



Enhancing EFL Students' Writing through Writing Centers: The Strengthening Role of AI Integration

Aziz Thabit Saeed^{*a} & Hassan Saleh Mahdi^b

* Corresponding author

Email: a.thabit@arabou.edu.kw

a. Faculty of Language Studies, Arab
Open University, HQ, Kuwait

b. Faculty of Language Studies, Arab
Open University, Riyadh, Saudi
Arabia

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ABSTRACT

This study investigates the impact of university writing centers on enhancing EFL learners' writing competence. It also explores the extent to which integrating AI technology into these centers can strengthen their impact. The total number of participants in this study was 117. Data were collected in two phases. In the first phase, 97 students who attended the Arab Open University (AOU) Writing Centers across five campuses received traditional support. The second phase involved collecting data from a second group in a later semester, with 20 students from the AOU Saudi Arabia campus. This group took the same pre-test and post-test as the first group. They visited the writing centers regularly for two months, but this time the Writing Centers' services incorporated AI tools, including ChatGPT, Gemini, and Copilot, for tutoring and task completion. The findings reveal significant improvements in writing skills across all groups from attending the Writing Centers, with the AI-assisted group showing even greater gains. The paper compares the performance of all groups and presents external examiners' perspectives on the role of writing centers.

KEYWORDS

AI Tools, ChatGPT, EFL Learners, Writing Centers, Writing Skills.

INTRODUCTION

Despite intensive instruction, many EFL learners continue to struggle to produce coherent and effective written texts, indicating a persistent gap between linguistic knowledge and actual performance. Writing is one of the four major language skills that EFL learners should master. Indeed, it is considered the most challenging skill in language learning (Fareed et al., 2016) involving different layers of complexity, including lexical, grammatical, organizational, and rhetorical aspects, among others. According to Kellogg (2001), writing is a cognitive process that draws on memory, thinking, and verbal knowledge to express ideas effectively.

Despite the writing courses offered at tertiary institutions, writing continues to be the major challenge for EFL learners. To support students in developing their writing skills, some higher education institutions offer remedial writing courses and establish writing support centers that function as writing clinics, providing students with assistance to improve their writing.

Previous studies have reported that learners who participated in activities provided by writing centers scored higher in overall essay writing, task fulfillment, and text organization (Tiruchittampalam et al., 2018). In addition, writing centers support peer interaction and feedback. They prepare students for academic success and future careers by developing good writing habits. Studies exploring the impact of writing centers have shown that students involved in writing center activities improve their writing skills and self-efficacy (Archer, 2008; Barton, 2018; Brown et al., 2026). They also help institutions maintain better student retention and academic success (Bielinska-Kwapisz, 2015).

Furthermore, they are vital for developing independent, self-motivated learners (Ariail et al., 2013; Ginting & Barella, 2022). In Saudi Arabia, for instance, writing centers in higher education have emerged as key academic support for EFL students (Eusafzai, 2017). These centers offer one-on-one tutoring, writing workshops, and feedback sessions to help students develop proficiency in English academic writing.

Recognizing the importance of creating a platform that supports students in developing their writing skills, the AOU established its Writing Center in 2017. Since then, it has been functioning well, providing writing support to students in the Faculty of Language Studies (FLS) and other colleges. All AOU campuses across multiple Arab countries have both digital and physical Writing Center platforms, and their schedules are posted on the Learning Management System (LMS) for students. Each center is open for at least 4 hours a day at different times and for a similar number of hours on its digital platform. Each English faculty member spends one of their weekly office hours either in the physical or the digital Writing Center. For instance, more than 50 faculty members engaged in developing students' writing skills at the AOU–Kuwait campus during the fall 2024 semester. The Writing Center is extending its services to all AOU students across the three majors that constitute the three main colleges at the AOU: English, Business, and IT.

A couple of years after the Center's establishment, FLS conducted a pilot study to assess the effectiveness of the writing support it provided. The AOU/Lebanon campus was selected for the study. A diagnostic assessment was conducted with a sample of 19 students during their first visit to the Writing Center (quiz 1) and again after one month of support from the Center (quiz 2). The Lebanon sample ($n = 19$) was used as a preliminary pilot study to test the study design and instrument clarity. Data from this pilot study were used solely to refine the study instruments and were not included in the main analysis.

Given the limitations of the pilot, the researchers conducted a larger multi-campus study to assess the usefulness of the centers' services and the extent to which these services become more effective when AI tools are incorporated into their operations.

Thus, despite the recognized benefits of the writing centers as hubs for developing writing skills (Kim et al., 2024; Wang, 2024), there is limited research on their effectiveness, particularly within Arab tertiary institutions. Similarly, while incorporating AI tools into writing has recently been advocated to develop language skills, there remains a notable gap in research on the impact of this integration on the role of writing centers.

This study aims to fill this gap by examining how writing support centers in higher education serve as platforms offering personalized, one-on-one help to students, and by exploring how incorporating AI tools into these centers can enhance their services to determine the potential of AI technology to boost the effectiveness of writing support. Moreover, the study explores the opinions of the British External Examiners, who mentor the teaching, learning, and assessment processes in accordance with the partnership agreement with the OU-UK, on the effectiveness of this educational hub.

REVIEW OF LITERATURE

Writing skills

Writing is considered one of the most essential skills both for academic success and employability. Through writing, many related skills can be developed, including critical thinking, analytical abilities, organizational skills, and linguistic proficiency, all of which are essential for success in both academia and the professional world (Deane et al., 2008). Training students in writing skills in higher education is essential, particularly in English-Medium Instruction (EMI) institutions, where success in college studies requires strong writing competence. Numerous studies (e.g., Coyle, 2010; Moore & Morton, 2017; Zainuddin et al., 2019) have recognized mastery of this skill as vital for success in both higher education and the job market. Indeed, writing is an important skill in contemporary career domain (Coyle, 2010; Moore & Morton, 2017). Coyle (2010, p. 195) asserted that "the ability to write well is often vital for effective work performance." Moore and Morton (2017, p. 591) stated that "recent developments in higher education have seen a strong emphasis placed on making graduates 'job ready' for their work in the professions." Indeed, competence in writing is an essential aspect of such readiness, which explains why it ranks at the top of the list of features that make a graduate job ready.

Rarely will a job seeker find a job that does not list writing proficiency as a requirement. Kellogg and Raulerson (2007, p. 237) pointed out that “advanced writing skills are an important aspect of academic performance as well as of subsequent work-related performance.” Zainuddin et al. (2019) examined the perspectives of Malaysian employers and students on the need for English-language proficiency and skills in employment. As expected, the study's findings show that both parties agree that English plays a major role in employability.

Writing centers and writing skills

Writing centers play an important role in improving writing skills among EFL learners. Many studies (e.g., Archer, 2008; Ariail et al., 2013; Bacha, 2002; Bielinska-Kwapisz, 2015; Landry et al., 2023; Maxhobandile et al., 2024; Mdoana-Zide & Mukuna, 2023; Mdoana-Zide & Mafugu, 2023; Solikhah et al., 2022) have highlighted the significance of writing centers in developing EFL writing skills. These studies found that students who actively engage with writing centers' services demonstrate significant improvement in their writing skills, often reflected in higher grades on class assignments. These studies have also shown that visiting writing centers positively impacts students' intrinsic and extrinsic motivation to enhance their writing skills (Bielinska-Kwapisz, 2015; Mohale, 2025; Ntando et al., 2024). One of the major findings in Bielinska-Kwapisz (2015, p. 382) is that “students' intrinsic and extrinsic motivational factors positively influence the likelihood that a student visits the center”, something that we have observed in our Writing Centers at the AOU. Other studies (e.g., Ginting & Barella, 2022) have shown that writing centers help students become both independent and self-motivated, skills that are essential for building confidence. This enhanced self-perception pays dividends when students do their writing assignments. In addition to enhancing confidence, writing centers contribute to the development of learners' critical and reflective skills, among others. In this respect, Ariail et al. (2013, p. 129) argue that enhancing students' writing skills prepares them “for scholarly pursuits, and through the process of writing, they engage [in] critical thinking skills that can make them more attuned to narrative and more reflective and empathetic in the clinical setting.” Writing centers function by providing personalized support, sometimes following a peer-tutoring method, an approach that has been investigated in studies, including Barton (2018), who examined the effectiveness of a peer-tutoring model facilitated through writing centers on student writing skills. The results indicated a statistically significant increase in writing skills for students who participated in the peer-tutoring program, as evidenced by post-assessment results. Salazar (2021) examined whether writing center visits had a significant and meaningful impact on college writing. The results showed a statistically significant positive relationship between students visiting the writing center and higher writing performance, compared with not using the writing center.

An equally essential role of writing centers is to assist students in coping with the challenges posed by the foreign language, particularly in EMI institutions. If students' language and writing skills are inadequate, they encounter substantial challenges that might cause some to drop out of the university. The services provided by the writing centers help alleviate the

severity of this problem and, consequently, contribute to student retention by offering the support needed for grammar and writing skills. At the AOU, the Writing Centers have regularly received letters and emails of thanks from students, indicating that without the help they received at these centers, they would have dropped out of the university. This very point was reported in Bielinska-Kwapisz (2015), who contended that the writing assistance provided to students helped them continue their studies. The study shows that increasing students' ability to write effectively is an important factor in retaining them at the university.

AI and writing skills

AI tools have demonstrated a transformative and largely positive impact on writing skills, particularly for English language learners. These tools significantly enhance writing performance by improving students' writing engagement, self-efficacy, and overall skill level. They offer essential aid by helping to formulate ideas, improving engagement, and providing personalized feedback (Lee, 2023). Students have shown noteworthy developments in recognizing and correcting writing inadequacies, which increase their confidence and writing abilities (Rad et al., 2024). In addition, they allow students to practice autonomously and promote self-directed learning (Losi et al., 2024). AI tools can support students in a wide range of tasks, including generating ideas, outlining, organizing content, and checking grammar (Al-Raimi et al., 2024; Syarifah & Fakhrudin, 2024). Some studies (e.g., Song & Song, 2023) found that AI tools can improve writing by boosting aspects such as organization, grammar, and vocabulary. Other studies (e.g., Barrot, 2023; Su et al., 2023) have noted that ChatGPT can provide a wide range of context-specific writing support, including idea generation, outlining, content improvement, organization, editing, proofreading, and post-writing reflection. Also, studies such as Yan (2023) have found that using ChatGPT can enhance writing competence.

Studies have raised concerns about over-reliance on AI, a lack of originality and creativity, and the risk of plagiarism. Also, several studies (e.g., Hidayatullah, 2024; Khamis & Yusof, 2024; Marzuki et al., 2023) have highlighted important limitations to consider when using AI tools. Such limitations may impede critical thinking and skill development when relying on AI, as users may try to have it do the work for them rather than work with the machine to obtain legitimate support. While these concerns are valid, the study focused on integrating AI tools into one-on-one Writing Center sessions, where both learners and tutors use the technology in a structured manner. When assignments involve AI tools, the purpose and use are explained to students to prevent misuse of the technology.

Despite the many positive aspects of AI in language learning, particularly for developing writing skills, no studies have examined the impact of integrating AI technology into writing center services, especially in the Arab context. The present study is a step in this direction.

Writing centers and AI tools

Writing has witnessed three major technological innovations: word processors, the internet, and artificial intelligence (Kruse et al., 2023). The arrival of AI tools, especially ChatGPT, has significantly changed writing, teaching, and learning. The integration of AI tools into writing

centers' operations is expected to enhance their operations. This integration of AI technology will have a significant impact, as it reflects the strategic thinking behind the continual development of methods of writing instruction and the adaptation of techniques to match the changing needs of students (Mutsvairigwa et al., 2024). AI tools can be used to enrich brainstorming and organize ideas (Kim et al., 2024; Wang, 2024). The integration of AI tools in writing centers is expected to offer various forms of support for student writing. AI tools can serve as a writing assistant, virtual tutor, and digital peer (Kim et al., 2024).

Similar to our current study, Mutsvairigwa et al. (2024) explored the experiences and perspectives of writing centers' tutors in consulting with students in the age of AI, focusing on the impact of AI on Writing Center consultations at the selected university in South Africa. However, their study relied solely on a survey for data collection. They found that AI enhanced the efficiency and effectiveness of feedback and allowed the tutor to focus on higher-order concerns during consultations. They advised that writing center instructors stay informed about the latest technological advancements. They recommended balancing AI use with traditional tutoring methods to ensure the human element remains central to writing support.

This study is informed by an integrative framework that brings together three complementary perspectives: writing as a cognitive and developmental process, writing centers as socio-constructivist learning environments, and artificial intelligence as a form of scaffolded, technology-enhanced support. These perspectives provide a coherent lens for examining how writing skills can be developed and supported in higher education contexts for learning English. First, writing is conceptualized as a complex cognitive activity involving planning, translation, and review (Kellogg, 2001). Effective writing development requires not only linguistic knowledge but also the ability to manage cognitive load, organize ideas, and engage in metacognitive reflection. Second, writing centers are grounded in socio-constructivist theory, particularly Vygotskian notions of learning through interaction and scaffolding. Through peer tutoring, feedback, and dialogic engagement, writing centers create supportive environments where learners can develop their writing abilities within their Zone of Proximal Development. This interactive, student-centered approach explains how writing centers enhance motivation, autonomy, and confidence, thereby improving writing outcomes. Third, AI tools can be understood as cognitive and pedagogical scaffolds that extend the support traditionally provided by human tutors. Drawing on theories of self-regulated learning and technology-enhanced learning, AI facilitates immediate feedback, idea generation, and iterative revision, enabling learners to engage more actively in the writing process. When integrated into writing center practices, AI has the potential to enhance efficiency and allow tutors to focus on higher-order writing concerns. Importantly, the framework assumes that the most effective writing support emerges from the interaction between human-mediated guidance (writing centers) and technology-mediated assistance (AI tools). This hybrid model maintains the centrality of human feedback while leveraging AI to augment learning processes.

In sum, this study adopts a holistic framework in which cognitive processes, social interaction, and technological affordances shape writing development. By synthesizing these strands, the study addresses a gap in the literature and offers a comprehensive perspective on enhancing writing support in EMI higher education contexts.

Research Questions

This study seeks answers to the following research questions:

RQ1. How do writing centers contribute to improving students' writing skills, and is this improvement consistent across multiple campuses?

RQ2. What is the impact of integrating AI tools into the services provided by the Centers on strengthening the center's efficiency?

RQ3. What are the opinions of the British External Examiners regarding the effectiveness of the writing centers in supporting teaching, learning, and assessment processes?

METHODS

Research Design

This study employed a quasi-experimental design to assess the impact of writing centers on students' writing skills and to explore the effectiveness of integrating AI tools into the centers' services in strengthening their role and overall contribution. This approach combined quantitative and qualitative elements to provide a comprehensive investigation of the treatment. For the first objective, the study examined the performance of a random sample of students who regularly visited the centers at five randomly selected campuses during the fall semester of 2024. To explore the impact of integrating AI technology into the centers' services (second objective), the study examined the performance of 20 randomly selected students who were regular visitors to an AI-enhanced Writing Center at the AOU Saudi Arabia campus during the spring 2024 semester. As for the third objective, the study examined the Faculty of Language Studies (FLS) External Examiners' (EEs) reports for the years 2024 and 2025 and summarized their observations and feedback about the observed impact of the Centers on students' written performance both before and after the integration of AI tools. Despite the quasi-experimental design and the use of samples drawn from different campuses and semesters, the study's findings remain meaningful. This is because the campuses where the study was conducted are located within the same geographical and institutional context, with students sharing similar academic backgrounds, admission criteria, and learning conditions. Consequently, no substantial variation in students' proficiency levels is expected across these campuses. In addition, although data were collected across different semesters, the students enrolled in these courses have similar language proficiency levels.

The study context

At the AOU, an upper-intermediate level of English proficiency is required for enrollment in its programs. Specifically, applicants to the English and Literature, Business Administration, and Computer Science programs must achieve a score of 500 on the TOEFL or 6.0 on IELTS prior to

their final admission. If students do not present evidence of this level, they are required to take the Oxford Online Placement Test (OOPT), a standardized assessment used for placement at the university. Those who score 80 on the test are allowed to enroll in the desired program, while those who score below 80 are required to enroll in the English foundation program. They are classified into English language levels based on their scores.

Some students in the English foundation program, as well as those who have begun their major programs, feel they need additional support. The extensive reading required in their fields of study, along with the need to write essays for regular assessments, underscores the need for extra assistance. For this reason, the Faculty of Language Studies (FLS) at the Arab Open University (AOU) established a Writing Center to function as a voluntary hub for writing skills, offering writing and grammar services to university students. The Center was established in 2017, as indicated above, and has since operated effectively, assisting students of all majors with English writing and grammar as well as critical thinking skills. Teachers across all majors direct students needing help with writing to the Centers, where English faculty members are available.

Participants

For the first objective, a random sample of students from various English foundation levels (EL097, EL098, EL099, EL111, and EL112) who visited the Writing Centers was selected for the study. These levels range from lower-intermediate to advanced levels. The students in these levels visited the Writing Centers for assistance during the spring 2024 semester. Prior to engaging with the Centers' services, they were given a pre-test. These students were encouraged to engage with the Writing Center regularly to seek support with writing and grammar. After two months of consistent engagement, during which students received one-to-one support with writing and grammar, a post-test was administered. The test instrument comprised objective questions, mainly multiple-choice questions (MCQs). Only data derived from those who visited the Writing Center 30 times or more during the two months were considered. Ninety-seven students who regularly visited the Writing Centers at four randomly chosen AOU campuses—located in Bahrain, Egypt, Kuwait, and Jordan—were considered. These students took a pre-test and, after a two-month exposure to the Writing Center's services, took a post-test. The study examined students' pre-test and post-test performance to determine whether significant progress was observed. Written informed consent was obtained from the study participants. To enable a balanced comparison in the analysis, a sample of 20 students was drawn from the larger group ($n = 97$). This sample was selected using simple random sampling to ensure that each participant in the larger group had an equal chance of inclusion. The sampling approach was adopted to match the comparison group size ($n = 20$) and to avoid biases associated with unequal group sizes in the analysis. Students enrolled in the fall semester are not the same as those enrolled in the spring semester. It is worth noting that the university system allows students to register each semester independently. Therefore, student bodies

differ from semester to semester. However, these students are drawn from the same courses, have standardized entry requirements, and are assumed to be at comparable proficiency levels.

To explore the effect of AI tools on strengthening the Writing Center's services, the study examined the performance of students who regularly visited the Writing Center at the AOU Saudi Arabia campus during the spring 2024 semester. The students completed a pre-test before exposure to the AI-enhanced writing center's services and a post-test at the end of the two months. The Writing Center on this campus was integrated with AI tools used in the personalized assistance offered to students, both in the tutoring sessions (supervised) and in completing their assignments.

AI Tools in the study

The AI tools in the study included ChatGPT, Copilot, and Gemini, which were used at different stages. First, these tools were introduced to the participants. Tutors explained how to use these tools in academic writing. Second, participants were asked to practice writing paragraphs using these tools. These tools helped them generate ideas and organize their thoughts, resulting in brainstorming notes and initial outlines. Third, AI tools assisted students in revising their first drafts for vocabulary and sentence structure, strengthening coherence and accuracy. After that, the tools were applied to check grammar highlighting errors and offer corrective alternatives. Finally, students reviewed and refined their work based on these AI-generated suggestions, integrating feedback into their final drafts. The integration of AI tools within the Writing Center's sessions employed standardized prompts or workflows developed by tutors. For example, generating draft ideas, reviewing grammar and sentence structure, and providing revision suggestions using AI-assisted feedback were used as prompts. At the same time, tutors guided students in using AI tools throughout the writing process, including brainstorming, drafting, and editing.

Despite many students visiting the Center on this campus, only 20 were regular visitors (i.e., those who made 30 or more visits), meeting the study's specified visit threshold. The performance of these 20 students, after exposure to the AI-enhanced Writing Center's services, was compared with that of 20 students randomly selected from the other four campuses who regularly visited the Writing Centers in the fall semester and received assistance without AI tools.

To gauge the perspectives of the British External Examiners (EEs) on the role of the Writing Centers, the authors examined their 2024 and 2025 reports, focusing on feedback on the Writing Centers both before and after the integration of AI tools. As part of the partnership agreement between the OU-UK and the AOU, both of which have maintained an academic partnership for more than 20 years, an External Examiner for each module or a couple of modules is appointed from a British university by the OU-UK in consultation with the AOU in an attempt to monitor and moderate the performance process, teaching, and assessments. EEs play a critical role in maintaining academic standards. Thus, the EEs' duty is to oversee the teaching, learning, and assessment processes within the AOU BA programs in English Language

and Literature and in Language and Translation, and to moderate assessments and review scripts for the midterm, semester project, and final exam. In addition, the EEs' role involves holding regular meetings with the modules' General Course Coordinators (GCCs) and attending exam board meetings to endorse semester results. At the end of each semester, they submit reports detailing their communication with the GCCs, their opinion of student answer scripts, the quality of assessments, and marking practices.

Data Collection Instruments

The study utilized a comprehensive data collection approach centered on pre-test and post-test assessments. Both tests were standardized and designed to measure students' writing skills across multiple dimensions. The pre-test was administered at the beginning of Study 1 and Study 2. An identical post-test was conducted at the end of the intervention to measure changes in students' performance in both groups. The English test comprised objective questions, mainly MCQs. The instrument consisted of 14 items, with 1 point awarded for each correct response, for a total possible score of 14. Content validity was established through alignment of the test items with key writing constructs, including grammar, sentence structure, coherence, and vocabulary use, and experts reviewed the items to ensure appropriate representation of these domains. Reliability of the instrument was assessed using Cronbach's alpha, which yielded a value of .98, indicating good internal consistency. Although MCQs are not a direct measure of extended writing performance, they were used to assess underlying components of writing competence, such as grammatical accuracy, organization, and language use, which are essential sub-skills. This approach is supported in contexts where objective assessment is required; however, the results are interpreted as reflecting students' foundational writing skills rather than their full writing production ability.

To supplement the quantitative data, the study, as noted, included a qualitative component that presented the EEs' perspectives on the effectiveness of the Writing Centers, as reflected in their semester reports for the 2024-2025 academic year. The external examiners consulted in the study comprised five professors from five different British universities.

Procedures

The study was conducted in several steps, as shown in Table 1. First, the participants in the control group who were regular visitors to the Writing Centers during the fall semester took a pre-test to measure their writing skills before the treatment. Second, the treatment lasted two months. During these months, participants who visited the Writing Centers were exposed to a wide range of topics based on their needs. These topics included topic sentences, concluding sentences, descriptive paragraphs, punctuation, grammar, and so on. AI tools assisted participants in the experimental group during the sessions. Tutors and student participants used AI tools for different purposes, including creating outlines, generating ideas, correcting errors, and editing. The same topics were addressed in both groups. They were explained using traditional writing centers' methods in the control groups and AI-enhanced methods in the experimental group. Third, a post-test was administered for both groups to measure any

improvement in writing skills after 1) benefiting from the Writing Centers' services in the fall semester and 2) exposing the experimental group to AI-enhanced writing centers' services in the spring semester. The performance of students in the experimental group was compared with the performance of 20 randomly selected students from the control group who attended in the fall semester. This allowed the researchers to examine changes in writing proficiency due to both traditional and AI-enhanced interventions. Finally, to substantiate the findings, External Examiners' semester reports were examined to identify their perspectives on the writing centers both before and after the AI exposure.

Table 1.

Summary of the study details

Stage	Timeline	Fall Semester – Control Group	Spring Semester – Experimental Group	Assessment
Stage 1	Week 1	Pre-test administered	Pre-test administered	Pre-test scores collected
Stage 2	Weeks 2–7	Received traditional writing support from Writing Center	Received writing support using AI-integrated tools	—
Stage 3	Week 8	Post-test conducted	Post-test conducted	Post-test scores

Data Analysis

To answer the first research question, a descriptive analysis of pre- and post-test scores across all campuses was conducted. To determine the difference in scores between the two support methods (traditional and AI) on the pre-test and post-test, an independent t-test was used. Furthermore, effect sizes (i.e., Cohen's *d*) were calculated to measure the degree of observed differences, providing valuable information about the significance of the study's findings. All analyses were conducted with IBM SPSS Statistics (Version 27). The significance level was $\alpha = .05$. Construct validity was checked using factor analysis. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.50, indicating an acceptable level. Bartlett's test of sphericity was significant ($p < .001$), suggesting that the variables were sufficiently correlated for factor analysis. Therefore, construct validity was considered acceptable, although the results should be interpreted with caution.

RESULTS

The impact of the writing centers

The first research question concerns the impact of the writing centers on students' writing performance in pre- and post-tests across all campuses. The results are shown in Table 2.

The Kruskal–Wallis test was used to examine differences in writing scores across five campuses. Test statistics were adjusted for ties. The Kruskal–Wallis test, as shown in Table 2,

revealed statistically significant differences in both pretest, $\chi^2(4, 117) = 26.63$, $p < .001$, and post-test scores, $\chi^2(4, 117) = 30.35$, $p < .001$, across the five campuses. These findings indicate that students' writing performance differed significantly among campuses before and after the writing center intervention. Although the results suggest that writing centers contributed to improving students' writing skills, the significant differences observed across campuses imply that the magnitude of improvement was not consistent across all campuses. Consequently, the effectiveness of writing centers appears to vary by campus, suggesting that contextual factors, implementation practices, or campus-specific resources may influence student outcomes. Further post hoc analyses would be necessary to determine which campuses differed significantly from one another.

Table 2.

Independent-Samples Kruskal–Wallis Test Results for Pretest and Post-test Writing Scores Across Campuses

Variable	N	χ^2	df	p
Pretest	117	26.62	4	< .001
Post-test	117	30.34	4	< .001

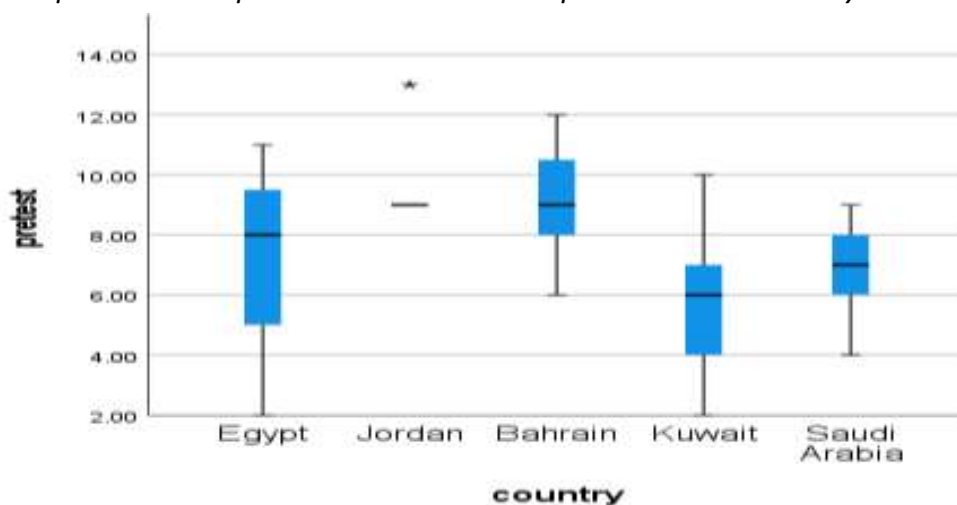
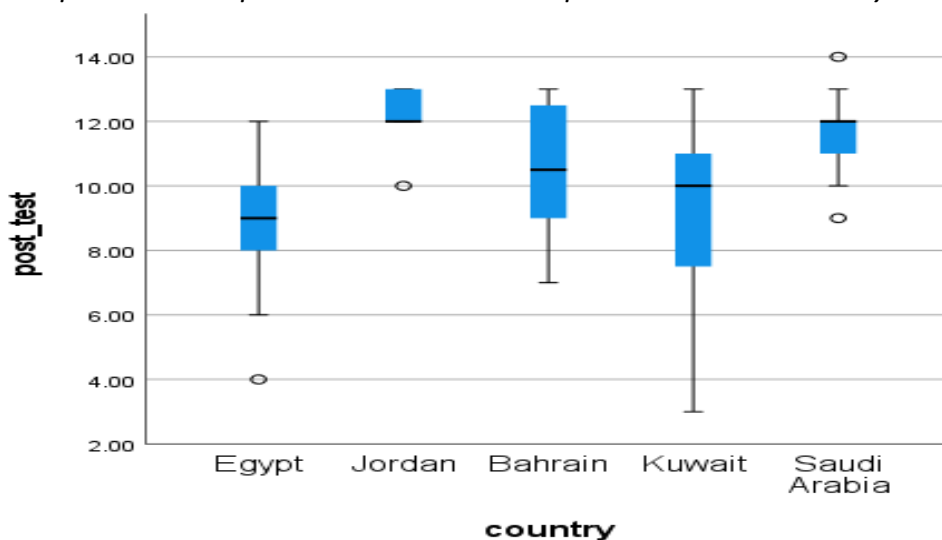
Table 3.

Results of the pre- and post-test scores across all campuses

	Pre-test	Post-test
Total N	117	117
Test Statistic	26.62 ^a	30.34 ^a
Degree Of Freedom	4	4
Asymptotic Sig.(2-sided test)	.00	.00

a. The test statistic is adjusted for ties.

The Kruskal–Wallis test was used to examine differences in writing scores across five campuses. Test statistics were adjusted for ties. The results in Table 3 revealed statistically significant differences in pretest, $\chi^2(4, 117) = 26.62$, $p = .00$, and post-test scores, $\chi^2(4, 117) = 30.34$, $p = .00$, across the five campuses. These findings indicate that students' writing performance differed significantly among campuses before and after the writing center intervention. Although the results suggest that writing centers contributed to improving students' writing skills, the significant differences observed across campuses imply that the magnitude of improvement was not consistent across all campuses. Consequently, the effectiveness of writing centers appears to vary by campus, suggesting that contextual factors, implementation practices, or campus-specific resources may influence student outcomes. Further post hoc analyses would be necessary to determine which campuses differed significantly from one another. The results are shown in Figures 1 and 2.

Figure 1.*Independent-Samples Kruskal-Wallis Test pretest across country***Figure 2***Independent-Samples Kruskal-Wallis Test post-test across country***AI tools' impact on strengthening the role of the writing centers:**

To assess the effectiveness of AI tools in enhancing the writing skills of students who visited the Writing Centers, statistics on participants' pre-test and post-test results were analyzed.

Table 4 presents descriptive statistics for the pre-and post-test scores in both groups. The mean score of pre-tests was 7.65 ($SD = 1.18$) in the control group and 7.00 ($SD = 1.29$) in the experimental group. Following the intervention, the mean post-test scores increased to 11.65 ($SD = 1.18$) in the experimental group and 10.25 ($SD = 2.35$) in the control group. The pre-test scores showed no statistically significant difference between the control and experimental groups, with a t -value of 1.65 and a p -value of 0.106. This indicates that both groups started at a similar level of performance. The mean difference between the two groups was 0.650, with a medium effect size (Cohen's $d = 0.52$). However, the post-test results indicated a significant difference between the experimental and control groups ($t = 2.37$, $p = 0.023$). The mean difference between the two groups was 1.40 with a medium-to-large effect size (Cohen's $d =$

0.75). The experimental group outperformed the control group. These findings suggest that the experimental group showed greater improvement over time than the control group. The results are shown in Figures 3 and 4.

Table 4.

Descriptive statistics for pre- and post-test scores

Test	Group	N	Mean	Std. Deviation	t	Sig.*	Mean Difference	Cohen's d
Pre-test	Control	20	7.65	1.18	1.65	0.106	0.650	0.52
	Experiment	20	7.00	1.29				
post-test	Control	20	10.25	2.35	2.37	0.023	1.40	0.75
	Experiment	20	11.65	1.18				

*Note: The significance of the analysis is .05

Figure 3.

Scores of the pre-test for both groups

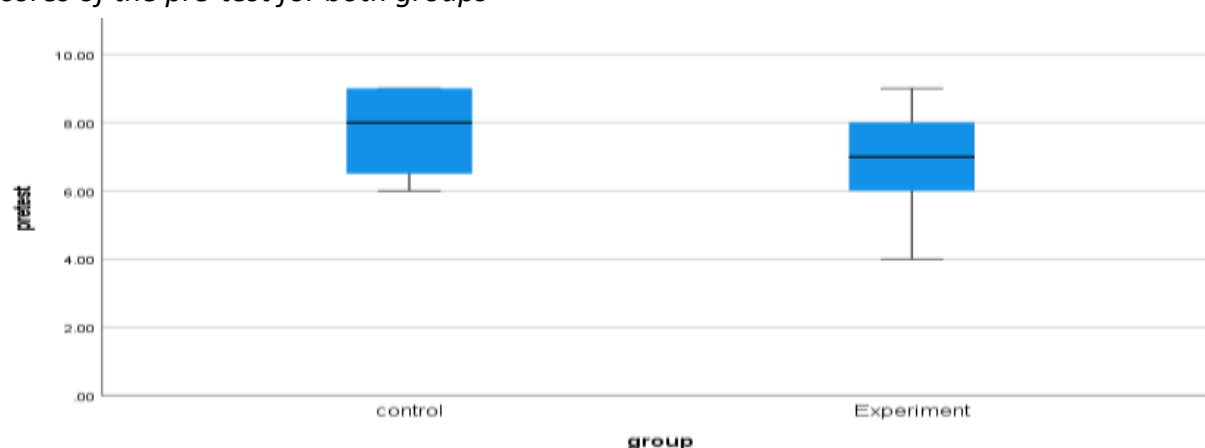
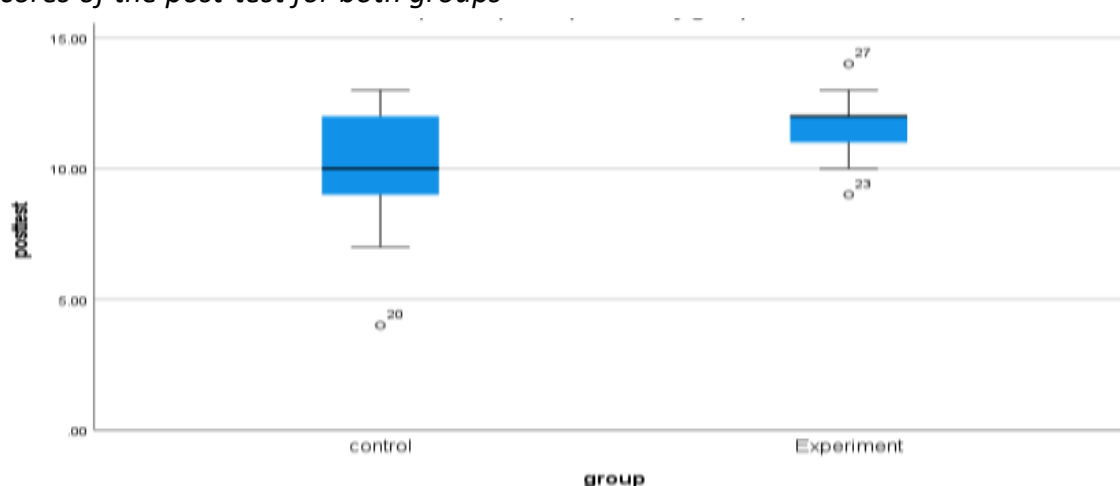


Figure 4.

Scores of the post-test for both groups



To sum up, the study's findings clearly show that writing centers play a significant role in enhancing students' writing skills, an assumption we have held all along, now supported by systematic research. The significant role of these writing hubs is strengthened when incorporating AI tools into the various forms of assistance they provide to students.

External Examiners' perceptions

In scrutinizing FLS British External Examiners' reports for the last two years (2024-2025), it was found that they hold positive views on the role of the Writing Center in enhancing students' writing and critical thinking skills, views evident in virtually all reports. The following are quotes from their reports:

External Examiner A, a former external examiner of the linguistics courses, wrote in her fall 2024 report the following:

It is to be commended that students, in some of the feedback, were advised to use the writing centers to improve their overall language use. Statistics show that the writing centers remain in high demand. The writing centers are in place still to support the lower-achieving students.

In her spring 2024 report, she wrote:

The writing centers are in place both face to face and online to support students and assist with the improvement of their language, essay planning, and organization skills, and feedback from staff encourages the students to make use of these centers, especially the students achieving the lower end grades.

In her summer 2024 report, she wrote: "The writing centers continue to support the lower achieving students, and this should go some way to assisting weaker students with the improvement of their language, essay planning, and organization skills if they attend."

External Examiner B wrote the following in his 2024 Central Examination Committee's report:

The Writing Center is an excellent initiative activity and maintains an excellent work by improving language and writing skills for a wide range of students from different programs. This initiative made an excellent contribution between the faculty and the whole university.

In his spring 2024 semester report, he praised the quality of teaching and the role of the Writing Center, maintaining that "The quality of teaching is high, and those students who are struggling are pointed in the right direction to see advice, e.g., to a one-to-one discussion or to the Writing Center."

In her spring report (2025), External Examiner C of the Literature modules wrote:

Weaker scripts suggested problems with writing and expression – it was reassuring to see such students directed to the Writing Center. Indeed, the level of support students receive with writing and presentation skills is a notable and welcome feature both of this module and of the program overall.

Regarding the EEs' perspectives on integrating AI tools into the Writing Center and the effectiveness of their introduction, their reports were positive. The following are quotes from their reports:

External examiner D wrote the following in one of her 2025 reports:

In terms of the Writing Center, particularly this semester, I did notice improvements in the writing skills of the students. Overall, the writing, organization, and presentation were of a high standard and very much in line with academic practices. I have also spoken with the staff at AOU about AI, and I was especially impressed by the practical work they do with students on using AI as a tool. It is my impression that these sessions help students to recognize their uses and their limits in important ways.

In response to a direct inquiry from the first author regarding students' writing performance following the integration of AI components into the Writing Center, External Examiner E, the British External Examiner of the linguistics courses, said the following:

As you know, I have been a staunch supporter of efforts to improve students' writing. The Writing Center has been an inspiring idea, but the operationalization of such resources [AI] is also worth commending.

In his 2025 spring semester report, External Examiner E acknowledged the importance of the services offered to students by the Writing Center and the impact on students' writing due to the integration of the AI component:

AOU students are quick to react to new initiatives and were full of praise about (i) scheduled revision sessions, and (ii) writing center sessions, including practice with AI and close reading. Happy students learn better!

DISCUSSION

The first research question concerns the writing center's impact on students' writing skills. The results indicate that the writing centers positively impacted students' writing skills across all AOU campuses. Personalized interventions and frequent engagement with support systems, as provided by writing centers, lead to significant improvements in writing. The findings of the study indicate the center's vital role as a writing platform that provides students with customized assistance based on their needs. This training is of paramount importance for AOU students, a university that is an EMI institution. These positive findings testify to the significant role of the writing centers, which provide students with opportunities to receive one-to-one help and to interact with tutors during their visits. Tutors in the Centers highlight students' problems, identify patterns of grammatical inadequacies to be addressed at each visit, and help them with various writing aspects, such as paragraph and essay writing, and train them in writing topic sentences, controlling ideas, and supporting details. Furthermore, they train students to revise their writing for organization, coherence, cohesion, and so on.

While these findings highlight the beneficial impacts of AI in writing, certain considerations warrant attention. For instance, self-selection bias may be present, as students with higher motivation are more inclined to utilize writing center services regularly; this could have potentially exaggerated the observed effects. Additionally, teacher- or campus-specific factors might have influenced student performance. Nevertheless, it is worth noting that the university system allows students to register each semester independently. Therefore, students

differ across semesters. However, these students are drawn from the same courses with standardized entry requirements. They are assumed to be at comparable proficiency levels, which reduces the likelihood that instructional differences across campuses significantly biased the results.

The results of the study align with many of the previous studies (e.g., Ariail et al., 2013; Bielinska-Kwapisz, 2015; Ginting & Barella, 2022; Hutson et al., 2024; Kim et al., 2024; Wang, 2024), which found that writing centers have a positive impact on improving students' writing skills.

The second research question concerns the impact of integrating AI tools into writing centers' services. The results indicated a positive impact of AI tools on the writing performance of the students who visited the centers. That is, when AI tools were integrated into writing centers, students had more opportunities to receive individualized support. The participants in the experimental group showed greater improvement in their writing skills than the control group. This can be attributed to several factors. First, AI tools provide personalized feedback, which is an important aspect of such tools. Students learn better when they receive feedback tailored to their own writing errors. For example, students who visit the centers receive the usual support outlined above, in addition to training on using AI tools to identify their grammatical, organizational, and stylistic problems. They are trained on how to use AI tools to evaluate their paragraphs and/or essays, how to use the suggestions provided by AI to review their written drafts, and how to benefit from previous suggestions when composing other paragraphs or essays, and so on. The findings of the study indicate that the training prior to the introduction of AI was effective, yet when AI tools were incorporated, the centers' effectiveness increased significantly, resulting in greater improvements in students' writing. Findings of the current study support those of previous studies (e.g., Lee, 2023). These studies report that AI tools support writing development by improving engagement and providing personalized feedback. Second, AI tools boost autonomous learning, as evidenced by individual assignments completed by the student visitors to the Centers. Students interacted with AI tools, asking specific questions and requesting particular points or comments as needed, suggesting that AI tools promote self-directed learning, a finding that confirms previous studies (see Ha, 2024; Losi et al., 2024). These findings are also in line with Yan (2023), who highlighted the significant contributions of AI-assisted language learning tools in advancing EFL learners' writing abilities. Overall, this study shows that AI tools are effective in improving writing skills, aligning with earlier research (e.g., Song & Song, 2023) that found they can boost writing performance.

The third research question concerns the opinions of the British External Examiners on the overall effectiveness of writing centers, with a particular focus on the role of AI in supporting teaching within these centers. Their views, presented above, praise the effectiveness of incorporating AI components into writing centers' services and argue that these services have become even better with the introduction of AI tools. Both their oral and written comments praised the writing centers, describing them as commendable initiatives that support weaker

students, improve essay planning, and foster language skills. Indeed, a year after introducing the writing centers, all EEs reported improvements not only in students' writing but also in critical thinking skills and organization of ideas. In their reports, two EEs noted concrete improvements in students' written performance, considered new variables that might have contributed to that significant progress, and concluded that the writing centers were the only new factor contributing to these improvements. This aligns with Ariail et al.'s (2013) study, which emphasized the critical role of the support provided by the writing center to medical students, asserting that through the process of writing, students engaged in "critical thinking skills that can make them more attuned to narrative and more reflective and empathetic in the clinical setting." Indeed, the EEs' positive feedback was seen as testimony to the importance of this language platform, prompting the OU-UK to request that the Centers' services be expanded to include all AOU's programs, a request that has since been implemented. These perspectives align with similar evaluations by Evans and Waring (2024), who stressed the value of writing centers in creating equitable academic support systems. However, some external examiners, such as Sarah Etchells, noted challenges in ensuring the attendance of students who need the services most. Addressing these challenges through targeted outreach and incentives could further enhance the effectiveness of the centers.

CONCLUSION

This study reveals the significant role played by writing centers at higher education institutions, particularly EMI institutions, in supporting students' writing skills. It also shows the impact of using AI tools in strengthening the centers' role in enhancing students' writing. External examiners acknowledge the positive role of the writing centers in supporting students, particularly weaker students, and commend the successful integration of AI tools into the writing services offered by these centers.

Pedagogical Implications:

These findings highlight the need to establish writing centers at higher education institutions, particularly EMI institutions, and to integrate their services with AI tools to complement traditional methods of supporting writing skills. AI can provide personalized feedback, identify common writing errors, and offer real-time assistance at different levels of competence. These tools help students develop their writing skills more effectively than traditional methods of support.

Limitations and Future Studies:

There are some limitations in this study. First, the quasi-experimental design, involving cross-semester and cross-campus comparisons, introduces potential confounding factors, including seasonal variation, institutional differences, and instructor effects. Second, the inclusion criterion requiring a minimum of 30 visits may have introduced selection bias, as more engaged or motivated participants were more likely to be included. Third, the experimental group sample size was relatively small ($n = 20$), which may limit statistical power and generalizability. Fourth,

writing competence was assessed indirectly through multiple-choice questions rather than direct evaluation of written output, which may not fully capture participants' actual writing ability. Fifth, participants were not randomly assigned to groups, increasing the risk of baseline differences between groups. Future studies can expand the experimental groups by comparing the effects of AI tools among students at a specific proficiency level rather than across all levels. Finally, the current study compared three disciplines (i.e., Computer Science, Business, and English language studies). Future studies can add groups from medicine and engineering. They can also vary the writing topics to determine which genre benefits most from AI tools.

Disclosure of interest

The authors report there are no competing interests to declare.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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