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Incorporating AI-Administered Personalized Feedback in an Inquiry-Based Learning EFL Writing Class

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Abstract

In an academic writing class using inquiry-based learning, ChatGPT-3.5 was used to provide personalized feedback to 95 female undergraduate native speakers of Arabic. Throughout the semester, students completed four essays by engaging in two weeks of student-led, in-class essay writing workshops, followed by entering their work into ChatGPT-3.5 with the prompt "correct my grammar." Students were to complete reflections on the types of errors found and how to use this information to improve future writing. Students either submitted the required reflection or incorrectly provided an AI-generated response. Completing reflections were significantly related to higher essay-writing grades in the handwritten final exam. This relationship was also found with grammar sub-scores within the total essay grade. No relationships were found with class attendance alone. Results suggest that AI-generated feedback can assist EFL learners in improving their writing in an inquiry-based learning course, but only if they choose to engage in related critical-thinking exercises.

Keywords: *EFL; Grammar Instruction; AI Teaching Tools; Writing Instruction; Inquiry-Based Learning, SRL, Personalized Feedback*

1. Introduction

Since Microsoft's 2022 release of Chat Generative Pre-Trained Transformer (ChatGPT), the experience of writing courses has evolved for students and teachers alike. Generative AI programs use Large Language Model (LLM) Functionality and are trained on vast amounts of both human and AI-generated writing to accomplish a wide variety of tasks. Among these tasks are translation, text summarization, and generation of conversation and written output intended to imitate human-like responses to prompts (Microsoft, 2025). Said output is known to be generally accurate, informative, and both lexically and semantically coherent in a wide variety of genres (Lo, 2023; Waked et al., 2024a). For instructors of writing courses, the aim of which is to improve students' composition abilities, this particular feature of LLM Functionality can

serve as a tool to develop novel educational activities that may increase students' course engagement.

Writing is a complex task requiring active learning that is both cognitively and linguistically demanding. Even in one's native language, writing entails engagement in a cycle of drafting, reflection, and rewriting after learning from one's errors. For English as a Foreign Language (EFL) learners, difficulties in navigating the writing process are further exacerbated when learning to write in the structured format of a university-level essay. Depending upon their level of English-language proficiency, EFL writers are challenged at every level of essay composition. Many EFL writers struggle to effectively outline the main ideas of their essays, leading to poor overall compositional structure. Limitations in vocabulary may also hinder the ability of EFL writers to construct sentences and paragraphs that effectively convey their ideas. Many students report feeling overwhelmed by the magnitude of the essay-writing task (Bisriyah, 2022). Indeed, Cheng (2024) showed that writing anxiety may manifest in avoidant behavior, wherein EFL learners procrastinate or attempt to avoid English-language writing tasks altogether. While writing, EFL learners face difficulties organizing the arguments they wish to express, including the construction of a strong thesis statement to guide their composition (Ananda et al., 2024). Writing as an EFL learner may also require overcoming negative language interference, in which lexical or syntactic rules from one's first language are incorrectly implemented in English-language writing (Waked et al, 2024b).

The process of learning to both write and refine a composition often takes place in a classroom environment in which instructors strive to provide real-time feedback. Instructor feedback is intended to assist students in the reflection portion of the active-learning writing cycle. While feedback is often managed by course instructors, peer review is also often implemented. Students report feelings of empowerment in the collaborative learning experience of both giving and receiving peer feedback (Miao et al., 2026). With minimal guidance and regular encouragement, ELF students may be able to engage in self-regulated learning (SRL). SRL theory proposes that lifelong learning comes from allowing learners to move at their own pace, reflect upon their own writing, and use this reflection to actively engage in revising their work. SRL requires students to approach academic tasks through the lens of critical thinking (Uyen, 2022). Educational activities using text-generative LLM Functionalities rely on this theory to provide timely, personal, and actionable insights into specific areas of improvement for EFL writers (Afzaal et al., 2024).

In EFL courses, students often complete short compositional responses to instructor prompts. As studies in the extant literature primarily focus on beginning to introductory level EFL education, activities incorporating LLM Functionalities often concern instruction of rudimentary aspects of the English language, such as the correct use of a singular grammatical tense. Such exercises have been described as empowering as students are allowed to engage in SRL by noting their own errors in the personalized feedback provided. Yet, given the level of

their English-language proficiency, the SRL allowed by AI-generative exercises is limited as interaction with feedback often requires instructor assistance (e.g., Baskara, 2023; Yener & Selcuk, 2024). Studies are also often limited by the number of participants, as small class sizes are often necessary to provide the focused instructor-led training that is beneficial to EFL learners at the beginning of their English-language educational journey (e.g., Harfitt, 2012).

The current study differs from those in the extant literature in two key aspects. Unlike the majority of studies assessing beginning to introductory level English-language learners, participants in this study consisted of undergraduate university students whose English-language proficiency was moderate to competent as judged by the International English Language Testing System (IELTS) prior to admission to an English-medium university. This study is additionally unique in that participants were enrolled in a course using inquiry-based learning as the method of instruction. In this educational structure, students are provided with the essential tools and information necessary to understand generalized academic concepts, but are required to engage in critical thinking and problem-solving to complete assignments with minimal guidance from the instructor. In this manner, the instructor acts primarily as a facilitator and moderator of educational activities (Pilotti et al., 2024).

In the current study, a convenience sample of 95 female EFL university students of Saudi Arabian descent completed academic essays in four genres as part of an introductory written communications class. All students were native speakers of Arabic. Following one class session of an instructor-led overview of an essay genre, two weeks of student-led writing workshops took place. At the end of this two-week period, students entered their completed work into ChatGPT-3.5 with the prompt "Correct my grammar. Highlight all changes." They were instructed to complete a reflection assignment in which they wrote one paragraph describing both the *types* of errors found (e.g., errors in capitalization, tense, or sentence structure) and how the personalized feedback regarding the types of errors identified would be used to improve future writing. Students either correctly submitted the required self-reflection or chose to incorrectly submit AI-generated output related to the reason behind the chatbot's changes. The relationship between engagement in this activity and grades in the handwritten essay portion of the course's final exam was investigated. The relationship between course attendance and grades on the essay portion of the handwritten final exam was additionally examined. These variables were further studied in relation to the grammar sub-section of the total handwritten essay grade. In this context, the following research questions were asked:

1) What is the relationship between writing a reflection on ChatGPT-generated personalized feedback of grammatical errors and the learning outcomes of both students' essay writing and English-language grammar use in an inquiry-based learning EFL writing class (as assessed by the handwritten essay portion of the course's final exam)?

2) What is the relationship between class attendance and the learning outcomes of both students' essay writing and English-language grammar use in an inquiry-based learning EFL writing class (as assessed by the handwritten essay portion of the course's final exam)?

The following hypotheses were proposed:

1) Engaging in the critical thinking required to analyze and explore the types of errors revealed through ChatGPT's personalized feedback and to write a well-structured reflection paragraph on how feedback would be used to improve future writing will be related to improved learning outcomes of both essay writing and English-language grammar use. Namely, students who correctly completed the activity would attain higher grades on both the handwritten essay portion of the final exam as well as the grammar sub-section of this essay.
2) Attendance alone does not necessarily imply engagement in critical thinking or SRL. As such, attendance will not be related to improved learning outcomes in either essay writing or grammar use. Namely, attendance will not be related to grades on either the handwritten essay portion of the final exam or the grammar sub-section of this essay.

At the core of inquiry-based learning is the establishment of critical thinking skills. Said skills have been found to be related to lifelong learning in a number of fields (e.g., Darland & Carmichael, 2012; Peters et al., 2015). In order to identify patterns in the grammatical errors as provided by ChatGPT's output, students must engage in the critical thinking SRL process of categorizing changes made by the program, determining how the information they have learned from this personalized feedback can be used, and crafting this reflection into a well-structured paragraph. As such, it is unlikely that simply attending classes without fully engaging in reflective, critical thinking exercises will lead to successful learning outcomes in an inquiry-based learning EFL writing course.

2. Methods

2.1 Participants

Participants in this study included a convenience sample of 95 Saudi Arabian female students enrolled in an introductory written communications course at an English-medium university in Saudi Arabia. Participants were native speakers of Arabic who were judged to be moderate to competent English-language users by the IELTS examination, which was administered prior to admission. Students were primarily freshmen and ranged in age from 18-22 years. As this course is the first in a required communications series, students had no prior experience with writing feedback at the university level.

2.2 Materials and Procedure

EFL students completed four essay assignments during a 16-week written communications course taught using inquiry-based learning. Although these assignments were written and submitted digitally, students were informed that the final examination for the course would be handwritten and that 60% of their final exam grade would be dependent upon writing a truncated essay (i.e., the introduction paragraph, one body paragraph, and the conclusion paragraph). As such, students were made aware that to pass the final exam, they were required to learn how to write a well-structured, grammatically correct, English-language essay independent of technological aids.

During the first month, students learned to write in the standard five-paragraph essay format (i.e., the introduction paragraph, three body paragraphs, and the conclusion paragraph). Students worked together in instructor-assigned groups to create documents defining key components of each type of paragraph, such as the thesis statement, topic sentences, supporting sentences, and concluding sentences. Students also worked in groups to define essential essay-writing concepts, such as lexical cohesion. The instructor interacted with each group throughout class sessions to ensure that students remained focused on assigned tasks. For the remainder of the semester, students completed four essay assignments using the five-paragraph essay format. Each essay was completed over a two-week period.

During the first class of each essay-writing cycle, the instructor used the first 30 minutes to introduce students to the novel genre. Students were encouraged to use this portion of the class to ask the instructor questions and to take notes. The remainder of this class was used by students to independently select the topic of their essays and begin the writing process. The remainder of the two-week period consisted of in-class, student-led writing workshops. Students worked in their assigned groups to assist one another. As the topic of each student's essay had been selected individually, groupmates could only provide feedback on queries pertaining to translation, grammar, and essay structure. As in the first portion of the course, the instructor interacted with groups in each class session to ensure that students remained engaged in the writing process. She did not directly answer students' questions, but instead responded with questions of her own relating to students' independent knowledge of the topic of their queries.

Students were explicitly directed to not use any form of AI during the writing-workshop period. These included paraphrasing programs and translation applications as well as generative AI programs. They were made aware that at the end of each writing workshop period, they would complete an exercise analyzing ChatGPT's correction of the grammatical errors in their compositions. They were also made aware that these activities would count towards their participation points, which collectively counted towards 10% of their final course grade. During the writing process, rather than relying upon technological aids, students were encouraged to use what they had learned through their problem-solving teamwork regarding general essay

structure and to rely upon one another within their assigned groups to both provide and receive the feedback necessary to restructure and refine written compositions.

During the final class of the two-week writing period, students completed an in-class exercise using the program ChatGPT-3.5. They were instructed to:

1) Enter the query, "Correct my grammar. Highlight all changes."
2) Paste a copy of their essay into the program
3) Analyze the changes and categorize general patterns (e.g., regular mistakes in capitalization, subject-verb agreement, word order, or tense)
4) Write a well-structured paragraph explaining the types of grammatical errors in their essays and how they intended to use this personalized feedback to improve their future writing

Students submitted their original essay, ChatGPT output, and their reflection as three separate documents to the online learning platform, BlackBoard. They were made aware that only the reflection portion of the assignment would be graded. They were also made aware that if a 100% match between the AI-generated document and their final assignment submission was found, they would be given a score of 0%. Thus, students were made to understand that they were to only implement grammatical changes to their original work rather than submit the AI-generated "correction" of their essay.

3. Results

Although students were aware that they would only receive participation credit based on their submitted reflection, only 35% of students (n = 33) submitted at least half of the four assignments using clearly human-generated reflections. The remaining 65% of students (n = 62) submitted only the AI-generated output without the required reflection paragraph.

Prior to conducting analyses, percentage scores were converted to rationalized arcsine units (RAU) to control for the assumption of normativity. Table 1 displays the means and standard deviations of the four variables of this study: Engagement with the ChatGPT reflection activity, class attendance, students' grades on the handwritten essay portion of their final exam, and the grammar sub-section on the handwritten essay in their final exam.

To determine the value of this exercise, a paired-sample t-test was conducted to examine whether class attendance differed from engagement with the ChatGPT reflection activity [$t(94) = 50.76$, $p \leq 0.000$]. As these two variables differed, correlational analyses were conducted to determine the relationship between exam outcomes and either course attendance or engagement with the ChatGPT personalized feedback activity. In Table 2, significant correlations are marked in bold with an asterisk.

Table 1. Means and Standard Deviations of Course and Learning Outcome Measures

	n	***Mean***	***SD***
Engagement	95	1.23	1.23
Attendance	95	89.12	17.31
Final Exam Essay Grade	95	72.08	23.62
Grammar Grade	95	79.75	31.17

**SD* = standard deviation

Table 2. Correlational Analyses Comparing Exam Outcomes with Assignment Engagement and Class Attendance

	Engagement	**Attendance**
Essay Grade	**0.46***	0.13
Grammar Grade	**0.28***	0.16

Engagement with the ChatGPT personalized feedback activity was found to be significantly correlated with improved scores on both the overall handwritten essay and the grammar sub-section of this essay in the course's final exam. No relationship between either assessment and class attendance was found. These findings provide evidence that in an inquiry-based learning EFL writing class, SRL engagement with the AI-generated personalized feedback was more likely to lead to successful course learning outcomes than simply attending class.

4. Discussion

The findings of this study indicate that for moderate to competent EFL learners enrolled in an inquiry-based learning written communication course, improved essay writing (including improved grammar) is unlikely to occur by simply attending classes. To benefit from personalized feedback through exercises involving AI-generated grammar corrections in an essay, active engagement with such activities is necessary. By writing a well-structured, reflective paragraph addressing the patterns of errors exhibited by a given text and explaining how to implement changes in future writing, students engaged in critical thinking as well as practiced articulating their ideas in a structured written format, an area of essay writing which many EFL students find challenging (Anada et al., 2024). As such, both H1 and H2 were supported.

Although students were told that each activity counted towards the 10% participation grade in the class, more than half of students elected to not actively participate in the SRL reflection activity. Inquiry-based learning requires students to be actively involved in the critical thinking process of discovering the information required to solve problems (Pilotti et al., 2024). Consequently, academic goal orientation (dispositions towards engagement with opportunities for furthering one's knowledge) may need to be considered for future implementation of SRL

activities with AI-generated feedback. Students with a learning orientation may possess sufficient intrinsic motivation to critically analyze feedback to increase their baseline knowledge. However, students with a grade orientation towards learning may not be motivated to engage in SRL activities at a level beyond what they perceive to be the bare minimum required to earn credit (Pilotti et al., 2003).

For grade-oriented students, the low percentage of each activity contributing to the total grade may not have provided sufficient motivation to correctly complete the SRL activity. To increase engagement, it may be prudent for instructors using similar SRL activities with AI-generated feedback to immediately post a grade of 0% for incorrect submissions. It may also be beneficial to regularly reiterate the importance of accumulating participation points throughout the semester for the sake of their final course grade. Allowing students to engage with AI-generated feedback may also lead grade-oriented students to submit the "corrected" ChatGPT-generated essay rather than their own work. In this study, students were warned that a 100% plagiarism match between the submitted assignment and the AI-generated essay submitted as part of the SRL engagement activity would result in a grade of 0%. For the first assignment only, students were allowed to resubmit a handwritten essay completed under instructor supervision. Following the shock of seeing a grade of 0% on the first essay assignment, very few students elected to again submit AI-generated essays.

This study contains limitations that can be explored in future research. First, 95 students participated. Greater generalizability could be found by increasing the number of participants. Second, the study examined only female students who were native speakers of Arabic. As such, results cannot be generalized to male EFL students of comparable English-language competency and similar linguistic backgrounds. Third, the present study did not examine learning orientation and did not account for students' attitudes and beliefs toward writing and feedback. Investigating said attitudes and beliefs before and after completing the four SRL activities with AI-generated personalized feedback may offer a broader insight into the potential benefits of such exercises. This research can lead to a better understanding of the benefits and costs of implementing SRL AI-based exercises in inquiry-based learning EFL written composition courses. As knowledge is a work in progress, it is believed that further studies will deepen the effectiveness of using activities involving generative AI in EFL instruction.

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