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Aligning ChatGPT with E-Portfolio Assessment as EFL Learning Model: Its Effect on Student's Speaking Performance and Feedback Literacy



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Abstract

The rapid development of technology, particularly Generative Artificial Intelligence (Gen AI) and e-portfolio assessment, has transformed English language learning practices. Many studies about these two technologies have shown positive impacts separately. However, the implementation of their combined effect on language learning outcomes remains unexplored. This study investigates the impact of aligning ChatGPT with e-portfolio assessment (CEA) on students' speaking performance and feedback literacy in the English for Interpersonal Communication course at a vocational college. Following an explanatory sequential mixed-methods design, this study involved 60 first-semester students divided into experimental and control groups. The experimental group experienced CEA integration. However, the control group experienced a conventional e-portfolio without exposure to ChatGPT. Data were

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collected through speaking tests, feedback literacy questionnaires, and semi-structured interviews. The result of MANOVA analysis revealed significant simultaneous effects of CEA on speaking performance and feedback literacy (Wilks' $\lambda = 0.476$, $p < 0.001$, partial $\eta^2 = 0.524$). The experimental group outperformed their control group counterparts in speaking performance ($M = 82.733$) and feedback literacy ($M = 79.666$). The thematic analysis of the interview data revealed seven key themes related to the student's feedback literacy experience in the CEA implementation. These findings indicated that the integration of ChatGPT with e-portfolio assessment created a dynamic learning ecosystem that enhanced language skills and feedback literacy. The result of this study offered a promising framework for technology-enhanced language learning in vocational education.

Keywords: ChatGPT, e-portfolio assessment, English language learning, feedback literacy, speaking performance

Introduction

The advancement of technology has altered the educational landscape in profound ways. The emergence of artificial intelligence (AI) and machine learning has transformed the teaching process, providing new ways to teach students and engage them in their own learning processes. Through generative AI (Gen AI), both teachers and students can receive individualized support based on their own needs (Dai et al., 2020; Yang et al., 2024). Furthermore, e-portfolio assessment has emerged as an effective method of assessing the learning and progress of independently through collaboration and feedback from peers; as such, they have helped students learn languages and plan for their careers (Babovič et al., 2019; Lam, 2022b; Papachristou et al., 2023; Wetcho & Na-Songkhla, 2019). All of these technologies allow students to create personalized learning strategies.

E-portfolios and Gen AI in language learning are grounded in social cognitive, constructivist, and connectivist theories (Cai et al., 2023; Chang & Kabilan, 2022; Siemens, 2004). These theories emphasize authentic and interactive learning experiences. Research shows that e-portfolios improve student motivation, self-regulation, speaking skills, and confidence (González-Mujico, 2020; Kusuma & Waluyo, 2023; Mathur & Mahapatra, 2022). Gen AI tools like ChatGPT offer personalized feedback and interactive practice for EFL students (Alberth, 2023; Kim et al., 2023; Kostka & Toncelli, 2023; Li et al., 2023).

ChatGPT has attracted educators and researchers seeking to enhance language teaching (Baskara & Mukarto, 2023; Kostka & Toncelli, 2023). E-portfolio assessment effectively supports student reflection, self-evaluation, and progress monitoring (Mathur & Mahapatra, 2022). As versatile digital tools in higher education (Ciesielkiewicz et al., 2020), e-portfolios facilitate work presentation, critical reflection, and skill demonstration (Korhonen et al., 2019; Tse et al., 2018). They promote language development through multimodal creation, self-regulated learning, vocabulary enhancement, and reflective writing (Behforouz et al., 2026; Behforouz & Al Ghaithi, 2025; Chang & Kabilan, 2022; Ismailov & Laurier, 2021; Kusuma, et al., 2021a; Kusuma, et al., 2021b; Lam, 2022a), with multimodal environments providing additional opportunities for creating meaning that are not possible to create through traditional single mode approaches (Mestre-Mestre, 2015).

Integrating ChatGPT with e-portfolio-based assessment (CEA) presents a novel approach for improving speaking performance and feedback literacy. E-portfolios enhance speaking skills through self-assessment and reflection opportunities (Cabrera-Solano, 2020; Kusuma & Waluyo, 2023). ChatGPT provides immediate, personalized feedback and interactive practice (Kostka & Toncelli, 2023; Li et al., 2023). Feedback literacy, crucial for effective learning (Carless & Boud, 2018) benefits from AI tools

offering instant, targeted responses. The creation of conditions that increase the willingness of students to communicate has been established as one of the primary concerns in English as a Foreign Language (EFL) instruction for many years (Cutrone & Beh, 2018). The CEA model directly addresses this concern through its use of a low-anxiety, technology-enhanced environment in which to provide and receive feedback related to speaking performance. However, the specific effects of CEA on speaking performance and feedback literacy remain unexplored.

E-portfolios evolved from traditional portfolios: organized collections of student work including reflective components (Delgado et al., 2015; Johnson et al., 2009; O'Malley & Pierce, 1996). The types of work found in a portfolio collection consist of homework assignments, tasks completed in or out of the classroom, presentations (both group and individual), and written reports/essays that were completed over a period of time. These forms of work have been collected to demonstrate the learner's ownership, their ability to reflect on the learning experience according to an evidence-based approach, and their ability to perform according to established principles of authenticity (Hamp-Lyons & Con, 2000; Johnson & Johnson, 2002). Either students or teachers select evidence to document learning progress (O'Malley & Pierce, 1996; Srikaew et al., 2015). Portfolios enable students to reflect on meaningful experiences and develop critical thinking through structured self-evaluation processes (Efe, 2016; Woodin et al., 2022). Key features include authenticity, student control, communication, engagement, flexibility, and versatility (Yastibaş & Yastibaş, 2015). Thus, portfolios serve as comprehensive assessment tools that store student work, track progress, and support educational success.

The Role of E-Portfolio Assessment on Speaking Performance and Feedback Literacy

Based on recent empirical studies, e-portfolio assessment has been shown to be an effective pedagogical strategy affecting the speaking performance and feedback literacy of students studying English as a Foreign Language (EFL) (Cabrera-Solano, 2020; Kusuma & Waluyo, 2023; Mathur & Mahapatra, 2022; Safari & Koosha, 2016; Yekta & Kana'ni, 2020). It has been demonstrated in various forms of digital platforms that there have been respective increases in speaking fluency, academic oral skills, and learner autonomy where this is true for students in higher education. Effectiveness of e-portfolios results from being able to promote continuous student self-reflection, peer assessment as well as repetitive practice, together resulting in increased levels of motivation, self-regulation and self-efficacy with regard to development of speaking skills (González-Mujico, 2020; Laksana et al., 2021). While the benefits on an individual's speaking performance are well established, emerging findings indicate that e-portfolio assessment promotes feedback literacy, conceptualized via Sutton's (2012) framework of knowing, being and doing, as well as refined by Carless and Boud (2018) as an improvement in learners' abilities to understand, interpret, and apply feedback toward improved learning outcomes. A validation study conducted by Molloy et al. (2020) on a large sample of 4,514 Australian students found seven aspects of feedback literacy through the three phases of how students elicit, process, and apply feedback (Malecka et al., 2022). The interactive nature of the e-portfolio environment, especially those that utilize social media, provides a greater opportunity for meaningful exchange of feedback and reflection upon feedback received (Chang & Kabilan, 2022; Soori et al., 2025). Therefore, e-portfolios support both the development of speaking ability and the metacognitive abilities to use feedback effectively (Dougherty & Coelho, 2017). By offering this dual benefit, using e-portfolios for assessment in EFL contexts is an especially beneficial way to assess the total development of oral communication, though further research is needed to examine fully the mechanisms by which e-portfolios relate to the development of feedback literacy.

ChatGPT for Learning

The advancement of Gen AI in this era has been remarkable, and its progress achievement holds massive transformations in numerous aspects including education. Gen AI has facilitated the creation of

advanced chatbots and language models that have the abilities to replicate human-like conversation and providing personalized support for users (Abdallah et al., 2023; Giglio & Costa, 2023; Griche & Bennis, 2026; Liu et al., 2024; Tung et al., 2023; Varitimiadis et al., 2021). Furthermore, Nam and Nguyen (2022) stated that the Gen AI impacts the mechanisms of algorithms for deep learning and natural language processing to facilitate the creation of contextual and appropriate responses, which make them invaluable instruments in boosting and supporting students' learning experiences. Moreover, various frameworks have emerged that seek to harness the capabilities of Gen AI in educational context, which further aims to enhance personalized learning, provide adaptive feedback, and offer effective support for both students and teachers (Fan et al., 2023; Haghighi et al., 2023).

Chatbots and machine learning translation serve as instances of AI systems that provide timely, tailored responses to assist learners in their reflection and development (Agustina et al., 2022; Greviana et al., 2020; Padmadewi et al., 2022; Pradana et al., 2023; Santosa, Putra, et al., 2024a; Santosa et al., 2024b). Furthermore, Gen AI has demonstrated certain advantages, such as delivering accurate information and addressing specific inquiries (Hirosawa et al., 2023). Despite the contributions of machine translation systems for the improvement of speaking abilities, people nowadays tend to favor Gen AI over traditional machine translation (Afandi et al., 2023). In relation with the previous discourse on Gen AI, ChatGPT, recognized as one of the most prominent examples of this technology, has been utilized by millions of people worldwide. Furthermore, some current studies have investigated the possibility use of ChatGPT in the process of language learning instruction, especially in Higher education setting. This issue raises potentials in assisting educators to improve their learning materials, provide personalized feedback, and promote interactive learning atmosphere in English language instruction (Baskara & Mukarto, 2023; Kostka & Toncelli, 2023; Li et al., 2023). However, through the study conducted by Yang et al (2024), there have been some inquiries regarding the ethical implications of utilizing ChatGPT in education, including the requirement of human error, academic integrity, and preconception.

Recent studies have begun to explore how ChatGPT can affect student learning outcomes and attitudes within a variety of different educational settings. One specific aspect of great interest to this research is the real-time spoken voice mode capabilities offered through ChatGPT which provide both spoken communication with the student as well as pronunciation assessment that is not typically available to students when they use e-portfolio systems. Using these oral communication options allows students to interact with ChatGPT as a means to support their writing and provides an authentic speaking experience that simulates a real-life conversation in the target language and supports both fluency and accuracy which are the two important dimensions of speaking development in an EFL setting (Housen & Kuiken, 2009). Tossell et al. (2024), for example, examined at what college students thought about using ChatGPT to complete essay assignments and gained valuable information on the use of ChatGPT in relation to assessing student learning, as well as whether or not students have trust in generative AI systems. This study further discovered significant insights into its implications for learning, assessment, and belief in Gen AI. Similar to Tossell et al. (2024), the study by Liu et al (2024) also focused on the students' perspective regarding writing skills in both conventional and Gen AI-assisted digital multimodal structure. This study underlined the abilities of Gen AI in developing students' writing abilities. The other study by Cai et al (2023) also conducted an examination of some variables that affect students' perception on using ChatGPT to support their language learning in higher education. Therefore, the study demonstrated the significances of students' attitudes and adoptions in using ChatGPT for their language acquisition were formed by positive emotional experiences and their trust toward the system performances. Although these studies provide a solid basis for ChatGPT implementation within EFL settings, there is still a need to conduct a more thorough and critical analysis of the conditions necessary for these benefits to occur, the cognitive processes involved in producing these benefits, and what the upper limits of reliability of such benefits are before we can understand the potential of using ChatGPT as part of an organized language-learning framework.

Research shows that ChatGPT significantly improves measurable results for EFL learners, but these improvements are not necessarily automatic and unconditional. A systematic review conducted by Teng (2024) showed that using ChatGPT helped EFL learners with their writing, increasing their clarity, cohesion, motivation, and self-efficacy, but the educational benefit of using ChatGPT became maximum only when the teacher structured and supervised the use of ChatGPT effectively rather than leaving it up to the student to do so. This was further supported by Teng and Huang (2026), who determined that the utilization of ChatGPT for providing feedback to EFL learners resulted in a significantly larger amount of dimensionally engaged learners and a greater amount of effective writing performed compared to traditional peer feedback directed toward the student, yet within the context of providing meaningful guidance on how to use ChatGPT to provide targeted feedback to students and not just write new drafts of students' writing. The studies have two key findings which have particular relevance to the present study: how AI is used in a learning environment (i.e., how teachers incorporate technology) is more important than the actual technology itself when considering how much a student will learn. Further, Teng (2024) states that there are dangers associated with using ChatGPT without an instructor, specifically dependence on this resource to produce information and what he describes as "high-tech plagiarism." As such, using artificial intelligence effectively necessitates that it be designed for specific pedagogical purposes rather than just having unrestricted access to it by students. These new findings lend support for the CEA model as not simply being a method for teaching language or a way of incorporating Artificial Intelligence into the language-learning process; they also provide evidence to support the assertion that there are significant benefits and potential risks of using ChatGPT to assist in developing spoken communication ability to the same extent as there are with written communication ability. However, the current literature does not yet address whether the expected conditional benefits and possible structural disadvantages of integrating ChatGPT into the development of spoken communication abilities will be similar to what has been discovered thus far.

At the heart of the outcome-level findings mentioned above is the bigger issue of how students utilize cognitive processes in order to derive benefit from AI feedback. The literature consistently highlights the role of metacognitive engagement as a key mediating factor. Teng (2025) investigated how EFL (English as a Foreign Language) undergraduate writers utilized metacognitive knowledge (the processes of planning, monitoring and evaluating) in relation to their use of ChatGPT for academic writing, and found that productive use of AI requires an evaluative, critical approach to evaluate the outputs produced by AI rather than a simply accepting the AI output results. Notably, Teng (2025) indicated that the use of metacognitive ability occurs through scaffolding (support or assistance) of language ability, and therefore does not occur naturally or organically, but rather requires deliberate cultivation of this ability through structured pedagogical guidance. According to Teng and Huang (2026), there are different levels of engagement with AI feedback; however, when students learn to engage with AI feedback through critical thinking, they find themselves deeply cognitively engaged. It is possible to effectively learn a foreign language through AI Support if the learner has "GenAI literacy", which is defined as the self-regulatory and cognitive ability to successfully work with AI feedback in a productive way rather than simply accept it without question. These concepts expand the existing body of knowledge about feedback literacy into the area of AI feedback, thus making it relevant to the development of feedback literacy that we investigated in this research. However, both studies did not explore how learners will be able to engage metacognitively and critically with AI Feedback when using it for performance assessments in speech, which have much more immediate feedback than in transcripts; whereby the demand for assessment from a learner's standpoint is much more demanding than when working with text revision; and that AI feedback has been provided primarily in a structured environment through Portfolios.

A critical component of developing critical thinking skills regarding AI feedback is to build an understanding of the research surrounding the limitations of AI evaluations. Research conducted by

Mizumoto et al. (2024) compared ChatGPT to human raters in terms of L2 writing accuracy assessment. The authors found that, although ChatGPT correlated with human evaluations, there was a systematic difference in the types of errors identified by ChatGPT versus human evaluations. ChatGPT was able to recognize multiple errors on the surface level, such as spelling and punctuation errors; however, ChatGPT was unable to identify any of a number of unique errors related to structure or argument missing in the original document. The implications of this uneven recognition of surface and deeper errors is particularly relevant in the assessment of speaking, where communicative competence includes characteristics such as prosody, pragmatic appropriateness, and coherence of discourse; therefore, are beyond what is able to be assessed by a surface-level automated analysis human rater. Mizumoto and Teng (2025) conducted an in-depth analysis of the qualitative response classification field by testing 7 of the largest LLMs against a human gold standard. These studies revealed that all 7 of the LLMs were unable to meet the KAPPA criteria of 0.80, which are indicative of a strong degree of agreement. In general, the misclassifications were attributed to the models relying more heavily on superficial linguistic markers instead of the underlying cognitive and temporal context of learner responses. Ultimately, these results form a significant empirical foundation for the current research: since AI-generated feedback cannot be assumed to be universally reliable or contextually accurate, the ability to assess AI feedback critically is not an advanced or optional skill, but rather a vital functional competency that every AI-assisted instructional model must be fundamentally designed to cultivate. This logic is reflected in the CEA's design and illustrates the lack of attention that has been afforded by prior research to this area within the oral domain.

Despite the growing expansion of studies on e-portfolio assessment and ChatGPT in EFL contexts have provided robust results, previous research has studied these technologies separately and no studies have empirically examined the combined and simultaneous effect of both technologies on learners' speaking performance, or feedback literacy within a single quasi-experimental research framework. The majority of research on e-portfolio assessment has focused on the development of writing skills (Lam, 2022a), vocabulary acquisition (Nourdad & Banagozar, 2022) and learner engagement (Kusuma et al., 2021a, 2021b), whereas only a small proportion of research has been focused on oral production and feedback literacy as dependent variables in a quasi-experimental design. Research on ChatGPT as a tool for language learning has predominantly focused on writing (Liu et al., 2024) and students' perceptions of ChatGPT's effectiveness as a feedback tool (Cai et al., 2023), the development of speaking skills has received very little attention. Thus, there is a large gap between AI-generated feedback, portfolio-based assessment and the development of oral communication for language learning in vocational EFL education. The identified gap demonstrates a pressing requirement for research to evaluate the combined impacts of adding ChatGPT into e-portfolios on students' speaking skills and their ability to improve quality through the use of feedback within the context of vocational English as a Foreign Language (EFL) learning. As such, the following two research questions provided guidance to the research:

- 1) Is there any simultaneous effect of CEA learning model on the students' speaking performance and feedback literacy?
- 2) How are the students' feedback literacy during the implementation of CEA?

This study aims to address these questions and contribute to our appreciative of how ChatGPT and e-portfolio assessment can be successfully integrated into language learning practices, mainly in the context of e-portfolio assessment. This research presents a unique investigation of the intricate relationships among ChatGPT, e-portfolio assessment, speaking performance, and feedback literacy. This study shows a high novelty because there is an intersection that has not been thoroughly investigated in previous studies.

Method

Research Design

This study employs explanatory sequential mixed-method design to examine the effect of CEA on speaking performance and feedback literacy of the students in vocational college. Moreover, this design requires the researchers to focus on collecting and analyzing the data with a quantitative method at the beginning and further supports the quantitative findings by gathering qualitative data through various instruments used (Creswell, 2022). Thus, the researchers apply a quasi-experiment with a pre-test-posttest control group design for one factor with more than one dependent variable to address the first research question (RQ) while the semi-structured interview is going to be administered to answer the second RQ.

Population and Samples

This study recruited 6 classes of first-semester students in vocational college as the population with a total of 180 students, ranging between 18 and 20 years of age, in the International Business Management study program, Politeknik Negeri Bali (PNB), who joined the English for Interpersonal Communication course. The students were explained briefly about the study aims as well as the terms and conditions if they agree to join in the research. All were non-native English speakers who had dedicated an average of 9 years to studying the language. Statistical analysis revealed homogeneity ($p > 0.05$), and the pre-speaking exam indicated a B1 level. The Common European Framework of Reference (CEFR) for Languages suggests that this level signified participants' ability to perform simple tasks and participate in social interactions. Furthermore, cluster random sampling techniques through the lottery system was administered to obtain the sample of the study from all classes. Only 2 classes (total of 60 students) were chosen as samples of the study. A semi-structured interview was purposively administered to 27 willing participants from the experimental group to obtain the qualitative data. Interviews were conducted in Bahasa Indonesia and subsequently translated into English by the researchers.

Procedure, Data Collection, and Instruments

Implementation of this study took around 8 weeks (see table 1), including the first and last weeks as pretest and posttest. During the 6 meetings, students were given 3 course-related topics. Each topic was covered in 2 meetings. Materials were provided through e-learning by PNB and the process of discussion was done in the classroom. After discussing the topics, students were given business and professional scenarios to create a creative presentation and conduct a roleplay that was recorded in the form of a video. Students submitted their videos on Padlet, which is the primary e-portfolio platform for submitting videos, receiving peer comments, and exchanging collaborative feedback. In addition, students used ChatGPT as a secondary digital workspace to help them organize the feedback generated by AI (see Figure 2), capture their self-reflections using a Google Form, and archive practice transcripts to refer back to when they were working alone. Together, these two platforms included Padlet as the primary e-portfolio environment and ChatGPT as the individualized feedback system represented the entire practical framework of the CEA model. Students had individual or group discussions and speaking practices in the second meeting. They were also allowed to use ChatGPT to help them with idea development and pronunciation practices. The students learned how to interact with ChatGPT through voice-mode interaction. Speaking assignments included individual and group work, and students' performances were evaluated based on complexity, accuracy, and fluency using scoring rubrics adapted from Housen & Kuiken (2009). Students were asked to give constructive feedback to their peers on Padlet using the comment feature after they finished the video and uploaded it to Padlet (see Figure 3). They also needed to add self-reflection through a provided Google Form attached on Padlet.

Table 1. *Participants' Activities in the Experimental and Control Groups*

Meetings	Experimental		Control	
	Topics	Participants' Activities	Topics	Participants, Activities
1 st meeting	Pre-test		Pre-test	
2 nd meeting	Describing products/ services in business	• Reviewing materials • Drafting ideas and practicing with friends and ChatGPT inside and outside the classroom • Recording a video performance (3 to 5-minute duration); • Uploading on Padlet	Describing products/ services in business	• Reviewing materials • Drafting ideas and practicing with friends • Recording a video performance (3 to 5-minute duration) • Uploading to Google Drive
3 rd meeting	Describing products/ services in business	• Lecturer and friends' comments • Writing self-reflection on Google form • Writing self-reflection	Describing products/ services in business	• Lecturer's comments
4 th meeting	Describing likes and dislikes toward online business	• Reviewing materials • Drafting ideas and practicing with friends and ChatGPT inside and outside the classroom • Recording a video performance (3 to 5-minute duration) • Uploading on Padlet	Describing likes and dislikes toward online business	• Reviewing materials • Drafting ideas and practicing with friends • Recording a video performance (3 to 5-minute duration) • Uploading to Google Drive
5 th meeting	Describing likes and dislikes toward online business	• Lecturer and friends' comments • Writing self-reflection on Google form • Writing self-reflection	Describing likes and dislikes toward online business	• Lecturer's comments
6 th meeting	Business presentation	• Reviewing materials • Drafting ideas and practicing with friends and ChatGPT inside and outside the classroom • Recording a video performance (3 to 5-minute duration) • Uploading on Padlet	Business presentation	• Reviewing materials • Drafting ideas and practicing with friends • Recording a video performance (3 to 5-minute duration); • Uploading to Google Drive
7 th meeting	Business presentation	• Lecturer and friends' comments • Writing self-reflection on Google form • Writing self-reflection	Business presentation	• Lecturer's comments
8 th meeting	Post-test		Post-test	

In the same way, students in the control group completed the same e-learning topics as the experimental group and completed the same video-recorded speaking tasks. Their video submissions were also uploaded to Google Drive, which is the digital storage platform used by the institution. The control group received all of their feedback on their video submissions from their course lecturer through

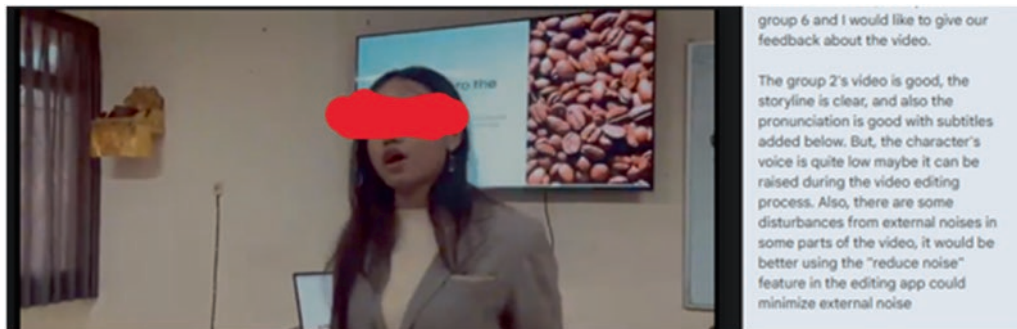


Figure 1 Students' e-portfolio activities on Google Drive and the Feedback (Control Group)



Figure 2 Drafting ideas, practicing with friends and ChatGPT activities in the class and practice report on Padlet outside the class



Figure 3 Participant's Project after practicing with ChatGPT and friends as well as feedback received on Padlet

Google Drive comments (see Figure 1), and they also wrote a written self-reflection on each submission after completing this process. It is critical to note that the control group received no structured instruction to use ChatGPT or any other generative AI tool as part of their course design, and therefore, the CEA model's integrated AI feedback design was not a part of their learning experience. It should be noted, however, since this was outside of the scope of institutional control, the researchers cannot claim that control group students had zero independent access to publicly available generative AI tools outside of class time due to the limitations inherent in the present technological environment. The control condition represents traditional e-portfolio practices without structured integration of AI into pedagogy, instead of a completely AI-free control group. The added benefit of the experimental group's advantage is more accurately characterized as an increase in the value of AI (i.e., AI as an integrated pedagogically guided and theory-based means of adding value to traditional e-portfolios), rather than simply the presence of AI access alone. For the control group, topic discussion occurred in the first meeting and completion of reflective feedback entries occurred in the second meeting; however, students in the control group did not use AI-enhanced feedback or the collaborative, socially visible features of Padlet. The decision to provide different platforms to both groups (and therefore provide them with different types of support) was intentional and based on theory. Padlet was chosen for the experimental group since it has a multimodal, collaborative, and socially visible interface, which supports the requirements of the CEA model; therefore, peer feedback, multimedia submissions, and AI-assisted comments were integrated within a unified networked environment using Padlet. The control group featured Google Drive because it is a commonly utilized and largely understood traditional style of digital data storage within vocational educational settings in Indonesia. Google Drive also embodies a well-known representation of current baseline instructional practices within the institution. The authors recognize that the varying affordances that each of the platforms possess present a possible confounding variable that the authors have identified in the limitations of this study.

In collecting the quantitative data, the researchers in this study employed a speaking test that will be supported by the lesson plan and rubrics in guiding and assisting the lecturer to assess the students and gather the data. However, a semi-structured interview will be implemented to gather the qualitative data from several students in experimental group.

In collecting both quantitative and qualitative data, some instruments were used. Initially, pre- and post-test evaluations were implemented to evaluate the students' feedback literacy and speaking

abilities before and after the treatment to acquire measurable data. The speaking test and rubrics used in this study were assessed from different facets of speaking, including fluency, accuracy, and complexity. The rubrics of speaking test were taken from the theory by Housen and Kuiken (2009) which were later developed by Ogawa (2022). The instrument for assessing the students' feedback literacy were adapted from the framework by Molloy et al (2020). The result of validation on feedback literacy self-rated questionnaire showed all 14 items ($p < 0.05$). Cohen's Kappa value for the inter-rater reliability of pre-tests control groups was 0.771. Meanwhile, the value for experimental group was 0.812. This indicates that the results of pre-tests in the control and experimental groups were classified as substantial agreement and almost perfect agreement (Cohen, 1960 in McHugh, 2012). Moreover, the result of Cohen's Kappa values in the control and experimental groups for post-tests were 0.840 and 0.761, respectively. This result showed a strong agreement between the raters. Additionally, this indicates that both groups' grading for pre- and post-speaking tests was highly consistent. The instruments and data collection procedures in this study are carefully considered to gain widespread data. This data later permits the researchers to effectively describe and investigate in detail about the study issues.

Data Analysis

This explanatory sequential mixed-method study employed a two-phase analytical approach to examine the effects of CEA on speaking performance and feedback literacy. The quantitative phase utilized one-way MANOVA to address the first research question regarding the simultaneous effect of the CEA learning model (independent variable) on students' speaking performance and feedback literacy (dependent variables), with Wilk's lambda serving as the statistical test following confirmation of all necessary assumptions including normality, homogeneity, scatterplots, equality of covariance, and multicollinearity. In the qualitative phase, thematic analysis according to Braun and Clarke's (2019) six-phase framework was conducted to find themes from the semi-structured interviews that were collected with the 27 research participants that were purposively chosen as a part of the experimental phase in order to obtain the second research objective regarding students' experiences with feedback literacy during the CEA implementation. Audiotapes, S1 to S27, protected the identity of the participants. All of the quotes included in the qualitative findings were translated from Indonesian to English and slightly paraphrased for clarity while maintaining the semantic and emotional qualities as the presented utterance. The sequential design allowed for a thorough analysis of the significance of CEA via statistical evaluation of pre-tests and post-tests, as well as providing in-depth knowledge about the lived reality of students engaging with the integrated learning model. All of this together offers compelling evidence that supports the utilization of an integrated learning approach via ChatGPT in conjunction with an e-portfolio assessment to improve student achievement in EFL speaking.

Following the six-phase thematic analysis process developed by Braun and Clarke (2019), the present dataset was analyzed and modified to fit the framework for the dataset. In Phase 1, two researchers printed 27 interview transcripts in the original language (Bahasa) and read them independently. In Phase 2, both researchers identified and placed inductively coded data in each original transcript, and coded the data based on the participants' own words in addition to the dimensions of feedback literacy developed by Molloy et al. (2020). In Phase 3, the coded data were clustered together to identify potential themes. In Phase 4, the potential themes were evaluated against the complete data set to assess the integrity of their relationship to each theme and their ability to represent the data. In the final Phase (5), through researcher discussion and agreement, it was determined that seven final themes would represent feedback literacy development in a CEA context; therefore, all themes were then edited to represent just how each of the seven themes exemplifies feedback literacy development in the CEA context. During the sixth phase (the report), excerpts were selected from Phase 5 (the development of coding and themes) to illustrate the themes comprising the data set. Each theme contained at least one extended excerpt of over 40 words to ensure that the richness and depth of the contextual information

is maintained. Peer debriefing was conducted throughout the analysis process in order to enhance the credibility and dependability of the analysis. An audit trail was maintained to provide a record of the decisions made regarding coding and theme development throughout the entire process. The dual independent coding approach and the structured discussion among researchers to resolve any discrepancies were the primary means used to ensure the confirmability of the analysis.

For data collection, each participant was interviewed on the phone through WhatsApp (a platform already used frequently by all participants), which helped reduce the number of technical barriers to participating in the interview. All interviews were also audio-recorded with the participants' consent and took an average of 15–25 minutes. Interview questions were created to promote extensive and detailed reflection on the participants' experience with the CEA feedback process, including ways they engaged with ChatGPT provided feedback; how they used Padlet for documentation of the provided feedback and to share it with others; and how their approach to receiving and using feedback changed throughout the 8-week program.

Results

The result of analysis in Table 3 shows a statistically significant difference ($F(2, 57) = 31.313$, $p < 0.001$, $Wilks' \lambda = 0.476$, $partial \eta^2 = 0.524$) between the scores showed on speaking performance and feedback literacy of the participants in the control and experimental groups.

Moreover, Table 4 below shows that there was a significant difference in statistical result between the participants' speaking performance scores in the control and experimental groups as $F(1) = 48.554$, $p < 0.001$, $partial \eta^2 = 0.456$. Moreover, Table 2 supports the result by demonstrating that the experimental group's participants ($M = 82.733$) outclassed over their control group matching part ($M = 78.833$) on the post-test of speaking performance. This means the implementation of e-portfolio with the assistance of ChatGPT (CEA) significantly improved the participants' speaking performance scores. Table 4 also shows a statistical difference between the participants' feedback literacy in the experimental and control groups as can be seen from $F(1) = 16.135$, $p < 0.001$, $partial \eta^2 = 0.218$. As can be seen in Table 2, the experimental group participants ($M = 79.666$) outperformed their counterparts in the control group ($M = 71.762$) on the result of feedback literacy post-test. It can be stated that the implementation of CEA significantly boosted the participants' feedback literacy.

After the quantitative analysis was completed, 27 participants from the experimental group were willing to take part in the interview to gain a more comprehensive understanding of their feedback literacy development, as well as to provide qualitative evidence supporting the statistical results presented above. Thematic analysis (Braun & Clarke, 2019) completed through six-phase framework identified

Table 2. Descriptive Statistics in the Experimental and Control Groups

Group	Score	Mean	SD	Var
Control (n = 30)	Pre-speaking	75.700	2.347	5.510
	Pre-feedback literacy	60.809	5.301	28.097
	Post-speaking	78.833	1.931	3.730
	Post-feedback literacy	71.762	4.418	19.516
Experimental (n = 30)	Pre-speaking	75.417	3.189	10.174
	Pre-feedback literacy	65.428	3.514	12.351
	Post-speaking	82.733	2.381	5.668
	Post-feedback literacy	79.666	9.830	96.632

Table 3. *Multivariate Tests*

	Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Pillai's trace	0.524	31.313	2.000	57.000	0.001	0.524
Wilks' lambda	0.476	31.313	2.000	57.000	0.001	0.524
Hotelling's trace	1.099	31.313	2.000	57.000	0.001	0.524
Roy's largest root	1.099	31.313	2.000	57.000	0.001	0.524

Table 4. *Univariate Tests (Post-Hoc Analysis)*

Dependent variable	Sum of squares	df	Mean square	F	Sig.	Partial eta squared
Post-speaking scores	228.150	1	228.150	48.554	0.001	0.456
Post-feedback literacy scores	937.019	1	937.019	16.135	0.001	0.218

seven separate themes that give a collective representation of how the students experienced and internalized feedback literacy through their engagement with the CEA model: Digital feedback orchestration, Systemic Feedback Information construction, Development of Adaptive Learning Strategies, Digital peer synergy, Digital confidence scaffolding, Tech-enhanced autonomy, and Metacognitive awareness enhancement.

Digital Feedback Orchestration

The first insight gained from the interviews conducted during this research study was that the newly developed method of providing student feedback represented not just an innovative method of providing feedback or just one isolated instance of student improvement but rather, this new method represented a change in a student's ability to give constructively developed feedback independently. Students learned to seek out feedback across multiple and simultaneous feedback channels and the ability to pull these feedback methods together into an intentional and coherent means of supporting their learning. Through the use of the CEA (Collaborative Evidence of Achievement) approach to student feedback, instead of waiting for feedback to be provided to them, students actively began pursuing and organizing and directing their pursuit of feedback. This shift from being a passive recipient of feedback to being a purposeful (and intentional) orchestrator of feedback represented one of the more fundamental changes resulting from the integration of ChatGPT with the use of e-portfolios to measure student proficiency; which was evident throughout the proficiency levels represented in the data collection participants. S1's description of this orchestration process with structural clarity illustrates just how sophisticated the process became by the end of the semester:

"I receive feedback from multiple sources, including my lecturer, my friends, and ChatGPT. My lecturer usually provides input on my speaking delivery and correct English pronunciation, while my friends help me with my pronunciation and intonation. ChatGPT gives me more targeted suggestions on word choice and expression. In my view, ChatGPT's feedback is the most useful because it is immediate and specific. I can clearly identify where I went wrong, understand why the mistake happened, and then work to correct it straightaway. That whole process makes my learning genuinely more effective and purposeful." (S1, phone interview through WhatsApp)

S1's account is unique in that they not only identified three different types of sources of feedback but also developed a high-level of metacognition about what each source of feedback provides its users. While a formal instructor provides a knowledgeable resource for identifying correctness based upon a formal pedagogy, classmates provide correction through social engagement and social norms, ChatGPT provides its users with correction through precision and immediacy in ways that no other human provides on a consistent basis. The division of labor in processing feedback demonstrated in this way indicates that S1 developed a new competency that would be called "processing feedback information," as described by Molloy et al, (2020). However, the CEA context has taken this function further by allowing students to triangulate these sources against each other which in turn leads to a more critical and perceptive relationship between students and their feedback. S7 solidified this idea when he described that both ChatGPT and e-portfolio changed how his feedback was stored and revisited:

"ChatGPT helps me with feedback and proofreading of the English content I create. Feedback is very important because it tells me my mistakes and shows me how to improve. The digital tools like Padlet help me convert feedback into data that can be stored and accessed at any point, which is so much more reliable than the traditional way of receiving corrections that are easily forgotten." (S7, phone interview through WhatsApp)

The way S7 frames feedback as data that can be stored and accessed indicates that the digitalization of feedback did not just change the medium through which it is received but rather transformed the ontological status of feedback from a temporary corrective action to a permanent, consultable record of learning evidence. This transformation indirectly supports both the "commits to feedback as improvement" and "processes feedback information" dimensions of the feedback literacy framework developed by Molloy et al. (2020) and represents a type of digital feedback literacy that traditional portfolio models were not built to support.

Systemic Feedback Information Construction

The second theme provides a description of what students did with the feedback they received after having learned how to create feedback from the various sources available to them. There was a clear pattern across the interviews in which students, on their own, created structured and personalized organizational systems for organizing, categorizing, and revisiting the feedback they received in the CEA environment. This behavior was not imposed on students in any formal way, rather it emerged through repeated use of the platform, suggesting that the CEA model itself helped to develop a feedback management orientation among students that allowed them to manage their learning more effectively with increasing complexity over time. S4 described both the structure and components of his system in a precise and personal way:

"I use the tools available in Padlet to store and organize all the feedback I receive. I always save every exercise and every correction as a reference so I can track my errors and monitor my progress over time. Having everything in one accessible place means I can see not just where I am now but how far I have come from where I started." (S4, phone interview through WhatsApp)

The term "track my errors and monitor my progress" is very expressive. It demonstrates that S4 is not only describing one instance where they have received feedback, but rather they are demonstrating an ongoing pattern of self-monitoring which can only occur if they have previously documented their feedback in a systematic fashion versus an arrival point. This behavior demonstrates the "appreciates feedback as an active process" and the "elicits information to improve learning" elements as identified by Molloy et al. (2020) to be essential in one's development of feedback literacy. S2 discussed another

strategy consisting of using ChatGPT to be both a source of feedback as well as to support the whole learning process through structure:

“Using Padlet as the e-portfolio platform has been genuinely helpful because we complete every task step by step. We practice and prepare thoroughly before submitting the final work, so it is not just about finishing the assignment but about truly developing our English skills along the way. The combination of Padlet and ChatGPT supports this gradual process. First, they help me collecting and organizing ideas, then practicing, and finally submitting the work only when I truly feel ready.” (S2, phone interview through WhatsApp)

The interpretation provided by S2 discusses the much less frequently acknowledged aspect of ChatGPT’s teaching functionality, which refers to the capacity that the tool has to provide the learner with a scaffold to assist in both sequencing and structuring the developmental journey itself. Therefore, the CEA system supported not only what students learned but how they organized the process of learning, fostering a systems-oriented approach to language development which has enabled them to develop beyond the scheduled classroom period. In this Theme, S7 elaborated on the development of a creative organizational approach to consolidating feedback from multiple sources to develop a visual analytical tool:

“I usually create a mind-map from the feedback I receive to make it easier to analyze what I have been told. The mind-map helps me pull out the important points and see the connections between different kinds of feedback. ChatGPT can also assist in identifying the key takeaways from a feedback session so that I know exactly what to focus on next.” (S7, phone interview through WhatsApp)

By using mind mapping as a way of synthesizing various sources of feedback, the example from S7 demonstrates a level of conceptualizing and managing information/directions that is indicative of developing feedback literacy as a higher-order metacognitive activity. That S7 was able to convert many forms of corrective feedback into a conceptual framework that had spatially organized the information indicates that S7 did far more than merely arranging the data; he/she was actually constructing meaning from the data. This indicates that the CEA environment was stimulating S7 to engage at a higher level of cognition with regard to the feedback process and reinforcing the overall feedback literacy concept through the areas described above.

Adaptive Learning Strategy Development

The third theme represents one of the most relevant changes within the CEA model; that students have become true adaptive learners. Regardless of their actual proficiency level, participants spoke about how they strategically adapted their approach to their next round of practice based on feedback received from ChatGPT and from their e-portfolio on an ongoing basis. This type of responsiveness was not an accidental outcome but was a direct result of having an immediate, very focused, highly individualized feedback loop in place that fostered authentic self-directed improvement rather than the passive repetition typically associated with many traditional cycles of language learning. S5 outlined this adaptive process in such a way that illustrated both the granularity of the improvement cycle and the deliberate intentionality behind it:

“I try to implement feedback through small, specific targets for each exercise I create. ChatGPT helps me practice directly with targeted examples that address exactly the areas I need to work on. Then I record my progress for personal evaluation so that I can see whether the adjustments I made are actually producing results.” (S5, phone interview through WhatsApp)

The approach done by S5 when setting small and specific targets before each practice session and then evaluating the outcomes afterward describes a full self-regulatory cycle that closely mirrors the deliberate practice framework connected with meaningful skill development rather than pure repetition of activity. S5 provides a good example of how this type of learning operates. He is practicing smarter, using feedback from one practice session to prepare him to practice again differently the next time. This kind of intentionality is rarely produced by less than effective modes of instruction. Thus, S5 use of this self-regulatory cycle satisfies the outcome of the “enacts outcomes of processing feedback information” component in Molloy et al.’s (2020) framework. Similarly, to how S26 describes the use of recorded practice and facilitator feedback in relation to their overall Workflow based on CEA:

“I used ChatGPT for activities such as conversation simulation and real-time correction during practice sessions. The recordings and transcripts from these sessions were then preserved for further analysis and to receive additional detailed feedback from my lecturer, which allowed me to compare the AI feedback with my lecturer’s professional assessment and develop a more complete picture of where I needed to improve.” (S26, phone interview through WhatsApp)

The way S26 compared feedback from ChatGPT to feedback from a lecturer showed an advanced level of learning through adaptive strategies. S26 used two sources of evaluation and created a critical analysis capability to help S26 learn at a deeper level and make long-term learning adaptations. The e-portfolio provided an environment for S26 to save recordings and transcripts of the evaluations which provided for the comparison. It also showed that the CEA model provided value for the evaluation process through the quality of each completed evaluation and the creation of an accumulation of practice evidence available over time. These results indicate that the implementation of the CEA not only assisted in receiving feedback but enhanced the development of adaptive learning skills critical to ongoing language acquisition.

Digital Peer Synergy

The fourth theme highlights an aspect of CEA that is often overlooked in discussions of AI-enhanced language learning. It is about the impact of the integrated technology not just on individual learning, but also on the social and collaborative nature of the learning community. The inclusion of ChatGPT into the peer feedback process created a peer feedback culture that could be described as socially calibrated where students were more confident when giving and receiving peer evaluations. The AI also acted as a neutral point of reference in cases where peer evaluations were uncertain, conflicting, or needed to be verified before being trusted and used. S23 described the collaborative aspect of this digital synergy in no uncertain terms where it exemplifies both efficiency and sociality:

“I found the process of giving and receiving feedback through the e-portfolio on Padlet with the help of ChatGPT both helpful and efficient. Through Padlet, I could add feedback directly to my friend’s video post, and my friends could do the same for mine. Having ChatGPT available during this process meant I could also verify whether the suggestions I was giving were actually accurate before I submitted them, which made me feel more confident and more responsible as a peer reviewer.” (S23, phone interview through WhatsApp)

S23’s reference to verification prior to submission highlights an extra level of peer feedback quality control that doesn’t often get discussed in conventional peer-review systems. Instead of just relying on their own language intuition, the students used ChatGPT as a way to confirm their facts while going through the peer review process which resulted in the feedback being more accurate, more specific,

and more trustworthy from the recipient's standpoint. The peer-AI triangulation process addresses the "acknowledges feedback as a reciprocal process" dimension of the Molloy et al. (2020) framework. Additionally, S15 mentioned how peer comments received through Padlet and independent AI assessment from ChatGPT were integrated in practical terms.

"My friends and I could make corrections to each other's work through the comment feature that is available on Padlet. We could give feedback to one another directly on the platform. For my own part, I would also consult ChatGPT whenever I had a task that required me to create a script or whenever I felt that a revision was needed, so that my feedback to others and my own revisions were both informed by AI guidance as well as peer input." (S15, phone interview through WhatsApp)

S15's story shows us that CEA's peer feedback (PF) environment did not substitute for human social interaction. Instead, it provided added enhancement to direct human interaction. The existence of ChatGPT as a supplementary support provided students with the language tools and confidence needed to provide specific and accurate feedback that resulted in an elevated quality of PF. These results increased our understanding of the social factors influencing feedback literacy, illustrating how technology can improve collaborative learning in EFL through technology-infused practices, with improved quality, objectivity, and pedagogical outcomes.

Digital Confidence Scaffolding

The theme within this group of data that is arguably the most important, is that it was not so much about developing skills, but rather it deals with developing one's own self as an individual. For a majority of individuals in the experiment group, the real barrier to their development as confident English speakers was not so much a lack of knowledge of the language itself but feelings of fear regarding how they would be perceived by others. In other words, many students had a sense of fear to a degree that was beyond anything they had encountered before. Their fears stemmed from the potential embarrassment and/or humiliation of appearing less competent than their peers. It is as if they are being perceived as having asked a question that indicated a lack of intelligence, or as having made an error in a situation where errors carry an obvious social cost. CEA helped remove this barrier to self-confidence by providing ChatGPT as a conversational partner that was perpetually patient, non-judgmental, and free from the social pressure that exists when interacting with humans. S9 was able to articulate a very honest, open, and emotionally charged description of their experience within this dataset. Regarding the value of the depth of emotion expressed in this case, we have decided to include the full transcript of the S9 statement:

"Before I started practicing regularly with ChatGPT through the e-portfolio course, I was honestly someone who could be described as very limited in English communication. But because I gradually got used to practicing with ChatGPT, I finally found the courage to step out of what I can only describe as a zone of fear. I am naturally a shy person and was always afraid to practice directly with my classmates or with people outside my close circle. With the e-portfolio, I finally had a safe and supportive space to practice directly with an AI, and I also started receiving genuine encouragement and constructive criticism from my friends through the Padlet comment feature, which made me even more motivated to keep working on improving myself." (S9, phone interview through WhatsApp)

When we refer to a "zone of fear," we are not using that phrase as a throwaway line. This name gives definition to something that cannot be captured through quantitative data of speaking score yet exists

as an emotional experience for many EFL learners, where socially speaking or emotional stakes far exceed the purely linguistic ones. The CEA demonstrated how to lower those emotional stakes through the use of a non-judgmental AI speaker. By doing so, CEA provided the ability for learners to have a corrective emotional experience with their own ability, as the outcome of potential humiliation makes it impossible to occur, and confidence develops instead. This finding offers a direct response to the “acknowledges and works with emotions” component of the framework developed by Molloy et al. (2020), as well as extending upon the findings presented by Hartono et al. (2022) regarding the psychological effect of corrective feedback on EFL learners. S10 presented the same phenomenon with an emphasis on the flexibility & relational safety offered within the CEA learning environment:

“I feel more confident and genuinely motivated when receiving feedback through Padlet and ChatGPT because the whole process is more flexible and supports my learning in a more relaxed and interactive way. There is no pressure of being judged in the moment, which means I am much more willing to try things I would normally avoid out of embarrassment.” (S10, phone interview through WhatsApp)

Based on the research done, the element of flexibility to develop confidence and not as merely a supplementary benefit has significant implications for the design of technology-enhanced environments for language learning (TELL). The experience of removing time and evaluative pressure/constraints from ChatGPT interaction led to an entirely different engagement with this technology, which was characterized by experimentation and a true openness to making mistakes productively. Engaging in these specific behaviors, which are the very dispositions necessary to support speaking development, demonstrate a new empirical basis for how technology supports student confidence. This research also shows that using CEA can help enhance the feedback literacy trait of “acknowledges and works with emotions,” through the development of a more collaborative and psychologically safe space in TELLs and that using CEA can help enhance the feedback literacy trait of “commits to feedback as improvement” through increasing the consistency of that element across the range of student experiences in TELLs.

Tech-Enhanced Autonomy

The sixth theme represents a shift in the fundamental relationship between students and their own learning. All proficiency levels have evolved from a model of passive participation through teacher-directed learning, to actively taking responsibility for pursuing a personalized and self-managed learning journey. The CEA which combined constant access to AI feedback via ChatGPT and a visible, persistent, and socially connected digital portfolio on Padlet made this transformation structurally possible where traditional classroom instruction continually failed to do so. Students not only were supplied with new tools but also had larger amounts of control over the tools they were provided and many of them exhibited purposeful and strategic intelligence in the usage of their newfound control beyond what was required in course design. S19 defined the essence of this new autonomy in detail that illustrates the theme:

“ChatGPT allows me to ask questions at any time without worrying about disturbing anyone or feeling like I am taking up too much of someone’s time. The explanations it provides are thorough and can be customized to exactly what I need at that particular moment in my learning journey.” (S19, phone interview through WhatsApp)

Because ChatGPT’s explanations can be customized exactly to what a student needs right now, it represents an aspect of personalized learning that cannot be replicated entirely in a classroom of 30 students by either a static curriculum design or a single human teacher at the same time. Each student’s

interaction with ChatGPT in the CEA framework was personalized at the level of their individual current knowledge, confusion, or learning goal. Any student could experience personalized learning in this environment and thus develop into an autonomous or self-directed learner. S1 added more detail to the concept that the CEA environment has transferred the control of learning to the student when he provided an example of how the CEA environment has shifted learning from a teacher-directed activity to a student-directed activity:

“Now I truly feel that I am in control of my own learning process. I can decide entirely on my own when and how to practice, for example by recording my presentation rehearsals with ChatGPT to train my fluency specifically. This ability to manage my own learning environment has made me considerably more confident in developing my English speaking ability both inside and outside the classroom.” (S1, phone interview through WhatsApp)

By intentionally recording their practice sessions and using these recordings as an opportunity to engage with ChatGPT, S1 demonstrates an example of self-generated learning that requires both digital literacy and the ability to understand their own need for growth. This behavior, which was completely self-directed and not prescribed by any instructor, illustrates the capacity of the CEA model to foster authentic and sustainable autonomy. S2 discussed how the autonomous control that S1 exercised over her own educational experience extended from the practice of recording, via ChatGPT as a source of feedback, to using ChatGPT as a personalized guide throughout her individualized developmental journey:

“With ChatGPT, I can find learning resources, ask questions, and practice at any time I choose. ChatGPT also arranges my learning from the most basic level upward to the next stage, and I follow those recommendations at my own pace. The course genuinely influenced my independence in learning English in a way I had not experienced before.” (S2, phone interview through WhatsApp)

S2’s account shows us that the autonomy developed by CEA was not simply freedom to engage in practice whenever they desired. Suffice to say that CEA provided a structured type of freedom where Chat-GPT was used as a personalized developmental scaffolding for students, enabling them to follow at their own pace to deepen the “appreciates feedback as an active process” and “elicits information to improve learning” elements of Molloy et al.’s (2020) feedback literacy framework, while also supporting conclusions of Kusuma and Waluyo (2023) which suggest an improved sense of self-efficacy in e-portfolio-based speaking courses. The ability to access and utilize both feedback and structured pathways of learning anytime allowed a direction and purpose toward independence that went well beyond the explicit boundaries of the course.

Metacognitive Awareness Enhancement

The last theme of the analytical arc of interview data comes from the emergence of sustained metacognitive awareness as an outcome of CEA engagement. It is widely acknowledged that metacognition, or one’s ability to consciously monitor, assess, and actively manage one’s own cognitive and linguistic processes, is a proven predictor of long-term learning success. This study shows that the CEA environment, through combining reflective portfolio documentation on Padlet with ongoing corrective, iterative feedback from ChatGPT, provided structural support and provoked reflective and self-monitored learning behaviors both throughout the semester and for many of the participants long after it. Importantly, the metacognitive growth developed over the course’s development is not being designed intentionally, but rather, is organic in character due to the CEA workflow itself. S5’s observation below

contains an overview of both an overall cognitive arc and an extensive account of reflective practice that serves to demonstrate the theoretical significance of the metacognitive development of students immediately:

“I analyzed the feedback I received by comparing the recurring mistakes I made across multiple sessions. Reflecting on that pattern, I created a small personal note to focus on during each subsequent practice session. ChatGPT was invaluable here because it not only identified the mistakes but helped me understand exactly why they were happening, which made it possible to actually correct them rather than just being aware of them.” (S5, phone interview through WhatsApp)

S5 described an important insight about the difference between being aware of an error and correcting an error in both metacognition and pedagogy. When someone is aware or “knows” about an error, they do not “fix” that error unless they also understand the cause for their error. Therefore, when a user of the CEA environment received explanatory feedback from ChatGPT as to why their error occurred, the user was able to change their error awareness into error correction, which directly reflects the “process feedback information” and “enacts outcomes of processing feedback information” aspects of Molloy et al. (2020). To further support this theme, S4 (describing how she created a concrete behavioral system that she created to track and address error’s that she made) illustrated the application of how to apply this system:

“I analyzed the feedback from ChatGPT by taking notes and carefully recording my errors alongside any motivating suggestions I received. I then grouped these documents by error type so that it would be easier to study and address each category systematically. Having this organized record means I can return to specific areas whenever I need a focused practice session rather than practicing randomly and hoping for improvement.” (S4, phone interview through WhatsApp)

The self-directed error categorization system that S4 developed has created a comprehensive and searchable personal knowledge base from what could have been an undifferentiated set of corrective actions. The use of this method is self-generated by the learner, based on their experience with the CEA environment for an extended period, rather than being directed by an instructor. This demonstrates how S4’s model can develop the need for metacognitive behavior and ability (the intendancy) to acquire metacognitive behaviors, as opposed to supplying tools to previously established metacognitive learners. In addition, the dimension of developing one’s metacognitive awareness in S4 will provide a new understanding of feedback literacy, as demonstrated by how technology enables the deep reflection and systematic analysis of the learning process. Additionally, this will support and extend the work of Carless and Winstone (2023) regarding the interplay of learning design and the deep internalization of feedback literacy as a lasting competency in academic and professional settings.

Discussion

A statistically significant difference in performance on speaking assessments and feedback literacy was found between the experimental group (Group A) and control group (Group B) (Wilks’ $\lambda = 0.476$, $p < 0.001$, partial $\eta^2 = 0.524$), with both dependent variables favoring the experimental group (group A). Although this study’s quasi-experimental design does not allow for strictly causal interpretations, the combined findings from both quantitative and qualitative data provide compelling evidence that CEA integration is the primary outcome influencing the difference between the two groups as they received the same topics, instruction from the same lecturer, and identical assessment rubrics over the 8 weeks of data collection.

In addition to validating the statistical significance of the CEA effect, the findings of this study prompt further theoretical exploration related to the type of feedback competency produced by the AI-integrated portfolio environment. The standard framework for feedback literacy presented by Carless and Boud (2018) and developed by Molloy et al. (2020) was created within a human-to-human feedback ecology. The feedback produced in such settings carries social, relational, and evaluative weight from an identifiable source that the learner recognizes as responsible for the feedback provided. In contrast, the AI-integrated portfolio environment has created a qualitatively different situation for learners. They are expected to provide their assessment of AI-generated feedback and to apply that feedback in a selective manner; however, they are expected to evaluate and apply AI-generated feedback from an immediate, infinitely patient source that is also contextually devoid of meaning and relationally neutral. Most alarmingly, Mizumoto et al. (2024) and Mizumoto & Teng (2025) documented empirical evidence indicating that AI-generated feedback from both sources has been shown to have limited accuracy, specifically in the classification of open-ended learner responses, which indicates that accepting AI-generated feedback without question is not only a pedagogical gamble but also, based on documented evidence, an empirical gamble. Teng and Huang (2026) highlight the need for explicit instruction in prompt engineering and developing critical skills for managing students' overreliance on AI-generated outputs. Therefore, the CEA model represents more than just putting an AI component on current feedback literacy but provides the infrastructure for a new type of critical feedback literacy, where the learner's metacognitive task now includes assessing both the reliability and epistemological nature of the feedback source itself. This represents a novel theoretical contribution to the field of feedback literacy frameworks that has never been empirically demonstrated until now.

This finding strengthened the previous study from Kusuma and Waluyo (2023) that showed the effect of e-portfolio in improving students' speaking performance. The result of this study also corroborated the study from Mathur and Mahapatra (2022) about the effect of e-portfolio assessment on the students' academic speaking. The present study is also in line with findings from Kostka and Toncelli (2023) about the potential of ChatGPT in English language learning, as well as expand the comprehension from Chang and Kabilan (2022) on the benefits of digital e-portfolio in learning. The integration of e-portfolio assessment with the assistance of ChatGPT gives a new perspective which has not been explored in the previous studies (Ayaz & Gök, 2022; Loan & Tin, 2016; Lukitasari et al., 2020; Nourdad & Banagozar, 2022; Yekta & Kana'ni, 2020) that only focus on using e-portfolios without integration with other approaches like what have been done by some previous studies (e.g. Kusuma, et al., 2021b).

The impact of CEA on oral/speaking was statistically significant as well as practically meaningful (partial $\eta^2 = 0.456$), in terms of its relative size between the experimental and control groups. In fact, the magnitude of this effect greatly exceeds Cohen's (2016) conventional standard (i.e., of 0.14) for large effects and therefore represents not only evidence of a statistically significant difference in terms of speaking performance but also of educational significance (due to the large effect size). In addition, another variable explains how CEA was able to bring about an improvement in speaking/ based on the fact that an iterative low-stakes practice structure was created through the CEA environment in conjunction with CEA usage. The control group's speaking improvement was only limited to one lecturer giving advice every other week. Throughout the six-week experimental period, students in the experimental group could receive feedback from their peers through Padlet and real-time pronunciation corrections from ChatGPT's voice mode. This combination of sources created a "digital feedback ecosystem" (Escalante et al., 2023) where each student received multiple, different responses for every time they practiced speaking; thus creating several feedback loops that students could use to enhance their speaking ability. The combination of these opportunities for repeated, low-anxiety correction and practice explains the increase in performance that was observed. This present study result emphasize the role of e-portfolio to improve the students' motivation in language

learning (González-Mujico, 2020) and also support the positive result of implementing e-portfolio in vocational college toward self-efficacy in speaking English (Laksana et al., 2021). The results of this study confirmed several factors influencing the students' behavior on ChatGPT based learning (Cai et al., 2023) and also adds new dimension related to the integration of e-portfolio and Gen AI. The results also aligned with Baskara and Mukarto's (2023) study on the implication of ChatGPT on language learning in higher education level. The present study expanded the perspective about the application of multilingual ChatGPT in language learning (Li et al., 2023).

The experiment group (CEA group) had a much higher feedback literacy score than the control group (non-CEA group). The M (mean) score for the CEA group was close to 80 ($M = 79.666$) while it was just under 72 ($M = 71.762$) for the control group. This difference is considered moderate to large effect size (partial $\eta^2 = 0.218$) which indicates that students' performance in both groups on cognitive skills, affective skills and behavioral skills (all three dimensions of feedback literacy) were very different from each other. Although the MANOVA results show a smaller effect for CEA-based feedback literacy than it did for the speaking results, the reason for this can be attributed to the fact that feedback literacy (knowledge, ability, behavior) encompasses a much more complex construct than speaking skill does (Molloy et al., 2020). Conceptualizations of feedback literacy using Sutton's (2012) knowing-being-doing model or Carless and Boud's (2018) four dimension models have been conventionally based on human feedback where they do not incorporate portfolio learning environments. The CEA framework adds a new level of agency that the other frameworks didn't think through, because now not only can learners receive AI feedback, they also have to evaluate, filter and selectively apply the AI response that they receive. This later provides a more responsive and individualized feedback experience than the human feedback they get. However, there's no real relationship or contextual depth to the AI feedback, which places an additional cognitive burden on learners in alignment with Liu, et al. (2024) who found metacognitive processes activated during generative AI-assisted learning environments where they act as mediators between AI content and their own developing linguistic judgments about the given content from the AI. Therefore, the AI critical feedback literacy component, which is where learners develop metacognitive skills to differentiate useful AI feedback from generic/possibly out-of-context suggestions, represents a significantly new theoretical contribution that requires additional research detailing its impact. Through this discovery, this study was able to support and greatly expand upon the argument of Carless and Winstone (2023) about how feedback design can change the way things are done and complement the other studies conducted into this area that did not include a technological component in their research.

According to Mizumoto and Teng (2025), the empirical evidence for treating critical evaluation as a strict educational requirement instead of an optional skill comes from direct software testing. None of seven leading large language models reached a strong level of agreement with human grading standards when evaluating open-ended student responses. These tested programs included major platforms such as GPT-4o and Claude 3.5 Sonnet. None of the applications achieved a strong inter-rater reliability score of $k \geq 0.80$ compared to the human benchmark. Even the top-performing system showed only a moderate level of agreement, resulting in a coefficient of $k = 0.68$. Multiple other models, including Claude 3.5 Sonnet, performed significantly weaker during the evaluation. The reason for misclassifying the open-ended responses was that the LLMs relied on surface-level patterns in the language while they did not understand the underlying temporal and cognitive context of the learners' responses, which is exactly the type of contextual nuance EFL speaking feedback needs to assess. Therefore, if AI feedback tools are not assumed to produce reliable accuracy or sensitivity to context, students who are taught to critically assess the AI feedback will not be developing a higher-order supplementary skill, but rather a fundamental functional competency for AI-assisted language learning environments. According to Teng's (2024) studies, although ChatGPT can improve writing mechanics and increase motivation, it has limitations in terms of pragmatic understanding and the potential for users to become

too reliant on it. Therefore, teachers should consider using a more balanced teaching strategy when incorporating ChatGPT into their instruction by teaching students to use ChatGPT strategically instead of just allowing them to use it freely. Furthermore, when Teng and Huang (2026) examined the impact of differing modes of use (i.e., writing drafts with and without receiving feedback prior to completion), they found that students provided with guidance in seeking feedback from ChatGPT were the most cognitively engaged in their writing and had the greatest improvement in their writing, thereby demonstrating that the way in which teachers use AI will ultimately determine how valuable it is for students. As such, future AI-integrated EFL assessment frameworks must include AI feedback literacy as a required component of the structure of the framework, while the CEA model found in this document provides one way to support development of AI feedback literacy based on empirical evidence.

The emergence of “Digital Feedback Orchestration” and “Systemic Feedback Information Construction” themes represented a paradigmatic movement in the context of technology-based language learning management. The systematic integration between the real-time AI feedback and the documentation process of e-portfolios created a more comprehensive learning structure. Moreover, the implementation of CEA showed a significant difference from the previous research that focused on the implementation of a single technology (Alberth, 2023; Dougherty & Coelho, 2017; Yang et al., 2024). This digital orchestration system allowed the students to develop more complex metacognitive abilities. In addition, the students not only received and responded to feedback but also actively organized and analyzed their learning patterns. The results of this study indicated that the CEA approach could enhance students’ ability to manage their learning and reinforce the findings about the potential of AI in education (Kim et al., 2023; Kostka & Toncelli, 2023). This study also added a new dimension in terms of systematic learning documentation that has not been explored in previous studies. Moreover, the findings confirmed and expanded the argument about the importance of organized learning structures in language development (Papachristou et al., 2023; Safari & Koosha, 2016; Woodin et al., 2022).

The themes “digital peer synergy” and “digital confidence scaffolding” revealed unique socio-psychological dimensions in technology-based learning. Empirical evidence showed the integration of CEA in creating a learning environment that supported peer collaboration and the development of individual self-confidence for the students. Adding an AI validation layer that helped students build their confidence in giving and receiving feedback, this phenomenon expanded the traditional understanding of peer feedback in language learning (Kusuma, et al., 2021a; Kusuma, et al., 2021b; Woodin et al., 2022). The implementation of CEA demonstrated how technology can actively facilitate the development of self-confidence through a combination of non-judgmental AI feedback and structured peer support. These results corroborated with previous studies that have identified the importance of emotional support in language learning (Hartono et al., 2022; Hill et al., 2021). These findings also aligned with arguments about the important role of affective aspects in language learning (Gado et al., 2022), but add a new dimension regarding how technology can systematically support the development of self-confidence in the context of collaborative learning.

The themes of “tech-enhanced autonomy” and “metacognitive awareness enhancement” demonstrated how CEA supported the development of learning independence and metacognitive awareness. These findings extended the research results of Ciesielkiewicz et al. (2019) on e-portfolio implementation in learning, as well as supporting Ismailov and Laurier’s (2021) study on virtual team processes in online learning. These results also confirmed the findings of Korhonen et al. (2019) on student competence in e-portfolio use, while adding an AI dimension to the process. This research also reinforced the results of Lam’s (2022a, 2022b) study on the use of e-portfolios for independent and collaborative learning.

This metacognitive aspect of ChatGPT corresponds with Teng (2025) who found that for EFL student authors using ChatGPT’s capabilities, actively planning ahead, checking back, and evaluating all

AI-generated outputs were important factors in their effective learning with an AI tutor – meaning the AI’s contributions helped these writers develop as writers. The writers were determined as active participants in their writerly growth if they had developed enough literacy skills (e.g., in the EFL context) to compare the AI’s suggestions to their own developing competencies. In further support of this systemic effect, the results from Teng and Huang (2026) concluded from this research that when students were given structured guidance on how to engage with ChatGPT feedback, they exhibited greater cognitive involvement through writing, resulting in more thorough revisions of their writing – comparatively versus peer feedback – evidenced that the level of cognitive involvement with ChatGPT’s tools and ability will depend on the individual student and the design implications of sequencing the lessons around developing cognitive skills; ultimately students must be guided by design factors related to student performance. The CEA method led to an equivalent process in the realm of oral communication. The students received feedback through ChatGPT, their peers, and the lecturer at the same time, thereby creating a requirement for students to critically evaluate the different sources of feedback and triangulate those source(s). Triangulation and judgement of the feedback source(s) represents a metacognitive effort that single feedback source(s) does not create. This triangulation process is documented in an empirical manner through the Digital Feedback Orchestration and Systemic Feedback Information Construction themes and can be viewed as a significant theoretical addition to the writer-based metacognitive dimensions as seen through AI research into writing to the area of oral EFL success.

The implementation of CEA has created an adaptive learning ecosystem that showed a significant evolution in technology-based language learning approaches. Studies about the individual potential of e-portfolios (Ducasse & Hill, 2019) and AI in learning (Alm & Watanabe, 2023) have become the focus of previous studies in these fields. According to the findings of this study, the integration of both technologies (E-portfolios and Gen AI) created a more responsive and adaptive learning system. The empirical data from this study also revealed that students not only utilized technology for documentation and practice but also developed the ability to adapt to various learning situations through a combination of dynamic AI feedback and structured reflection in e-portfolios. This phenomenon expanded the understanding of adaptive learning developed by Klayklung et al (2023) and Farrell et al (2021) while adding a new dimension to how technology can support the development of adaptive skills in language learning. These findings also confirm and expand Roco and Barberà’s (2022) argument about the importance of flexibility in technology-based learning, demonstrating how CEA can facilitate learning that is more responsive to individual students’ needs.

CEA implementation in the EFL learning context has given a theoretical contribution. the CEA learning model presents a new paradigm in our understanding of technology-based language learning. The previous studies focused on the implementation of traditional language learning models on linear interactions between students, materials, and feedback (Buyarski & Landis, 2014; Mohamad et al., 2016), while CEA introduces a more complex cyclic learning model where AI and e-portfolios serve as dynamic mediators in the learning process. These findings expanded the connectivism theory developed by Siemens (2004). However, it also integrated a new perspective on the role of technology in scaffolding language learning. The research data from this study showed that the CEA model supported the term “technology-mediated language learning ecology” which was identified by Tse et al. (2018) as well as Wetcho and Na-Songkhla (2019) as a learning environment that dynamically adapts to and responds to learners’ needs.

The emotional and psychological aspects which revealed in the implementation of CEA through the theme “digital confidence scaffolding” provided an interesting new perspective. The findings extended Hartono et al’s (2022) research on the psychological impact of oral corrective feedback on EFL students, by adding the dimension of technological support in the process. This result also supported the findings of Hill et al. (2021) on students’ emotional responses to assessment feedback, while showing

how technology integration could help manage the emotional aspects of learning. This study is also aligned with the research of Gado et al. (2022) on factors that influenced the acceptance of AI by psychology students, as well as reinforcing the findings of Dai et al. (2020) on developing students' readiness for the AI era.

The role of the educators in implementing CEA and supporting students' feedback literacy development showed an important dimension to consider. This finding extended Carless and Winstone (2023) research on the interplay between teacher and student feedback literacy. It also supported Zhan's (2022) study on the perceptions of school teachers' feedback literacy. Moreover, this study also confirmed the findings of Brown et al. (2024) on teachers' perspectives and experiences in assessment literacy, while also proposing a technological dimension to the process. In addition, this study reinforced Williams's (2024) research on the challenges and best practices of providing feedback to higher education students. The present study was also aligned with Akpinar and Özalp's (2023) findings on the effects of providing individualized feedback.

This research provided a synthesis of findings that reflect a fundamental shift in the way technology supports language learning. CEA provided a new integrated approach to the use of AI (e.g., chatbots, machine learning) and the use of e-portfolios (e.g., electronic systems for managing documents) while simultaneously creating a completely new paradigm for developing language proficiency and feedback literacy. The findings from this research offer a broader base upon which to further challenge existing assumptions in previous research regarding the extent to which technology has impacted language learning (Blaschke & Hase, 2019; Ciesielkiewicz et al., 2019; Lam, 2022a, 2022b). In addition to providing empirical evidence to support those claims, many areas were identified as priorities for future research, including the need for longitudinal studies to assess the long-term effects of utilizing CEA, developing an individual's personalized learning experience using AI, and conducting thorough investigations into the socio-cultural contexts for implementing technology in language learning. This research has reiterated several key conclusions from a number of modern-day studies (Gozali et al., 2024; Kusuma et al., 2024) concerning the future direction of language acquisition training using technology. Next, one of the leading examples of how to effectively and efficiently integrate these two emerging technologies is the CEA model proposed by the authors. This CEA model provides an effective tool to facilitate the integration of both complementary technologies.

The findings of this study must be interpreted using data that is subject to many limitations. One of the key limitations is the inclusion of different e-portfolio systems for each of the two participant groups. While both e-portfolio systems allow users to store digital portfolios, the additional functionality and social aspects provided by the use of Padlet may have resulted in greater engagement among participants in the experimental group. This would thus add a confounding variable that cannot be fully accounted for by the quasi-experimental design used in this study. Due to the limitations of the current design, future research should either standardize participants through the use of one e-portfolio system or conduct a three-arm design (1) ChatGPT + Padlet, (2) Padlet, (3) traditional digital e-portfolio system). This will improve the ability to contextualize the individual technological components. In addition, a further contextual limitation concerns the ecological boundaries of the control condition. This study was conducted while generative AI tools such as ChatGPT were available and widely used by students outside of traditional classroom environments. The control group (which did not have any type of guided or institutionally integrated ChatGPT instruction as part of their course design) may still have utilized generative AI tools individually for their own task preparation and when not in the classroom. As a result of the current technological landscape, where there is no longer an absolute pure AI-free baseline, the control condition of this study reflects typical e-portfolio practice implemented without direct or structured integration of generative AI pedagogies. Reframing clearly demonstrates the more specific nature of CEA's contribution. The value of AI to students is not

simply having access to it, but having purposeful, supportive, and theoretically grounded architecture through which they will access AI. Further, due to the small sample (60 students from 1 vocational institution), the generalizability of these findings will necessarily be limited to these participants. Further research involving long-term evaluation will also be required to determine whether or not the increases observed after the 8-week study period will be maintained.

This research provided strong empirical evidence of the CEA model's simultaneous effect in improving students' speaking performance and feedback literacy. The integration of e-portfolio assessment with the assistance of ChatGPT has created a more dynamic and responsive learning environment. This model also transformed the way students interact with feedback and develop their language skills. The themes from this study that emerged through the process of interview have provided a comprehensive framework. It also offers practical guidance for educators and educational institutions to integrate and utilize Generative AI with the existing assessment systems. The implementation of CEA is hoped to make the process of language learning to be more focused on the holistic development of student's abilities. The implementation of the principles and findings on the CEA model in vocational education not only implies the scope of vocational education itself but also implies broader implications for the development of technology-based learning models in various educational contexts.

Conclusion and Pedagogical Implications

The implementation of CEA has a significant simultaneous effect on students' speaking performance and feedback literacy. The learning model that integrates ChatGPT with e-portfolio assessment has proven to create a more dynamic and adaptive learning ecosystem. This ecosystem provided the students with experience and improvement in their speaking abilities. It also assisted the students to develop a deeper understanding of the feedback process. The significant improvements observed in both variables indicate that the combination of AI technology with a structured assessment system can produce a more comprehensive learning impact compared to the separate implementation of technology.

Seven important themes as the framework of this study were revealed through the students' experiences in developing feedback literacy during the implementation of CEA. These themes illustrated a fundamental transformation in the way students understand, manage, and utilize the feedback in their learning process. The implementation of CEA has facilitated the development of the student's technical skills in giving and receiving feedback. It also supported the students' socio-emotional aspects of learning through digital peer synergy and digital confidence scaffolding. The implementation of the CEA model proved to encourage the development of learners' autonomy and metacognitive awareness. This means that the model prepared the students to become more independent and reflective learners in the digital era.

Declaration of Using AI

The authors used Claude AI to assist the writing of statistical description symbols in the paper. Claude AI was also used to help paraphrase several interpretations of statistical data especially in research findings and discussions.

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