corrective feedback can enhance learners' feedback literacy particularly if they are required to interpret teacher's comments, evaluate their relevance, affectively regulate their reactions to such comments, and make decisions about responding to these comments. For this to happen, teachers need to create a convenient learning environment in which learners efficiently draw on the given feedback (Han & Xu, 2021; Zhan, 2022).

Feedback literacy has been widely explored in previous studies with reference to learner engagement with feedback (Han & Xu, 2021), L2 writing outcomes (Zhang et al., 2023), and self-assessment (Yan & Carless, 2022). When it comes to teacher- and AI-generated emergent feedback, research on feedback literacy remains scant. Furthermore, there is a dearth of research on learners' perception of this experience. Considering the potential of generative AI for human-like feedback generation and given the scarcity of research on learners' feedback literacy in this regard, more research is needed on AI-generated emergent feedback in relation to writing feedback literacy. Comparing the effects of AI-generated feedback with teacher-generated one in terms of feedback literacy can help EFL course designers and teachers design more effective pedagogical approaches for writing practice. Theoretically speaking, such a comparison is also productive as it uncovers how moving from implicit comments to explicit correction can help learners recognize feedback and take action. To address this research gap, the present study compares the effects of AI-generated and teacher-generated emergent feedback on writing feedback literacy of Iranian upper-intermediate EFL learners and their perceptions of these two feedback modes. It is worth noting that teacher-generated emergent feedback is not treated as the antithesis of AI feedback in the present study; rather both feedback types are analyzed in terms of operationalizing the logic of graduated mediation.

In other words, learners' perception of feedback plays an important role in determining whether learners will attend to the feedback, trust it, and respond to it (Shen & Chong, 2023; Teng, 2024). This willingness also shapes their feedback literacy (Carless & Boud, 2018; Han & Xu, 2021; Yu et al., 2022). Despite their determining role in the process of EFL writing development, research remains scant on how different types of written feedback (e.g., teacher-generated versus AI-generated one) might affect and shape learners' feedback literacy. Moreover, research has not fully explored learners' perceptions of these two feedback sources in relation to feedback literacy. With this in mind, the present study examined the comparative effect of AI and teacher emergent feedback on Iranian EFL learners' feedback literacy. It also explored their perceptions to each of these two feedback types. The following research questions were addressed in this study:

Does the change in writing feedback literacy differ between AI-generated and teacher-generated emergent feedback conditions?

Do learners report distinct perceptions of AI-generated and teacher-generated emergent feedback in relation to writing feedback literacy?

Literature review

Emergent Written Corrective Feedback: Theoretical Grounding

Feedback, more specifically written corrective feedback, is a crucially important strategy in influencing EFL learners' writing performance (Mirzaii & Aliabadi, 2013; Weisi et al., 2025). Such feedback not only needs to entail specific qualities but also requires learners' attention and constructive engagement to be effective (Hyland & Hyland, 2019; Yu et al., 2022). Written corrective feedback is offered in different forms. It may be generated by the teacher, more capable peers, and/or platforms capable of speech or text recognition. To be efficient, written corrective feedback should be meaningful, personalized and contextual information (Zheng & Yu, 2018). It is generally believed that, when given by the teacher, such feedback may enhance learner's self-confidence and motivation that is not necessarily achieved by automated tools (Carless & Winstone, 2023). The empirical research shows that learners tend to find teacher feedback more helpful in dealing with meaning-level problems, personalized advice and affective aspects of learning (Er et al., 2024; Steiss et al., 2024).

However, when generated in conventional paper-and-pencil mode, corrective feedback is usually confined to the identification of errors in learners' writing and sometimes entails suggestions for improvement (Shen & Chong, 2023; Wang et al., 2023). Generating such feedback is a time-consuming task and is usually accomplished in delayed mode due to the time restrictions and large classroom size (Mattarima & Hamdan, 2011; Nawshin, 2009). These challenges lead many teachers to a one-time review of learners' final texts usually out of the classroom setting. While delayed corrective feedback is widely applied and entails some educational value, it does not provide opportunities for learner mediation through the process of writing and may hardly result in efficient revision (Mattarima & Hamdan, 2011; Nawshin, 2009).

On the contrary, scaffolding learners through the process of writing in an emergent mode gives them the mediation needed for progressing to their actual level of writing development (Shalizar & Rezaei, 2023). Known as emergent feedback, such mediation features a dynamic and responsive approach that aims at enhancing learners' awareness about their writing to promote effective error correction (Zarei et al., 2020). Emergent feedback, first proposed by Zarei et al. (2018), is defined as graduated scaffolding which is initiated at the most implicit level and moves to the most explicit level based on the learner's responsiveness and growing independence. More specifically, similar to dynamic assessment, such feedback entails a sequence of comments beginning with the most implicit prompting, proceeding to clarification request, suggesting effective language use, and finally concluding with explicit correction and explanation (Zarei et al., 2018). However, dynamic assessment centers on combining the assessment and teaching in a dynamic pretest–mediation–posttest format and modifiability

measurement (Aljaafreh & Lantolf, 1994). Emergent feedback, on the other hand, is provided based on an already-available feedback category which is delivered from the most implicit to the most explicit manner and hence is predefined and pre-arranged. The current study similarly applies emergent feedback as a strategy for delivering scaffolding rather than dynamically evaluating learners to help them develop their understanding, evaluation, and knowledge construction abilities.

Grounded in Vygotsky's (1978) notion of zone of proximal development (ZPD), it is suggested that emergent feedback can engage learners in the problem-solving required to fill the gap between the current and potential levels of writing skill resulting in learning and cognitive development. This potential is mostly attributed to the supportive and gradual nature of such feedback that enables learners to gain the confidence required to fill the gap between what they can indecently produce in written mode and what they can accomplish with the assistance of a more capable peer (Lantolf, 2000). This occurs through socially mediated interactions, with a more knowledgeable person who provides individualized support within the learner's ZPD. In addition to Vygotsky's (1978) notion of ZPD, the concept of emergent feedback has been inspired by studies on contingent mediation where the level of assistance is set depending on the learner's reaction (Aljaafreh & Lantolf, 1994; Lantolf, 2000). This idea of mediated scaffolding has recently started to capture attention in L2 research (Zarei et al., 2020).

Research on emergent feedback in L2 contexts has mainly focused on its effectiveness when provided in oral modes for enhancing learners' oral fluency and accuracy (e.g., Zarei et al., 2018). Other research strands include the analysis of its impact on learner motivation and perception formation (Zarei et la., 2020), and writing skills development (Shalizar & Rezaei, 2023). The reported findings suggest that graduated mediation facilitates learner independence in language use, whether oral or written, in case it is based on learner reactions rather than offer in a pre-arranged mode (Shalizar & Rezaei, 2023).

Despite its educational value, emergent written feedback has not been widely applied and explored in L2 classrooms. This might be attributed to its time-consuming nature as the mediation is required to be provided at different phases through the process of writing. Considering the large classroom size, teachers' busy work schedules, and compact instructional materials, it appears natural for many teachers to avoid practicing such feedback. Add to this teachers' limited knowledge about its requirements and the effective way it can be offered. This is where technology, and more specifically artificial intelligence (AI), can be applied as a solution. In what follows, the possible contribution of AI platforms for generating emergent written feedback beyond the confines of the physical classrooms is discussed.

AI- versus Teacher-Generated Emergent Feedback

Recent advances in large language models (LLMs) and the emergence of generative AI platforms capable of generating personalized and customized feedback for every single user based on their input have opened up new opportunities for feedback presentation and language skill development. AI feedback in general terms features machine-generated feedback which

draws on natural language processing and machine learning technologies (Barrot, 2023; Guo & Wang, 2024). Automated writing evaluation tools usually score written texts using predefined scoring rubrics or error-detection algorithms (Waer, 2023).

The feedback generated by AI tools, such as ChatGPT and other Automated Writing Evaluation (AWE) systems has the advantage of scalability, immediacy, and consistency (Daungsupawong & Wiwanitkit, 2025; Steiss et al., 2024; Waer, 2023). Contrary to conventional automated evaluation platforms which relied largely on pre-set and usually limited algorithms for evaluation and scoring or texts, generative AI platforms are capable of offering more context-sensitive and personalized explanations depending on the prompt they receive. These platforms can generate explanations, suggestions and even reformulations based on the learner's written text without assigning scores or detecting only surface-level errors (Teng, 2024; Zhan & Yan, 2025). In other words, generative AI tools and platforms can be trained to move beyond simple error correction strategies and scaffold learners through the process of writing by generating implicit mediation and guiding them toward finding and understanding the errors in their texts. These qualities turn generative AI to an apt tool for providing emergent written feedback as these tools are ubiquitously available beyond the spatial and logistic confines of the classrooms. The custom GPT applied in the present study, for instance, was similarly trained to offer a graduated sequence of writing feedback rather than a single correction.

The findings from empirical studies conducted on AI-generated feedback have reported positive impacts on EFL writing skills, as well as revision and engagement (Guo & Wang, 2024; Harunasari, 2022; Imran & Almusharraf, 2023). There is also some evidence reflecting that AI can offer immediate scaffolding, help overcome cognitive barriers when writing, and aid in revising a writing iteratively (Gayed et al., 2022; Teng, 2024). Nevertheless, the drawbacks of AI include an over-reliance on it, confusingly inconsistent depth of feedback, and a lack of relational support compared to teacher feedback (Algrin et al., 2025; Kohnke et al., 2025). Such contrasting results necessitate more in-depth analysis of AI-generated and teacher-generated emergent feedback.

Teacher-provided feedback could offer a rich content, a personalized experience, and even relationship-based support (Er et al., 2024; Steiss et al., 2024) whilst AI-generated feedback would be timely, consistent, and scalable (Algrin et al., 2025; Kohnke et al., 2025; Teng, 2024). The review of the literature indicates that there are only few studies which have explored the effects of implicit, explicit, and emergent oral feedback on Iranian EFL learners' oral accuracy, fluency, and attitude (Zarei et al., 2018), and EFL learners' motivation, attitude and perception (Zarei et al., 2020). Shalizar and Rezaei (2023) have also examined the differential effects of focused versus unfocused ZPD and explicit feedback on second language writing.

Feedback Literacy and Learners' Perception toward Feedback

How effective corrective, delayed, or emergent feedback can be depends on a number of factors, including its pedagogical design, its mode of delivery, and perhaps above all, learners'

understanding of the feedback (i.e., feedback literacy) (Carless & Boud, 2018; Sutton, 2012; Yu et al., 2022) and their perceptions and attitudes toward it (Han & Xu, 2021; Lee, 2017). Regardless of the mode of delivering (i.e., teacher- or AI-generated) corrective feedback, without feedback literacy on the part of learners, emergent or any other form of written feedback cannot be realized to its full potential. In other words, in the absence of an ability to and readiness for understanding and acting upon the feedback, learners cannot be expected to effectively notice the errors, revise their text, and develop their writing skill. Feedback literacy, reflects learners' readiness to effectively grasp, process, and use feedback to enhance their work (Carless & Boud, 2018; Sutton, 2012). Grounded on Sutton's (2012) model of knowing, being, and acting, such literacy enables learners to appreciate feedback's value, recognize diverse feedback sources, pass sound judgments, control emotions, and take practical steps (Yu et al., 2022). These allow learners to evaluate and act upon writing feedback while managing their affective responses throughout the process (Yu et al., 2022). For this to happen, learners need to play an active role in their own development, which requires a shift away from a teacher-centered, transmission model of feedback toward a more learner-oriented paradigm.

More recent research on written corrective feedback has highlighted the essence of enhancing learners' ability to understand feedback in order to effectively respond to it (Carless & Boud, 2018; Han & Xu, 2021). feedback literacy enables learners to receive feedback, identify the sources of feedback, make reasonable decisions, manage one's emotions, and engage in actions (Sutton, 2012; Yu et al., 2022). Feedback literacy becomes particularly important for second and foreign language writing in which learners need to balance their writing to accomplish the task and effectively demonstrate coherence and cohesion, lexical resources, and grammatical accuracy for which learners need to perceive different types of feedback that may be either implicit, explicit, or contradictory (Chen & Wang, 2023; Hwang et al., 2023). Research suggests that exposure to corrective feedback might foster feedback literacy as it encourages learners to detect their mistakes, compare them with the feedback received, and revise and regulate their affect (Han & Xu, 2021; Weng et al., 2024; Zhang et al., 2023). However, the source of feedback, be it teacher or AI, could scaffold these processes in different manners (Er et al., 2024; Steiss et al., 2024).

The second most important determiner of the success/failure of feedback is learners' perception toward it. Learners actively process and interpret feedback through their own beliefs, prior experiences, and even their expectations. As far as feedback sources are concerned, exploring learners' perceptions of different modes of feedback delivery is essential. When it comes to AI feedback, learners tend to appreciate the promptness, convenience, and usefulness it can provide in spotting surface-level errors, but doubt its accuracy or rhetorical and meaning (Algrin et al., 2025; Kohnke et al., 2025; Teng, 2024). On the other hand, teachers' feedback may be considered trustworthy and relational; but it may also be regarded as delayed and less available (Er et al., 2024; Steiss et al., 2024).

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Method

Research Design

This study adopted an explanatory mixed-methods design with quantitative data collected during the first phase of the study were followed by qualitative data collection and analysis. In the present study, qualitative data were applied to enrich the analysis of the quantitative findings. Thus, the quantitative phase of the study dominates the qualitative phase.

Setting and Participants

This study was conducted in 2024–2025 academic year at Islamic Azad University (IAU), Tehran and Karaj branches. The researchers operationalized the research plan in the regular academic program. From an initial pool of 200 EFL learners studying at different majors, 160 learners were selected based on intact accessible classes. After administering Oxford Quick Placement Test (OQPT), 120 learners at upper-intermediate level of language proficiency (OPT 37–47) were selected for the study and divided into two groups of 60 (i.e., AI and Teacher feedback groups). Learners at this proficiency level were selected as they are believed to have the ability to produce texts of required length for IELTS writing tasks and comprehend AI-generated comments. At the same time, their writing ability might be slightly restricted in terms of coherent argumentation, lexical resource, and grammatical range and accuracy).

Since one participant left the study from the AI group during the study, the data from one participant in the teacher feedback group was randomly deleted. As a result, the final analysis was conducted on the data from 59 learners in each group. Considering the large number of students and the time-consuming nature of the treatment (i.e., writing instruction, practice, and revision), to help the instructor better manage classroom instruction and writing evaluation, particularly in the teacher-feedback group, each group (n = 59) was divided to four classes (i.e., n class 1 = 15, n class 2 = 15, and n class 3 = 15, and n class 4 = 14). The first researcher attended the study as the course instructor in both groups and across the classes.

This study included 51 (43%) male and 67 (57%) female participants within the age range of 20-24 and a mean of 22.8 (see Table 1). Learners majoring at English Language Teaching, English Translation, or English Literature participated in the study. All participants had access to smartphones and had previous experience using AI. Informed consents were obtained from participants and they were informed that their identities would remain confidential. Further ethical safeguards included voluntary participation, anonymized data handling, safe storage of user data.

Table 1

Detailed Demographic Information of the Participants

Standard Deviation (SD)	1.2	1.3	1.25
Range	20–24	20–24	20–24

Gender, n (%)			
Male	26 (44.1%)	25 (42.4%)	51 (43.2%)
Female	33 (55.9%)	34 (57.6%)	67 (56.8%)
Educational Status			
Full-time Undergraduate	59 (100%)	59 (100%)	118 (100%)
Major, n (%)			
English Language Teaching	22 (37.3%)	20 (33.9%)	42 (35.6%)
English Translation	20 (33.9%)	21 (35.6%)	41 (34.7%)
English Literature	17 (28.8%)	18 (30.5%)	35 (29.7%)
Institutional Branch, n (%)			
Tehran	32 (54.2%)	33 (55.9%)	65 (55.1%)
Karaj	27 (45.8%)	26 (44.1%)	53 (44.9%)
Intact Class Groups, n	4	4	8

Instruments

Writing Tasks

Ten IELTS Academic Writing Task 2 topics and relevant instruction were selected to ensure that the task requirements were comparable throughout the treatment. Participants were required to write multi-paragraph argumentative or opinion essays under 40 minutes. The selected topics addressed education, technology, environment, and social concerns. Task types included descriptive, narrative, and argumentative, with opinion essays dominant as they better elicited the cognitive and linguistic requirements of IELTS Task 2. Writing instructions were piloted for clarity and appropriate difficulty prior to the intervention.

Oxford Quick Placement Test (OQPT)

The paper-and-pencil OQPT, developed by Oxford University Press and the University of Cambridge Local Examinations Syndicate, consisting of 60 multiple-choice items was used to select a homogenized group of participants in terms of language proficiency. Contrary to the computer-based version, this version does not include listening and primarily focuses on reading and grammatical/lexico-grammatical language use (Oxford University Press & University of Cambridge Local Examinations Syndicate, 2001). Only the learners whose scores fell within the range of 37 to 47 (M = 41.70, SD = 2.71) were asked to participate in this study. To evaluate the reliability of the instrument, Cronbach's Alpha was calculated. A reliability estimate of 0.91 reflected an acceptable level of internal consistency.

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Learners' Writing Feedback Literacy Scale

Learners' writing feedback literacy was measured before and after the treatment via a five-point Likert scale questionnaire consisting of 28 items developed and validated by Yu et al. (2022). The options range from 1 (strongly disagree) to 5 (strongly agree). Similar to OQPT, this instrument was administered in pencil-and-paper format. The instrument measures five dimensions of feedback literacy including appreciating the value of feedback (10 items), acknowledging that different feedback sources offer different learning opportunities (5 items), making judgments about writing based on those criteria (5 items), managing affect or negative emotional reactions to feedback (3 items), and taking action or planning how feedback shapes future writing (5 items) (Yu et al., 2022). A Cronbach's Alpha of 0.87 reflected satisfactory reliability for this scale.

AI-based Writing Feedback Tool

This study used a domain-specific Custom GPT named EFL Writing Feedback Tutor as the main instrument for generating feedback on learners' writing in the AI feedback group. Embedded in the ChatGPT platform, this feedback agent was customized for IELTS-informed EFL writing evaluation and feedback generation. This educational assistant provides individualized feedback on learners' essays based on their evolving writing competence. More specifically, the feedback starts with implicit cues and gradually progresses toward more explicit comments (e.g., corrections) if the learner fails to notice or self-correct the errors. In other words, movement to more explicit feedback occurred when the learner did not notice or self-correct the problem at the preceding level. Therefore, the tool served as a standardized instrument for generating AI-mediated emergent feedback.

The Custom GPT was designed to offer feedback based on IELTS band descriptors: task achievement, coherence and cohesion, lexical resource and grammatical range and accuracy. It generates individualized feedback depending on the writing ability of the learners. Based on a 6-cycle sequence of feedback delivery, graduated mediation was provided. The first cycle involved implicit cues offered in the form of indirect coded feedback; that is, the AI agent used error codes associated with grammar, vocabulary, cohesion, coherence, and task completeness. For the second cycle, indirect unfocused feedback was offered, which involved providing sentence numbers and error types without explicit correction. The third cycle, indirect focused feedback, involved marking erroneous sentences and identifying the incorrect or inappropriate word or phrase. In the fourth cycle, elicitation feedback was provided; it exposed learners to choice prompts to guide them toward self-correction. The fifth cycle related to metalinguistic explanation through which learners received brief rule reminders but their texts were not corrected or rewritten. In the last cycle, direct explicit correction, the error was spotted and the corrected form was offered.

More specifically, the feedback starts from the implicit cues and progressively develops into explicit comments, including corrections, if the learner fails to notice or self-correct the mistakes. In other words, the progress towards the more explicit feedback occurs when the learner fails to notice or self-correct the problem at the previous stage (Aljaafreh & Lantolf, 1994; Zarei et al., 2018).

Semi-structured Interviews

A series of semi-structured interview questions were developed to elicit responses from the participants regarding how they perceived the impact of teacher- and AI-generated emergent feedback on their writing feedback literacy. The interview instructions were examined by three TESOL and applied linguistics professionals to ensure content validity. Each participant attended a 30- to 40-minute interview session in person and the interviews were conducted in Persian. The questions aimed at eliciting information about the extent to which learners valued feedback, were able to identify sources, judge feedback effectiveness and relevance, manage their emotional reaction to it, and act based on their feedback their received. For instance, the question "how do you perceive the value of teacher-generated feedback for improving your writing?" was used to obtain information about how participants valued feedback. "What emotions arise when you receive critical teacher-generated feedback, and how do you regulate them to act on the feedback?" aimed at eliciting information about learners' affect management. Participants' ability to recognize sources was explored with "Can you distinguish between feedback from AI and from your teacher in terms of its source and intent?". In other words, for each of the five dimensions of feedback literacy, one relevant question was asked.

The Writing Course

The writing course ran for ten 90-minute sessions for both groups (each comprised of four classes of 14 to 15 learners in terms of treatment) in the academic year of 2024-2025. The instructor applied a task-based teaching approach for writing instruction and practice. The course aimed at preparing the upper-intermediate EFL learners for IELTS Academic Writing Task 2. Hence, the focus of instruction was on the main skills required for performing this task successfully.

Procedure

AI-Emergent Feedback Group

The learners in the AI-emergent group took part in the study in four classes with three classes containing 15 learners and one class consisting of 14 learners. They submitted their essays to the customized GPT agent, *EFL Writing Feedback Tutor*, to receive emergent feedback. The agent was created, with the assistance of an IT specialist, on the GPT-4 Turbo model and accessed through OpenAI's Custom GPT framework. The GPT agent provided iterative, scaffolded comments related to text organization, lexical precision, grammatical range, and argument development based on Aljaafreh and Lantolf's (1994) graduated mediation

framework for written corrective. Accordingly, participants received six rounds of feedback including 1) Indirect Coded, 2) Indirect Unfocused, 3) Indirect Focused, 4) Elicitation, 5) Metalinguistic Explanation, and 6) Direct Explicit Correction in an ascending order from the most implicit to the most explicit.

The agent was trained to 1) avoid explicit correction at initial stages of feedback exchange with the user and 2) align its evaluation with the four IELTS band descriptors (task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy). Additionally, specific error-code taxonomies were developed for the descriptors and given to the AI agent during training phase to ensure that the error were consistently categorized across all six feedback cycles. To validate AI agent's feedback accuracy and consistency, its function was pilot tested using 12 sample essays. The agent was further trained based on the results until it was observed that the AI's generated comment completely adhered to the feedback stage, error-code taxonomy, and the provided instructions for formatting and early-stage correction avoidance. All hallucinations or off-taxonomy suggestions were addressed by the IT specialist, and the system prompt was subsequently refined.

To standardize the prompts across participants, the instructor shared six prompts with participants via a classroom Telegram channel. They were informed to submit their writing to the AI agent and start entering the given prompts in the specified order. Participants were required to review and edit their texts based on the feedback they received from the agent after submitting each prompt. The agent evaluated the resubmissions following each feedback round. If the specified error was successfully addressed, the AI agent advanced to the next implicit-to-explicit stage. If participants failed to address the problem, they remained at that stage and received more scaffolding, after which more direct guidance was provided to help them revise their text and move to the next stage. The entire process was monitored by the instructor, who helped participants and guided them through when they encountered problems. In other words, the instructor played a facilitative role; that is, she helped them address the technical issues while at the same time tried to enhance learners' sense of responsibility for revising their texts. Participants were asked to document their revisions in a feedback log, enabling the instructor to monitor uptake and ensure engagement with each feedback stage before progression. The essay topics were the same for the four classes and participants had about 40 minutes to write their essays during the classroom meeting.

Participants in each class attended one session per week for 15 consecutive weeks and every three sessions focused on one of the IELTS Academic tasks, prompting multi-paragraph argumentative and opinion essays on topics of comparable sophistication and complexity. Thus, overall, there were five writing tasks. The learners in this group completed their drafts in class and submitted them to the AI-feedback tool via their laptops. They received the first feedback round consisting of the first and second feedback stages, and revised their drafts twice. During the second consecutive session, they submitted their drafts to the AI-feedback tool and were given the third and fourth rounds of feedback, and made revisions to their drafts. As for the third session, they were given the third feedback round comprising feedback stages five and

six. It should be noted that in each session, the majority of time was devoted to revision as the learners received two feedback stages and were required to apply the feedback.

Teacher-Emergent Feedback Group

To ensure that identical procedures were followed in both groups, identical writing prompts (or feedback) were given to students in both the AI-generated and teacher feedback groups. The only difference was that, students in this group interacted with the instructor instead of AI. Similar to the AI group, the participants used their personal devices (i.e., laptops and/or tablets) to write their essays. Rather than submitting their work to AI, however, they emailed their essays to the instructor immediately after drafting. Moreover, they were required to complete their essays in about 40 minutes.

The teacher read each draft, first coding the errors and sending back the essays to the students for revision. In the context of the real classroom setting, however, this was completely accomplished using the underlining and highlighting features of the Word Document and the teacher typed the codes on learners' texts, emailing back the texts. Considering the classroom time limitation, the teacher usually offered three rounds of feedback on learners' essays inside the classroom, and the students revised their essays twice. The remaining rounds of revision and feedback generation (i.e., three rounds) were accomplished throughout the week, out of the classroom setting. The students were asked to revise their texts according to the comments and send back their drafts for teacher feedback.

During the classroom meetings, the teacher used to overhead projector to display students' essays with highlighted or coded errors, inviting learners to find the problem. Students were free to ask and answer questions with peers as they watched their differed essays displayed with marked or coded errors. Therefore, the revision process usually engaged students in discussions with peers and the teacher. Students brought their laptops or tablets to the class, and the teacher had access to a desktop computer and an overhead projector. To ensure procedural equivalence, the AI and teacher conditions used identical writing prompts and the teacher used the same feedback generation framework and method for reviewing the texts. To maintain fidelity, a session checklist was used to ensure that each of the six stages was followed and delivered in the predetermined sequence for each task. The teacher monitored revision uptake by having a log.

Post-Treatment Phase

Following the administration of the treatment, the two groups completed the writing feedback literacy questionnaire as posttest. Twenty learners (10 from each condition) were then selected at random from the individuals who volunteered for semi-structured interviews, ensuring equal representation across the two conditions. Participation in the research was voluntary, anonymity was supported through pseudonyms, and the data were used for research purposes only. Table 2 displays detailed demographic information for the semi-structured interview participants.

Table 2

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Demographic Information for Interview Participants

Characteristic	AI-Generated Feedback (n = 10)	Teacher-Generated Feedback (n = 10)	Total (N = 20)
Age (Years)			
Mean (M)	22.6	23.0	22.8
SD	1.1	1.2	1.15
Range	20–24	20–24	20–24
Gender, n (%)			
Male	4 (40%)	5 (50%)	9 (45%)
Female	6 (60%)	5 (50%)	11 (55%)
Major, n (%)			
ELT	4 (40%)	3 (30%)	7 (35%)
Translation	3 (30%)	4 (40%)	7 (35%)
Literature	3 (30%)	3 (30%)	6 (30%)
Branch, n (%)			
Tehran	6 (60%)	5 (50%)	11 (55%)
Karaj	4 (40%)	5 (50%)	9 (45%)

Data Analysis: Quant-Qual

Quantitative and qualitative data were analyzed separately. Quantitative analyses were conducted in jamovi 2.6.45. Descriptive statistics were examined first, followed by baseline comparison, Shapiro-Wilk tests, Levene tests, and the 2 × 2 mixed ANOVA with feedback condition as the between-subjects factor and time as the within-subjects factor. Partial eta squared was reported for ANOVA effects. Standardized values showed no observations exceeding $|z| = 3$ for pretest, posttest, or change scores. Although the teacher-condition posttest distribution departed from normality, the groups were equal in size and variance homogeneity was satisfied; Welch and Mann-Whitney analyses of change scores were therefore used as sensitivity checks. SPSS version 26 was used to analyze the data.

Thematic analysis in light of a deductive-inductive framework was applied to analyze the qualitative interview data (Braun, & Clarke, 2021; Fereday & Muir-Cochrane, 2006). First, by associating every interview question with the writing feedback literacy dimensions (appreciation, recognition, judgement, affective management, and action), a prior codebook was prepared (Table 3) along with their descriptions. Each of the first two researchers coded 1/5 of the transcripts, with a large inter-coder agreement after reaching consensus ($\kappa = .87$). Further patterns developed beyond the initial framework when an inductive pattern was developed. Different sources appeared using analytic memos, and themes were refined through repeated discussion. Three themes emerged: 1) From Compliance to Critical Engagement with Feedback; 2) Metacognitive and Dialogic Pathways to Feedback Literacy; and 3) Ownership, Dependence, and Emotional Regulation in Feedback Use. Synthesis with quantitative outcomes

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was done by considering both thematic patterns and the non-significant Time × Condition interaction.

Table 3

A Priori Codes and Their Descriptions

Code	Code description
Appreciation	Learners' capacity to develop positive attitudes toward receiving feedback and to value feedback as a resource for learning.
Recognition	Learners' ability to identify feedback providers, sources, and formats, and to distinguish among different feedback channels.
Judgement	Learners' capacity to reflectively process, evaluate, and make decisions about the relevance and quality of feedback.
Affective management	Learners' ability to regulate emotional responses to feedback, including managing anxiety, defensiveness, or over-dependence.
Action	Learners' capacity to implement feedback in subsequent writing, including planning, revising, and monitoring changes.

Findings

Quantitative Results

As shown in Table 4, the two feedback conditions began with similar pretest means. The AI-generated emergent feedback group had a pretest mean of 64.88 (SD = 12.18, range = 38–86) and a posttest mean of 76.15 (SD = 19.59, range = 40–114). The teacher-generated emergent feedback group had a pretest mean of 62.86 (SD = 12.52, range = 40–87) and a posttest mean of 67.93 (SD = 18.96, range = 40–105). Each condition contained 59 learners in the balanced analytic sample.

Table 4

Descriptive Statistics for Writing Feedback Literacy by Feedback Condition and Time

Feedback condition	Time	n	M	SD	Min	Max
AI-generated emergent feedback	Pre-test	59	64.88	12.18	38	86
AI-generated emergent feedback	Post-test	59	76.15	19.59	40	114
Teacher-generated emergent feedback	Pre-test	59	62.86	12.52	40	87
Teacher-generated emergent feedback	Post-test	59	67.93	18.96	40	105

Note. Descriptive statistics are based on the balanced analytic sample (n = 59 per condition).

The feedback conditions indicated no significant difference at pretest, $t(116) = 0.89$, $p = .377$, $d = 0.16$. Leven's test showed that homogeneity of variance was not violated at pretest, $F(1, 116) = 0.22$, $p = .638$. With regard to pretest and posttest distributions for AI-condition, Shapiro-

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Wilk tests showed non-significance. However, with regard to the teacher-condition posttest distribution, Shapiro-Wilk tests indicated to be significant, a departure from normality W = .941, p = .006. Levene's posttest test was non-significant F(1, 116) = 0.16, p = .690. the differences/changes in the pre- and post-test scores did not move beyond |z| = 3. To examine the robustness of the mixed-ANOVA conclusion, analyses related to homogeneity of variances, sensitivity, and equality of group sizes were done.

Table 5

Baseline Comparability of Pre-test Writing Feedback Literacy Scores

Comparison	Statistic	df	p	Effect size
Levene test for equality of variance	F = 0.22	1, 116	.638	—
Independent-samples t-test	t = 0.89	116	.377	d = 0.16

Note. The comparison was based on pre-test writing feedback literacy scores.

Table 6

Assumption Checks for Writing Feedback Literacy Scores

Variable	Feedback condition	Shapiro-Wilk W	p	Levene F	p
Pre-test feedback literacy	AI-generated feedback	0.973	.214	0.222	.638
Pre-test feedback literacy	Teacher-generated feedback	0.970	.156	0.222	.638
Post-test feedback literacy	AI-generated feedback	0.967	.106	0.160	.690
Post-test feedback literacy	Teacher-generated feedback	0.941	.006	0.160	.690

Note. Levene statistics are reported for between-group equality of variances at each measurement point.

The mixed ANOVA showed a significant main effect of time, $F(1, 116) = 15.86$, $p < .001$, $\eta^2p = .120$, indicating higher feedback-literacy scores at posttest when the two conditions were considered together. The between-subjects main effect of feedback condition was also significant, $F(1, 116) = 5.60$, $p = .020$, $\eta^2p = .046$, indicating a difference in scores averaged across the two measurement occasions. Critically, the Time × Feedback Condition interaction was not statistically significant, $F(1, 116) = 2.29$, $p = .133$, $\eta^2p = .019$. Thus, the data did not provide statistical evidence that the amount of pretest-posttest change differed between the two feedback conditions.

Table 7

Mixed ANOVA Results for Writing Feedback Literacy

Effect	SS	df	MS	F	p	η^2p
Time	3937.69	1	3937.69	15.86	< .001	.120
Time × Group	567.61	1	567.61	2.29	.133	.019
Group	1545.83	1	1545.83	5.60	.020	.046

Note. Group refers to feedback condition: AI-generated emergent feedback versus teacher-generated emergent feedback. η^2p = partial eta squared.

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Within-condition comparisons showed a significant pretest-posttest increase in the AI-generated feedback condition, $t(58) = 3.54$, $p < .001$, $dz = 0.46$, whereas the teacher-generated feedback condition showed a smaller increase that did not reach the .05 threshold, $t(58) = 1.95$, $p = .055$, $dz = 0.25$. This difference in within-condition significance does not establish a between-condition difference. The direct comparison of change scores was nonsignificant, $t(116) = 1.51$, $p = .133$, 95% CI [-1.92, 14.33], $d = 0.28$. A Welch test gave the same substantive result, $t(111.49) = 1.51$, $p = .133$, and a Mann-Whitney comparison of change scores was also non-significant, $U = 2012$, $p = .145$. These sensitivity analyses support the conclusion from the non-significant Time × Feedback Condition interaction.

Table 8

Within-group Pre–Post Comparisons for Writing Feedback Literacy

Feedback condition	Pre-test M	Post-test M	Mean change	95% CI	t(58)	p	dz
AI-generated emergent feedback	64.88	76.15	11.27	[4.91, 17.64]	3.54	< .001	0.46
Teacher-generated emergent feedback	62.86	67.93	5.07	[-0.12, 10.26]	1.95	.055	0.25

Note. Mean change refers to post-test minus pre-test; dz = standardized mean change for paired samples. Each condition included 59 learners.

Table 9

Between-group Comparison of Feedback Literacy Change Scores

Comparison	Mean difference in gain	95% CI	t(116)	p	Cohen d
AI gain minus teacher gain	6.20	[-1.92, 14.33]	1.51	.133	0.28

Note. Positive values indicate larger gain in the AI-generated emergent feedback group.

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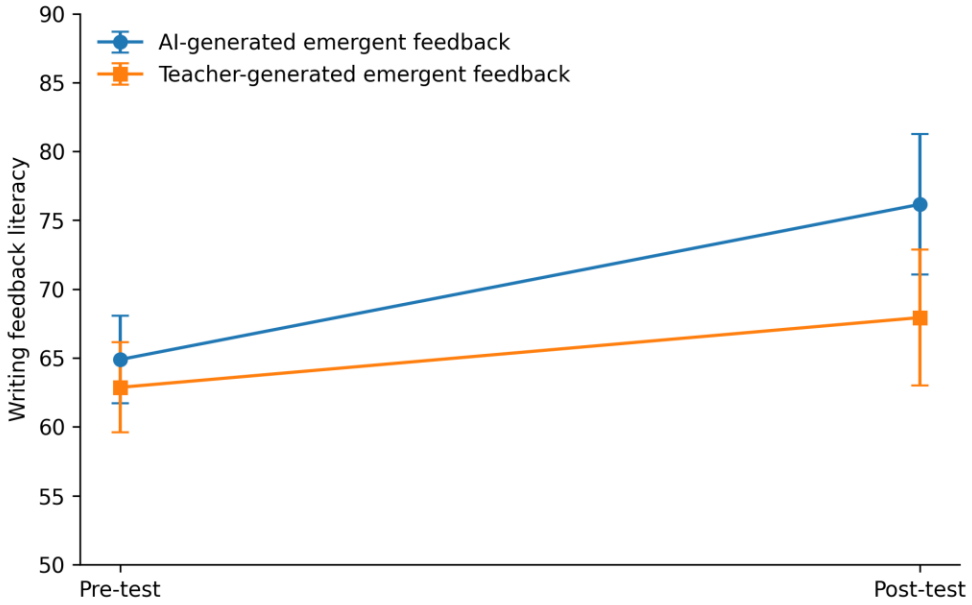

Figure 1.

Writing feedback literacy development by feedback condition

Qualitative Results

A qualitative analysis was carried out to investigate learners' perceptions of AI and teacher-enabled emergent feedback for their writing feedback literacy. The analysis produced three interrelated emerging themes that nuanced the statistical result. Despite the statistical results that there were no significant differences between the two feedback conditions in fostering feedback literacy, interviewees indicated there were different pathways into feedback literacy across the two modes. AI-enabled emergent feedback was mostly characterized as an instrumental, autonomous, diagnostic aid, while teacher-enabled emergent feedback was predominantly indicated as a dialogic, contextualized, relationally-oriented communication. Across the themes, what participants described aligned with making judgments, managing affect, and taking action whereas references to source value and source differences indicated the appreciation and acknowledgement of feedback and its different sources. Participant codes mark the feedback condition (AI or TCHR), and an anonymized ID for each person. For transparency, we built a codebook that mapped each interview question to a feedback-literacy dimension. That mapping shaped the interview protocol and the follow-up coding. Two researchers coded 20% of the transcripts and reached consensus with high inter-coding agreement ($\kappa = .87$). Through discussion, disagreements were settled. Analytic memos recorded cases that did not fit the main patterns. We went back to those cases when refining the themes so the findings would not be overgeneralized beyond what the data allowed. Quantitative and qualitative strands were synthesized at the interpretation stage. Thematic patterns were set against the non-significant Time × Condition interaction to justify how comparable overall gains could still come about through different qualitative mechanisms.

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From Compliance to Critical Engagement with Feedback

For the first theme, respondents considered "whether individual learners responded to a series of feedback comments as a worthwhile activity of reflective-critical thinking or as instructions to be blindly followed". Except where mentioned in relation to detailed elaboration in the next paragraph, especially in the AI-generated feedback condition, shared reflections such as how they had learned to be more cautious and selective in their responses to the suggestions of others:

> *When AI gives a suggestion, instead of correcting immediately, I now judge whether the suggestion is relevant to my essay or not by comparing it with rubric, teacher's expectations, etc. Also I have read a lot of research articles on this topic and learned some academic writing skills. So I could decide whether to accept the AI suggestions according to my knowledge of academic writing. (AI-HSE-L2)*

Most notably, though, the learners in the AI-generated feedback group described how they felt overwhelmed by an excess of information, which ultimately led them to be passive recipients of feedback comments. In conclusion, thus far it appears an increase in feedback exposure by itself was insufficient to direct or deepen a reflective approach to feedback and learning. It was only if learners also had the motivation, knowledge or strategies to think critically about feedback that the feedback experience translated into the kind of feedback literacy training needed for improved writing performance. This theme linked primarily to the judging and appreciating dimensions, as learners described evaluating feedback relevance and developing—or failing to develop—positive attitudes toward receiving large volumes of AI-generated comments.

Metacognitive and Dialogic Pathways to Feedback Literacy

The second theme concerned the learners' increasing capacity to critically reflect on their own writing process as well as to understand feedback interactively. The most successful learners in terms of effective feedback use did not just learn how to eliminate individual errors. They came to recognize patterns of errors, to foreseen areas of weakness, and consequently to rely on feedback as a source for the next draft. In the AI-generated feedback condition this kind of metacognitive growth appeared to be largely related to the consistency of AI diagnosis.

> *After 3* essays*, I could see the points of passive voice that AI had focused on my writing. It inspired me to realize importance of active voice. Now I know what to learn even before AI focuses a lot on it. (AI-HSE-P5)*

Emergent feedback from the teacher fostered metacognitive elaboration in another sense. Some of the most feedback-effective learners evaluated the teacher's comments quite favorably because they explained to them why something was problematic and thus how they could apply that principle in subsequent writing. It seemed that the elaborate nature of teacher feedback, that is,

the dialogic exchanges, was especially conducive to promoting issues of evidence, reasoning, tone, and appropriate style in academic writing.

> *My teacher explained that my evidence and reasoning did not really support the thesis. That correction made me write in a more efficient way and regard writing from a different perspective. (TCHR-HSE-P4)*

These findings imply that feedback literacy is not solely linked to having access to correction. Students require clarity and aid in processing the feedback, perceiving common errors, making rational decisions, and applying a feedback idea to writing independently. This theme predominantly reflected the recognizing dimension, as learners described identifying feedback sources, alongside the action dimension through their documented application of feedback principles to subsequent drafts.

Ownership, Dependence, and Emotional Regulation in Feedback Use

The third theme related to feedback literacy, as it moved to issues of learner ownership and emotion management. Learners with mature feedback literacy responded to feedback; they also formed their own habits of interacting with feedback. They learned how to turn ongoing comments into a personal revision checklist, how to anticipate problems beforehand, and how to carry previous feedback to the next submission. These episodes appeared in both feedback groups, just in slightly different ways.

> *I used a revision checklist based on my AI commentaries: whether I used transitions and whatever else there was, and before I took my paper to the teacher I used the list to check everything, and then I submitted it. (AI-HSE-P2)*

The learners interpreted the request for guidance or a template as a lack of faith they could do their own thinking, and were looking for an authority like the teacher or the AI to determine when they had written adequately. Emotionally, some learners appreciated receiving AI feedback because it was free from personal judgment, because they were free to be risk-takers, and because they could experiment without feeling judged. Taken together, and in direct comparison, the qualitative results show that AI-generated and teacher-generated emergent feedback had complementary effects on feedback literacy: AI improved diagnostic awareness and autonomous monitoring, while teacher feedback improved dialogic sense-making, judgment of context, and emotional scaffolding. This theme aligned most closely with the managing affect and taking action dimensions, documenting how learners regulated their emotional responses to feedback and transformed feedback into actionable revision strategies. A divergent case involved one learner in the teacher condition who reported decreased anxiety over time despite initial apprehension, illustrating that emotional trajectories varied within groups and were shaped by prior feedback experiences.

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Discussion

The purpose of this study was to compare the effect of AI-generated emergent feedback and teacher-generated emergent feedback on Iranian upper-intermediate EFL learners' writing feedback literacy and understand learners' reactions of each mode of feedback. In the balanced reanalysis, there was an overall significant growth in feedback literacy rose significantly over time, and there was also a significant between-condition main effect when the means were calculated across the two measurement points. The Time × Feedback Condition interaction was not significant, however. For comparative improvement, then, the two conditions did not follow statistically distinguishable change paths. The significant condition main effect should not be read as proof that AI feedback led to greater gains. Because feedback literacy is multi-faceted, and the overall average scoring was used for calculating the score means, condition differences may not demonstrate distinct pathways in appreciation, judgement, affect, and action (Sutton, 2012; Yu et al., 2022). Thus, the non-significant interaction cautions against ranking feedback sources.

This result is notable primarily because it moves the field forward from investigating AI feedback versus teacher feedback to exploring what they can afford as pedagogical practices towards a common goal. A good deal of the present rise in research on AI-supported writing has focused on its speed, accessibility, and predictability (Barrot, 2023; Mahapatra, 2024; Teng, 2024) vis-à-vis human feedback; the existing teacher feedback literature has concentrated on explanation, mediation, and relational support (Carless & Winstone, 2023; Ferris, 2011; Hyland & Hyland, 2019). The present findings are consistent with the possibility that both feedback sources can support engagement with feedback when embedded in a graduated framework, but the design does not establish that either type caused the overall increase in feedback literacy. From a sociocultural lens, both types of feedback may have functioned as mediators, but contingent graduation, common in both feedback modalities, remains essential for internalization and learner independence (Aljaafreh & Lantolf, 1994; Lantolf, 2000; Zarei et al., 2018).

The qualitative outcomes illuminate how each mode of feedback could productively aid learner feedback literacy as understood by the formal analysis. Both processes can resonate with the required constructs of feedback literacy: learners valued feedback, recognized criteria, evaluated comments, interpreted them, dealt with emotion, and then acted on them. These processes happened along different pathways, but both supported the development of feedback literacy in naturalistic ways, namely, by means of real-time immediacy, presentation clarity, and continual product iteration in AI support, or simple verbal explanations, affirmatory emotional support, and contextual reference in classroom-group support. Authenticity of contextual reference and explanation is again shown as something necessary to feedback literacy (Carless & Boud, 2018; Han & Xu, 2021; Yu et al., 2022). These qualitative findings further confirm that feedback literacy is a multi-faceted construct comprising knowing, being, and acting,

wherein learners judge, regulate affect, and act on comments (Carless & Boud, 2018; Han & Xu, 2021; Yu et al., 2022).

Both modes of access to emergent feedback again hint at each other's unique advantages, which can be merged into a proposed comprehensive "hybrid" approach integrating AI and teacher as mediational sources of writing feedback. The speed and repetition of self-practice were supported by the structure and flexibility of AI support. On the other hand, verbal explanation, emotional support, relevance to the task, and an authorial supportive framework were best supplied and appreciated through teachers. Together, these affordances support the effectiveness of joint teacher-AI feedback generation, but the present study did not test such a condition. AI and teacher feedback thus appear complementary. In other words, AI offers immediacy and repetition, whereas teachers provide relational and meaning-oriented mediation (Er et al., 2024; Steiss et al., 2024; Teng, 2024). This provides supports for hybrid designs in which both modalities can be used to promote better learning outcomes. This study found an overall increase in self-reported feedback literacy across the instructional period and no statistically significant evidence that the amount of change differed between AI-generated and teacher-generated emergent feedback. The qualitative findings nevertheless suggest that the two sources were experienced through different affordances, supporting a complementary rather than a simple source-ranking interpretation.

Conclusion

This study examined the effects of AI- and teacher-generated emergent feedback on Iranian upper-intermediate EFL learners' feedback literacy and also investigated learners' perception of these two types of emergent feedback. In the balanced analytic sample, self-reported feedback literacy developed over time. The Time × Feedback Condition interaction was not statistically significant, however. The analysis does not indicate that either source led to larger gains than the other. With no no-feedback comparison in the design, that rise should be treated as the result of the instructional period. It is not claimed as an effect of emergent feedback alone. Feedback literacy includes facets such as appreciating, judging, regulating affect, and acting on comments, so gains may arise through different pathways for each specific component (Sutton, 2012; Yu et al., 2022). Thus, promoting evaluative judgement is vital to both feedback conditions; as without it, learners may accept or reject feedback uncritically, whether it comes from AI or a teacher. The qualitative outcomes assist in explaining the way learners experienced feedback conditions in spite of the non-significant interaction. Learners connected AI-generated feedback with immediacy, diagnostic consistency, noticing patterns, and choosing when to work with the feedback. With the teacher, however, they talked about explanation, dialogue, contextual judgment, and emotional support. Not every account fits that picture. Different accounts showed the danger of accepting AI recommendations and reliance on teacher authority, which highlights the requirement for promoting evaluative judgement instead of going along with whichever source is used.

The study contributes to empirical literature studies on AI and teacher feedback by holding both to one graduated-mediation frame. Contingent mediation from implicit to explicit may support internalization, yet both sources ultimately require learner engagement and reflective action to foster autonomy and independence in writing (Aljaafreh & Lantolf, 1994; Zarei et al., 2018). A hybrid feedback mechanism is only a pedagogical conception that follows from the different qualitative affordances. It was not a condition we examined. The results should be read with the limits noted above in mind.

Classroom decisions with regard to AI and teacher feedback should be made based on the needed function rather than being considered interchangeable. The sources should not be assumed to be ranked above the other. AI-mediated graduated prompts may pave the way for opportunities for spotting problems or diagnosis and self-correction while teacher mediation still has a determining role when it comes to contextual explanation, rhetorical judgement, dialogue, and emotional support. learners should be needed to evaluate feedback, account for revision decisions and transfer principles across texts. From a theoretical point of view, the study indicates the way graduated mediation can provide a common structure, which made the comparison more coherent. Feedback literacy, however, shifts attention from feedback transmission to learner interpretation and use.

The findings of the study should be generalized with caution as there are a number of limitations that require attention. Data was mainly self-report. Other results might have been obtained if more diverse data sources were used rather than observing learners' behaviors regarding feedback literacy development. Considering the fact that no control group was used, the overall time effect result may have been the outcome of writing practice, test familiarity, maturation, or repeated exposure to the measure. Future studies should explore how combined and guided use of teacher-AI feedback might affect learners' writing achievement. Additionally, the participants in this study were confined to the learners from two branches of a university. More research is required to explore how learners at different educational contexts and settings might accept AI feedback.

Based on the findings, it is suggested that learners take AI as a feedback resource rather than as a master that they must follow without question. This can include conceptualizing the automated tool as a resource to be analyzed, asking learners to compare the AI comments with the rubrics and usual language features, and emphasizing their comparison of before- and after-feedback drafts rather than blindly copy-pasting suggestions. For its own part, teacher feedback might need a similar style of planning, promoting confidence-building as well as independence in order to make learners clearer about the rationale and transferability of principles. Teachers should engage their learners in clarification exchanges and contrasting alternatives so as to instruct and model a good understanding of principles; they should also infuse their feed-forward instructions with emotional support and make exercises easy to complete.

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