Analyzing the Impact of CALL Tools on English Learners' Writing Skills: A Comparative Study of Errors Correction

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Abstract

The study seeks to compare the effectiveness of Computer-Assisted Language Learning Tools (ChatGPT, Grammarly, and Google Translate) in correcting the occurrences of common errors in English as a second/foreign language (ESL/EFL) learners' writing. An experimental design offered instructions for Class A with ChatGPT, Class B with Grammarly, Class C with Google Translate, and Class D was the control group with no exposure to any of these tools. Data were collected from texts created by the students based on pictures, both before and after the intervention. It was found that ESL/EFL learners frequently made eight distinct types of errors in their writing: spelling, punctuation, capitalization, possessive words, verb forms, subject-verb agreement, articles, and prepositions. The interventions across different classes showed that ChatGPT in Class A significantly corrected spelling, verb form, and subject-verb agreement-related errors, Grammarly in Class B excelled in correcting prepositional errors, and Google Translate in Class C effectively addressed errors in article use, capitalization, and possessives. In contrast, the control group in Class D surpassed the others in enhancing punctuation. In Class A, ChatGPT, and in Class B, Google Translate displayed enhanced effectiveness in rectifying common writing errors of ESL learners compared to Grammarly in Class B and the control group. The findings suggest that employing targeted digital tools for distinct grammatical challenges can substantially enhance learning outcomes in a language learning context.

Keywords: distinct grammatical challenges; enhancing punctuation; language learning context; occurrences of common errors

1. Introduction

Writing in English is among the most significant challenges for second/foreign language learners. This is primarily due to the differences in language and structure between English and their native languages (Hyland & Anan, 2006; Pandey & Jha, 2021). ESL/EFL learners often struggle with mastering the intricacies of English grammar and syntax, resulting in errors in their written work (Ferris, 2003; Hyland & Anan, 2006). The errors could be grammatical or structural issues with their texts. Addressing and correcting these errors in ESL learners' writing is crucial as they can impede effective communication, potentially leading to misunderstandings in academic and professional settings. Furthermore, writing accurately in English is essential for academic success in English-speaking environments, as it directly impacts learners' grades and their capacity to effectively convey their knowledge and ideas (Silva, 1993). Therefore, recognizing and correcting these errors becomes essential for linguistic accuracy, learning advancement, and employment worldwide.

The last few years have witnessed an increased utilization of technology for language learning, teaching, and research. As the pandemic-induced social realities forced the world to adopt unusual and unprecedented methods to cope with the new challenges, educational institutions switched to online and technology-enabled learning. Realizing the importance of technology-enabled learning's feasibility and conventional learning's limitations, ESL/EFL classrooms fully incorporated technology both for language learning and teaching. CALL tools namely ChatGPT, Grammarly, and Google Translate are being increasingly utilized by both language learners and instructors. They have emerged as significant technological aids in language learning, with each tool aligning itself with distinct pedagogical approaches to facilitate the learning process. For example, ChatGPT exemplifies the utilization of conversational AI to offer interactive, artificial intelligence-driven writing assistance, reflecting a constructivist approach to learning that emphasizes active and personalized engagement with the subject matter. Grammarly, on the other hand, follows behaviorist pedagogy, stressing the significance of grammar and stylistic errors and offering immediate suggestions on areas for improvement. Lastly, Google Translate assists in overcoming language barriers through instantaneous translation, thereby supporting a communicative language teaching approach by enabling comprehension and production of language skills in real-world contexts. Therefore, this study seeks to analyze ChatGPT,

Grammarly, and Google Translator's effectiveness in correcting common writing errors among ESL/EFL learners.

1.1 Research Problem Statement

The efficiency of computer-assisted language learning tools in enhancing English writing was extensively explored in the context of ChatGPT, Grammarly, and Google Translate. These studies found that CALL tools enhanced the writing and grammar skills of ESL/EFL students. They found that all these tools have their distinct advantages and disadvantages with each essential to language acquisition and instruction. Thomas et al. (2013) found that targeted and successful language education can be facilitated by comprehending the contributions of CALL tools. However, there is a scarcity of comparative advantages and efficiency of CALL tools despite sufficient work on specific advantageous and negative aspects of these teaching and learning tools. This study, therefore, seeks to address this deficiency in comparative advantages of CALL tools and, thus, make a meaningful contribution to the existing literature.

1.2 Research Purpose Statement

Utilizing ChatGPT, Grammarly, and Google Translate could immensely help in enhancing English language learners' skills. These tools in ESL/EFL classrooms can greatly enhance students' common writing error correction, especially compared to conventional teaching methods. Therefore, this study examines how CALL tools affect students' writing skills, showing that classroom technology can improve learning.

2. Literature Review

2.1 Error and Mistake

The difference between mistakes and errors in learning a second language is significant. It differentiates between systematic knowledge gaps and sporadic lapses in language use. According to Ellis (1997), errors are consistent deviations that reflect a learner's interlanguage. This concept, introduced by Selinker (1972), refers to the transitional linguistic system that learners develop as they acquire a new language. It integrates a person's native language with the target language, and potentially other languages they are familiar with. In contrast, mistakes are performance errors not rooted in a lack of linguistic understanding but in moments of lapse, often due to stress or fatigue. It is suggested that these errors can be corrected once they are noticed (James, 2013). This distinction is significant in pedagogy as it guides educators in tailoring instruction and feedback. Understanding these nuances allows educators to adopt more effective language instruction and learner assessment strategies, ultimately facilitating a more nuanced approach to teaching English.

2.2 Computer-Assisted Language Learning Tools

ChatGPT, Grammarly, and Google Translate are instances of Computer-Assisted Language Learning (CALL) applications that make use of computational power to enhance language learning and competency. They embody CALL by integrating technology into language education to offer customized, accessible, and efficient methods to acquire and enhance language skills, promoting digital language acquisition and proficiency objectives.

ChatGPT, with its powerful natural language processing, offers an interactive platform that simulates conversational practice to assist learners enhance their language skills in real-time. The study holds immense implications as ChatGPT could be used in English classrooms. Several research investigations on ChatGPT and language learners' writing skills have produced positive findings. Zebua and Katemba (2024) explored the opinions of learners on utilizing ChatGPT OpenAI for enhancing writing. The study employed a quantitative method and a closed questionnaire to collect data. It was found that most of the students had positive opinions regarding ChatGPT as an essential instrument for improving student writing. Mahapatra (2024) found that ChatGPT enhanced students' academic writing, particularly grammar. Tertiary ESL students completed three assessments and three focus discussions. Students were highly satisfied with ChatGPT's academic writing improvement in the mixed-methods intervention. Both theoretical and practical consequences of the work increased our understanding of interactive feedback and ChatGPT as a reliable writing tool. The study suggested incorporating it into writing courses with proper teaching. Emphasizing its usage in language education as a potent instrument for writing skills, Fitria (2023) observed that ChatGPT's structured responses might help English writing across essay genres. The descriptive-qualitative technique found that the researcher could access ChatGPT on openai.com or chat.openai.com from a computer. However, the study advised more investigation to ensure the ChatGPT essay produced is grammatically perfect. Imran and Almusharraf (2023) evaluated ChatGPT as a writing aid in 30 academic papers. This systematic literature study found 550 publications six months following ChatGPT's introduction (December 2022 to May 2023) using defined phrases. A PRISMA flowchart selected the top 30 articles. The statistics showed that ChatGPT, the latest chatbot, was a significant aspect of the continued expansion of artificial intelligence, which has positives and cons for academic writing. This study focuses on ChatGPT's higher education writing support and ignores other capabilities. Additional functions or applications can be researched later.

2.3 Grammarly

Grammarly utilizes sophisticated algorithms to examine texts for grammatical, punctuation, and stylistic issues while offering prompt feedback to help learners better their language usage. Barrot (2023) explored how college students' writing accuracy and errors are impacted by AWCF (Automated Writing Correction Feedback) utilizing Grammarly. Findings of the quasi-experimental study demonstrated that the utilization of AWCF enhanced the accuracy of students' writing attributing the outcome to AWCF's ability to encourage noticing and offer adaptable metalinguistic explanations and individualized instruction. The study has immense pedagogical implications for enhancing the writing accuracy of students. Certain challenges emerged such as inadequate metalinguistic explanation,

excessive correction, and cognitive overload. Koltovskaia (2020) evaluated how two college ESL students utilized Grammarly's automated written corrective feedback (AWCF) while revising a final manuscript. It was found that student participation was behavioral, cognitive, and emotional. Student Grammarly QuickTime screencasts were analyzed for behavioral engagement. Students' cognitive and emotional engagement was assessed via prompted screencast recall and semi-structured interviews. The results showed distinct levels of student involvement with AWCF. While exceptional English students questioned and selectively adopted AWCF, the weak English learners were dependent on AWCF. Guo et al. (2021) examined the potential of AWCF to assist unskilled EFL writers in enhancing their proficiency in academic writing by emphasizing AWCF's error-correction impact and variables related to it. The study additionally examined how effectively EFL students used Grammarly feedback to correct academic writing flaws, and what factors impacted human responses (updating procedures) and precision. It was found that the effectiveness of error correction was unusual considering how writing scientific research might influence feedback, user responses, and response accuracy. The outcomes have implications for academic writing instruction that makes use of sources and for the creation of tools by AWE. Ranalli and Yamashita (2022) examined the challenges related to Grammarly's delivery of feedback and its ability to address common challenges faced by second language learners comparing it with another tool MS-NLP, in correcting common L2 errors and providing feedback. The findings revealed *Grammarly* to be superior in identifying and rectifying errors, although it occasionally provided feedback too late for optimal learning outcomes. The study holds implications as enhanced error-correction of AWCF tools assists L2 student writing. The study has certain limitations due to its small, identical sample, a single writing task type, and 4 error forms. Alam et al. (2023) primarily focused on inflectional morpheme errors at Darul Uloom Nadwatul Ulama in Lucknow, Northern India, aiming to enhance the writing skills of Madrasa ESL students. The study comprised two groups of sixty-eight Madrasa learners studying Alimiyat. Grammarly was used by one group while the control group received communicative language instruction. Data obtained before and after the treatment was analyzed quantitatively. The experimental group of ESL students showed significantly improved inflectional morpheme writing than the control group using a repeated-measures two-way ANOVA test. The results are significant as Grammarly could prove quite helpful for English writers.

Using Grammarly, an AWE platform, Tambunan et al. (2022) examined Indonesian EFL students' grammar, punctuation, spelling, sentence formation, and style. An ex post facto investigation examined 54 fourth-semester English students' work—Grammarly categorized student writing. Male and female learners' writing profiles were compared using average, deviation from mean, as well as significant variations. Grammar was the main concern of the learners. The study suggested academic writing professors offer online remedial feedback. Size, context, and college students writing examples are limitations of the study. Different scenarios with large samples and average English learners can be investigated. Thi and Nikolov (2022) investigated the incorporation of automated feedback with traditional teacher feedback by conducting a written feedback analysis of Grammarly's emphasis on instructor input on language and content-related issues. The study sample included 27 low- to medium-income Myanmar university students who authored 216 persuasive and descriptive essays during a 13-week semester. It was found that Grammarly addressed surface issues, but teacher feedback enhanced lower- and higher-level writing. Pre- and post-tests and revision assessments revealed students enhanced writing with feedback. The study has pedagogical implications. Further investigation should involve courses, instructors, and learners of different skill levels.

2.4 Google Translate

Google Translate capitalizes on powerful automated learning algorithms to translate languages instantaneously and assist students in comprehension and interaction. Multiple research investigations have demonstrated that Google Translate (GT) enhances ESL/EFL learners' English skills. For example, Tsai (2019) examined the effect of Google Translate (GT) on spontaneous English first writings in three assignments given to Chinese EFL students studying English at the sophomore, junior, and senior levels. Both of the English texts were evaluated using two different categories of online computer tests to compare and grade the quality of the vocabulary and grammar. GT students' English papers surpassed SW (self-written) students' in several areas. The quantity of words, writing and grammatical errors, and word error rate showed this. Students' GT readings had more advanced terms than SW readings. Similarly, Lee (2019) explored how machine translation (MT) may be used as a CALL tool for ESL/EFL writing. This study, in contrast with the vast majority of studies on machine translation (MT) as a device for second language acquisition, evaluated students who translated their first language writing into the second language without MT and then revised it while comparing the MT translation. Text analysis revealed that MT enhanced student revisions and lexicon-grammatical errors. It was also demonstrated that using MT improved student writing approaches and helped them perceive writing as a process. The study implies that MT may assist in learning a new language. Chung and Ahn (2022) used both automatic computer methods and human raters to look at how participants' utilization of MT affects their L2 writing CALF scores. The study examined 91 Korean language learners who created an essay in English on one topic without help for one week and then utilized Google Translate to write another essay on a different topic for the following week. Analysis of texts revealed significant accuracy gains, but grammatical and vocabulary complexity gains were unclear. The pros and cons of MT usage varied by text type and ability level (high vs. low; narrative vs. polemical). The study holds implications that MT usage can immensely help learners' English writing skills. Tsai (2020) assessed Chinese English language students at universities and non-English majors' perspectives on Google Translator's translingual CALL tool in EFL writing. After a 5-minute video, each group produced a spontaneous analytical essay. Students produced a Chinese and English text, sent it to Google Translate (GT), reviewed the GT and SW texts, and revised SW using GT. The study found that GT produced improved writing, expanded vocabulary, and reduced spelling and grammatical errors compared to SW. RSW texts outperformed SW ones, especially for non-English majors. Google Translate as a testing tool enhanced L2 written language and content performance.

2.5 Research Questions

1. What are the common writing errors students make in English classes A, B, C, and D?

2. How do different CALL tools stack up against each other in terms of fixing common writing errors among students learning English as a Second Language (ESL) in classroom settings?

3. Method

3.1 Research Design

The study encompasses three experimental and one control group. Three different training models were applied in the experimental groups' interventions: Grammarly, ChatGPT, and Google Translate. In contrast, the control group was instructed using a conventional method. This study used two tests to obtain data: a preliminary test and a final test on picture interpretation. This deliberate strategy was selected to maintain testing integrity and credit any writing skill gained between preliminary and final assessments to the intervention rather than participants' memory of the initial picture.

3.2 Training for the Classroom A Students

The training program for students utilizing ChatGPT 3.5 was extended for 12 weeks, taking place four times a week, with each session lasting for an hour. Primarily, students were introduced to the functionalities of ChatGPT and how it could assist them in their English writing. Subsequently, they created narratives based on visual stimuli, using a specific prompt (I am a learner of English as a second language; I have composed a story in English based on a picture. I seek assistance identifying and understanding any grammatical or structural errors in my composition. Your task is to review the story, identify errors, provide explanations for each type of error, and offer illustrative examples to aid in knowledge) that was designed by researchers. This exercise aimed at allowing students to submit their stories to ChatGPT for evaluation. The feedback provided by ChatGPT, which involved identifying and categorizing errors in the students' writing, was then utilized by the students to revise their texts.

3.3 Training for the Classroom B Students

The training program integrated the utilization of Grammarly's Automated Writing Evaluation tool, employing modified procedures from Tambunan et al. (2022) and Almusharraf & Alotaibi (2023), to align with our distinctive learning framework for 12 weeks, with sessions occurring four times per week, each lasting for 60 minutes. Initially, the program commenced with a comprehensive orientation on Grammarly, wherein its multifaceted functionalities were delineated, highlighting the tool's potential to enhance students' writing skills significantly. Subsequently, students were instructed to meticulously submit their assignments for Grammarly's thorough analysis to identify a wide range of linguistic inaccuracies, encompassing both grammatical and stylistic errors. A crucial aspect of this process involved students composing narratives based on visual stimuli, which were submitted to Grammarly for evaluation. The subsequent stage entailed a reflective feedback session, wherein students reviewed the feedback provided by Grammarly on their written work. This reflective session was designed to encourage a critical examination of their writing errors, foster self-improvement, and deepen their understanding of the intricacies of English writing. Moving forward from this phase, students were actively encouraged to revise their assignments, incorporating the insights and suggestions offered by Grammarly to refine their writing. The training program culminated in providing personalized feedback to each student, tailored to address their specific learning needs and writing challenges, thereby enabling a more targeted approach to enhancing their English writing skills.

3.4 Training for the Classroom C Students

Based on Tsai's (2020) investigation but adapted for the specific objectives of this study, the training protocol extended over 12 weeks, encompassing four days per week, with each session lasting 60 minutes. It was initiated with an introduction to Google Translate, emphasizing its attributes and potential for enhancing writing skills. Students were assigned the task of composing a narrative based on an image in Hindi (the participants' first language) and subsequently translating it into English independently. Subsequently, they employed the Google Translate tool to perform an additional translation of the same story (refer to image 3 for the Google Translate output). The final stage necessitated students to review and amend their self-translated story by contrasting and comparing it with the version generated by Google Translate, thus promoting thoughtful consideration of linguistic choices and translation precision. This comprehensive approach was designed to ameliorate English writing proficiency by correcting errors and capitalizing on bilingual resources and self-evaluation strategies.

3.5 Training to the Students of Classroom D

In Classroom D, the control group, students were not exposed to technological interventions to improve their English writing abilities. Instead, their educational experience relied on the traditional grammar-translation approach, a customary method employed at their institution. This strategy emphasizes translating sentences from the student's native language into English rather than using interactive or technologically facilitated learning methods.

3.6 Participants

In this study, four complete classes, denoted as Classes A, B, C, and D, were randomly allocated to experimental or control groups by the established sampling principles commonly employed in experimental research within education and applied linguistics (Perry, 2011). The 12th-grade students were selected from an Indian public school due to their significant English language learning backgrounds. These

students had been studying English as a second language since childhood, with Hindi as their native tongue. They were fully immersed in a curriculum that mandated English as a subject, entailing four hours of instruction per week across various disciplines such as science, commerce, and arts. None of the participants had previously utilized ChatGPT to enhance their writing abilities. However, they were familiar with utilizing laptops, mobile phones, the internet, and other artificial intelligence tools. Before the commencement of the intervention, the students were provided with a comprehensive briefing on the study's expectations and their involvement nature. To ensure the voluntary nature of participation, they were informed that they could withdraw from the study at any point. A total of 213 students, consisting of 139 males and 74 females aged between 16 and 17, agreed to participate. This cohort comprised 58 students in Class A, 49 in Class B, 61 in Class C as part of the experimental groups, and 52 students in the control group. The researcher taught both the experimental and control groups to preserve consistency. All students gave informed consent before the study began.

3.7 Data Collection Procedure

The collection of data for this study was conducted in two separate stages: a preliminary test and a final test, both centered on a task involving the interpretation of pictures. Primarily, participants were instructed to create a narrative based on a picture within a designated 30-minute time frame, utilizing a word processing program for the preliminary test phase—this initial data collection aimed to establish a starting point for participants' writing abilities before any intervention. Subsequently, after implementing technological interventions, the final test phase replicated the initial task under the same conditions to assess any potential improvements in participants' writing skills, thereby facilitating comparative analysis of their progress. Two distinct images were used for the preliminary and final tests to ensure that participants did not recall specific details of the pictures. This deliberate approach was chosen to maintain the integrity of the testing process and ensure that any enhancement in writing skills observed between the preliminary and final tests could be attributed to the intervention rather than the participants' memory of the initial picture.

3.8 Analysis of Errors

Data was collected by giving pretests and posttests to students in classrooms A, B, C, and D. To analyze the data, the enhanced version of Grammarly, a tool that benefits from Automated Essay Scoring (AES) systems, was employed. These systems are widely recognized for their superior ability to detect errors in English writing produced by students learning it as a second language, surpassing the evaluation skills of human assessors (Almusharraf & Alotaibi, 2023). By employing Grammarly, a meticulous identification of various error types present in students' written compositions was facilitated. Subsequently, a systematic classification of these errors was performed, aiming to identify patterns of commonality and quantify the frequency of these errors across different classrooms.

3.9 Statistical Analysis of Data

The study utilized a Multivariate Analysis of Variance (MANOVA) to systematically evaluate the occurrence of different writing errors among individuals learning English in four distinct classroom settings (Class A utilizing ChatGPT, Class B with Grammarly, Class C employing Google Translate, and Class D serving as the control group without technological assistance) at two evaluation points (pretest and posttest). MANOVA was selected due to its capacity to handle multiple dependent variables, precisely the frequencies of eight writing error categories, including spelling, article use, prepositions, capitalization, punctuation, possessive forms, errors of verb forms, and subject-verb agreement. The independent variables were the classroom settings, different instructional approaches, and the assessment times, reflecting the study's temporal dimension. This analytical approach was adopted to examine the primary impact of the instructional tools and assessment timing on the frequencies of learners' errors and explore the interaction effects between these variables. The rationale behind employing MANOVA was to understand how each Computer-Assisted Language Learning (CALL) tool influenced the correction of writing errors, thus providing insights for more effective pedagogical strategies in ESL education.

4. Results

The multivariate analysis of variance (MANOVA) conducted on the frequency of common error types (spelling, article use, prepositions, capitalization, punctuation, possessive forms, verb form errors, and subject-verb agreement errors) across four classes (A, B, C, and D) using two assessments (pretest and posttest) indicated a significant main effect for the common error types, $F(7, 42) = 31.580$, $p < .001$, $\eta^2p = .840$. The analysis found that spelling errors were most frequent, followed closely by errors in articles and prepositions (Fig I). Capitalization and punctuation errors occurred slightly less frequently, while errors in the possessive form were rarer. Errors of verb form and subject-verb agreement were the least frequent, with subject-verb agreement errors being the least common of the reported errors. Furthermore, the main effect of the four classes revealed a significant variation, $F(3, 46) = 18.179$, $p < .001$, $\eta^2p = 542$. This indicated that Class A had the highest mean of errors, followed by a progressive decrease in the means of Classes B, C, and D (Fig. II). Moreover, the MANOVA analysis demonstrated a significant main impact for the test factor $F(1, 48) = 86.767$, $p < .001$, $\eta^2p = .644$. This effect encompassed pre-test and post-test evaluations within a group of ESL learners. The results demonstrated a marked reduction in the writing errors of ESL learners from pre-test to post-test, signifying substantial enhancement, thereby suggesting the interventions implemented during the study were effective (Fig. III).

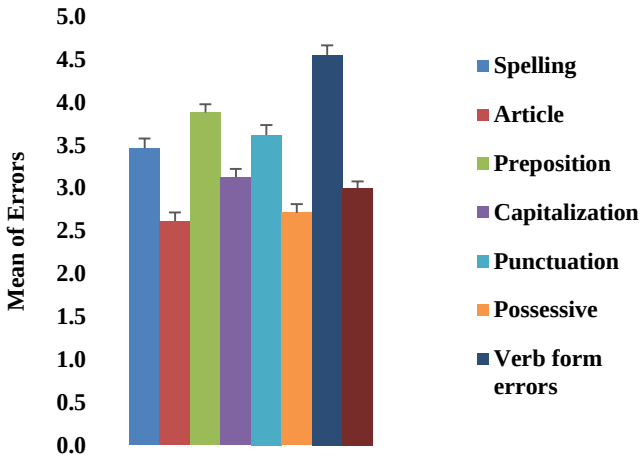

Figure I. Main effect of Errors in Written English

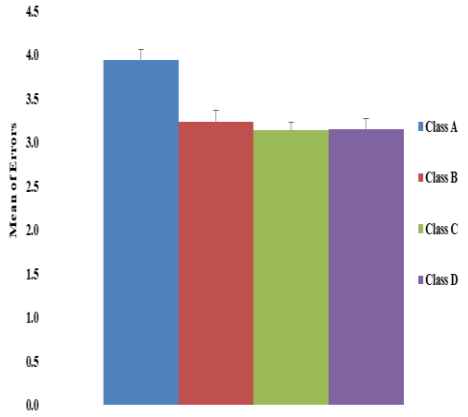

Figure II. Comparison of Classes

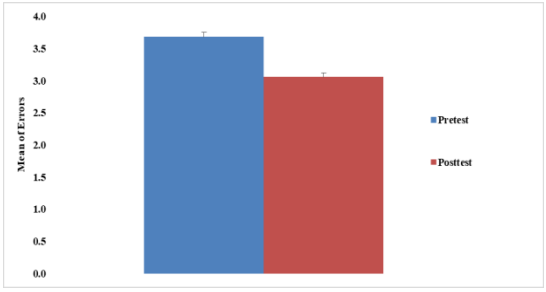

Figure III. Comparison of Tests

According to the MANOVA results, this two-way interaction of common types of error and classes was statistically significant, F (21, 28) = 20.594, p < .001, ^{2}p = .939, presenting the mean of writing errors for four distinct classrooms, Class A, Class B, Class C, and Class D, across eight error categories: spelling, article, preposition, capitalization, punctuation, possessive, verb form, and subject-verb agreement. Class A tends to have the highest frequency of errors, especially in categories such as spelling, punctuation, and verb forms. At the same time, Class D registers the lowest frequencies, suggesting differences in teaching efficacy or learner understanding across the classrooms (Fig. IV). Furthermore, the two-way interaction between common types of error and testing times (pretest, posttest) showed significant results. Specifically, the MANOVA analysis yielded substantial results, F (7, 42) = 15.326, p < .001, ^{2}p = .719, indicating that the difference in the mean number of errors between the pretest and posttest was statistically significant across the common types of errors. This statistical interaction suggests that the pre and post-test interventions may have been differentially effective across the various common types of error, with some errors showing more pronounced improvements than others (Fig. V). Moreover, the two-way interaction between four classes (Class A, B, C, and D) and Tests (Pretest and Posttest) factors showed a non-significant result (F (3, 46) = 0.100, p = .960). This implies that the differences in the mean number of errors between the pretest and posttest were consistent across the different classroom settings, indicating that the change in error frequency from before to after the instructional period or intervention did

not significantly vary between the other classes. Therefore, any improvements or lack thereof in ESL learners' writing errors due to the instruction provided were not dependent on the class in which they were taught. Furthermore, the analysis of variance, as indicated by the MANOVA results, revealed a significant three-way interaction among standard error types, the four instructional classes, and the two testing instances, $F(21, 28) = 2.367$, $p = .017$, $(\eta^2p) = .640$. This significant interaction effect suggested variations in the response to instruction across different error types when comparing pre-test and post-test scores among the various classes (Table 1).

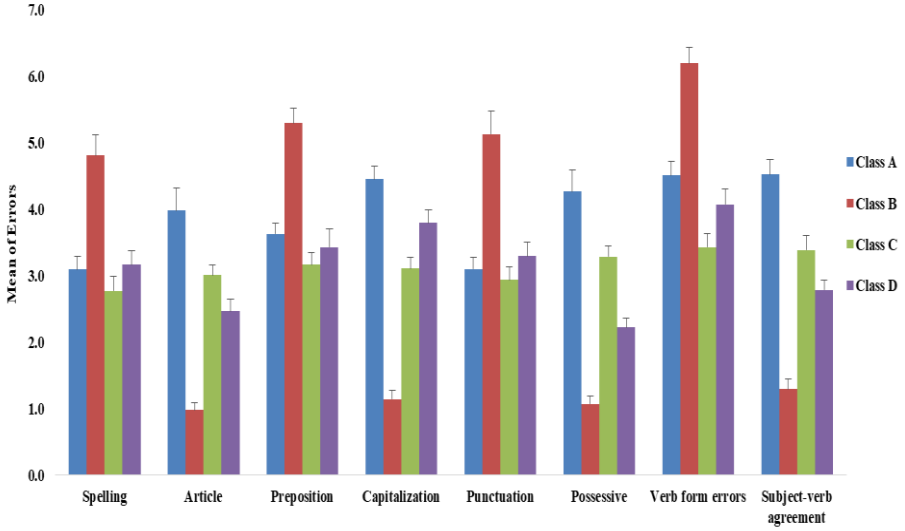

Figure IV. Comparison of Errors in Class

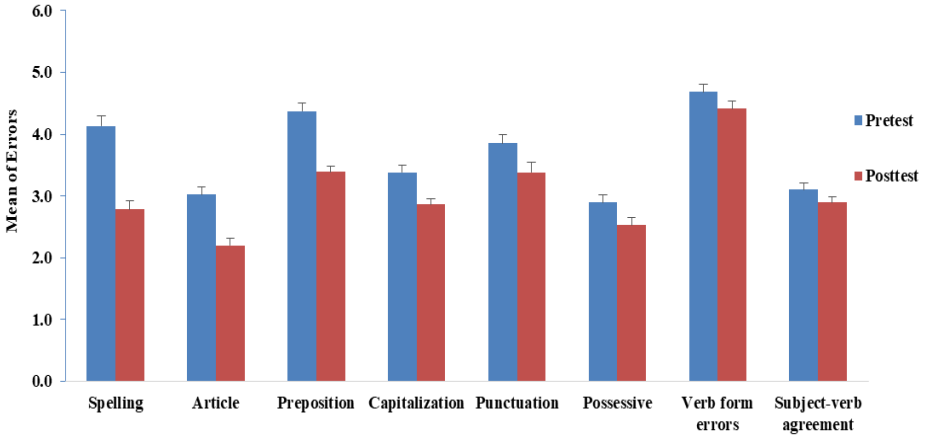

Figure V. Effect of Tests for each Type of Error

4.1 Comparative Analysis

The performance of ESL learners across four distinct classroom interventions about eight grammatical error categories, as assessed in pre-test and post-test, is presented in detail in Table 1. Each class corresponds to a specific intervention condition, namely Class A (ChatGPT), Class B (Grammarly), Class C (Google Translate), and Class D (Control Group). The data is structured to demonstrate the average number of errors for each error category, accompanied by the standard error, thereby enabling an evaluation of both the central tendency and variability of the learners' achievements. Herein lies a comparative breakdown:

	Class A (ChatGPT)				Class B (Grammarly)				Class C (Google Translate)				Class D (Control Group)			
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error
Spelling	4.02	0.31	2.16	0.22	5.49	0.39	4.12	0.43	3.14	0.36	2.41	0.18	3.90	0.36	2.43	0.19
Article	4.35	0.35	3.61	0.45	1.22	0.13	0.73	0.11	3.71	0.24	2.31	0.20	2.80	0.24	2.14	0.21
Preposition	4.22	0.20	3.04	0.14	5.92	0.27	4.67	0.23	3.45	0.22	2.88	0.20	3.90	0.36	2.96	0.25
Capitalization	4.90	0.24	4.00	0.25	1.41	0.16	0.88	0.13	3.71	0.24	2.51	0.19	3.51	0.22	4.08	0.31
Punctuation	3.33	0.23	2.88	0.34	5.49	0.39	4.78	0.47	3.14	0.36	2.73	0.28	3.90	0.36	2.69	0.20
Possessive	4.35	0.35	4.18	0.42	1.22	0.13	0.92	0.15	3.71	0.24	2.86	0.23	2.31	0.17	2.14	0.21
Verb form errors	4.31	0.25	3.84	0.25	6.33	0.23	6.06	0.27	3.47	0.21	3.39	0.21	4.65	0.21	4.37	0.23
Subject-verb agreement	4.69	0.23	4.35	0.26	1.35	0.16	1.24	0.16	3.47	0.25	3.31	0.27	2.90	0.21	2.67	0.25

Figure VI. Pre- and Post-Test Results of ESL Learners' Grammatical Error Correction using CALL Tools and Control Group

1. Spelling Errors: The group designated Class A, associated with ChatGPT, and exhibited the highest improvement score of 1.85. This was followed by Class B, which pertains to Grammarly, with a score of 1.36. Class D, representing the control group, scored 1.4694, while Class C, corresponding to Google Translate, obtained the lowest score of 0.73.

2. Article Errors: Class C, which comprises the Google Translate group, exhibited the most substantial improvement with a score of 1.40. Class A, consisting of the ChatGPT group, and Class D, the control group, also demonstrated improvement with scores of 0.7347 and 0.65. Conversely, Class B, encompassing Grammarly's group, displayed the most minor improvement at 0.48.

3. Preposition Errors: Grammarly's group (Class B) was the top performer, with an improvement score of 1.24. ChatGPT's group (Class A) scored 1.18, the control group (Class D) 0.9388, and Google Translate's group (Class C) had the lowest score at 0.57.

4. Capitalization: Google Translate's group (Class C) had the most significant improvement at 1.20, followed by ChatGPT's group (Class A) at 0.89 and Grammarly's group (Class B) at 0.53. The control group (Class D) decreased, with a negative score of -0.57.

5. Punctuation: The control group (Class D) scored the highest at 1.2041. Grammarly's group (Class B) had an improvement of 0.71. ChatGPT's group (Class A) and Google Translate's group (Class C) had lower scores of 0.44 and 0.40, respectively.

6. Possessive Errors: Google Translate's group (Class C) had the most significant error reduction at 0.85. Grammarly's group (Class B) scored 0.3061, and both ChatGPT's group (Class A) and the control group (Class D) scored 0.16.

7. Verb Form Errors: ChatGPT's group (Class A) improved most at 0.46. Grammarly's group (Class B) and the control group (Class D) followed at 0.26 and 0.28, respectively, with Google Translate's group (Class C) at 0.08.

8. Subject-Verb Agreement: The group denoted as ChatGPT (Class A) experienced the most substantial improvement, reaching a value of 0.34. Conversely, the remaining groups, namely Grammarly's group (Class B), Google Translate's group (Class C), and the control group (Class D), displayed lower scores of 0.10, 0.16, and 0.22, respectively.

5. Discussion and Analysis

5.1 Discussion Addressing the First Research Question

The examination of common writing errors among ESL learners highlights a consistent pattern of challenges across different learning contexts, with spelling, articles, and prepositions identified as the most common stumbling blocks. This finding echoes the broader academic consensus that these error types are particularly problematic for ESL students, mainly due to the complexity and idiosyncrasies of English grammar and orthography (Alam et al. 2023; Ahmed & Salim, 2021; Omar & Barzani, 2022). The research underscores that spelling mistakes frequently occur as learners navigate the phonetic and orthographic discrepancies between English and their native languages, complicating the acquisition of accurate spelling skills (Llombart-Huesca & Zyzik, 2019). Similarly, difficulties with articles and prepositions are noted, reflecting the intricate rules governing their use in English—a challenge that learners often face due to the lack of direct equivalents in many other languages, which can lead to confusion and errors in application (Ahmad & Khan, 2021). Moreover, while less common than spelling, article, and preposition errors, challenges with capitalization and punctuation also emerge as notable areas of difficulty for ESL learners. These errors, though occurring slightly less frequently, underscore the wide range of grammatical nuances that learners must master. On the rarer end of the spectrum, errors related to possessive forms, verb tenses, and subject-verb agreement are identified, with subject-verb agreement errors being the least frequently reported. These fewer common errors, however, highlight the advanced grammatical understanding required to achieve proficiency in English writing (Phuket & Othman, 2015; Zheng & Park, 2013).

The patterns observed suggest a multi-faceted landscape of grammatical challenges confronting ESL learners, necessitating tailored educational strategies to effectively address these diverse areas of difficulty. The emphasis on these common errors reinforces the need for focused instructional approaches to guide learners through the intricacies of English grammar and spelling, enhancing their overall writing proficiency (Wornyo, 2016; Getie, 2020).

5.2 Discussion Addressing the Second Research Question

In English language learning, CALL tools like ChatGPT and Google Translate have demonstrated superiority over Grammarly and

traditional pedagogies in correcting ESL learners' writing errors. ChatGPT fosters interactive dialogues that enhance learners' understanding of spelling, verb forms, and subject-verb agreement, reflecting natural language learning processes and promoting active error correction. This approach has been supported by research from scholars such as Mahapatra (2024) and Barrot (2023), showing ChatGPT's significant impact on improving grammar and composition. ChatGPT's interactive dialogue system promotes active engagement and deeper linguistic comprehension, facilitating a learning process that mirrors natural language usage and encourages critical thinking (Johnson, 2022). Google Translate, on the other hand, effectively addresses basic grammatical mistakes, offering immediate translations that aid in grasping fundamental grammar, as noted by Tsai (2019) and Lee (2019). Google Translate offers instant, context-specific translations that aid in the immediate understanding and application of grammatical rules, significantly benefiting learners' grasp of complex grammar in real-time (Benda, 2014). Both tools provided personalised feedback, addressing a wide range of error types, from simple spelling mistakes to complex verb form and subject-verb agreement errors, thus offering comprehensive coverage that enhances overall writing proficiency. Conversely, Grammarly specialises in clarifying complex grammar issues and prepositions with detailed feedback, enhancing learners' grammatical awareness and writing proficiency, a benefit echoed by researchers like Fitria (2021) and Purnamika Utami & Mahardika (2023). These interactive and tailored feedback mechanisms, combined with the ability to correct and explain errors instantly, ensure that ESL learners receive the corrective assistance and the grammatical insights necessary to improve their language skills effectively (Adzhar & Sazalli, 2024). Furthermore, integrating these advanced CALL tools creates a dynamic and multifaceted learning environment that maintains learner engagement and significantly boosts motivation and the desire to learn a language (Seven, 2020). Therefore, the superiority of ChatGPT and Google Translate in ESL education is underscored by their capacity to offer a more engaging, efficient, and comprehensive learning experience.

6. Conclusion

The study discovered that ChatGPT, Grammarly, and Google Translate were effective computer-assisted language learning tools for rectifying ESL/EFL learners' writing errors. It was found that technology could enhance language acquisition by fixing several kinds of grammatical errors. The analysis showed a substantial reduction in students' writing errors, including spelling, articles, prepositions, capitalization, punctuation, possessives, verb forms, and subject-verb agreement. This significant enhancement in the learners' writing errors from the pre-test to the post-test indicated the positive impact of the interventions implemented during the study. The results revealed that these tools successfully addressed various grammatical errors, showcasing the substantial role technology could play in enhancing language learning.

6.1 Pedagogical Implications, Limitations, and Prospective Studies

The results have important pedagogical implications for the classroom as they promote the use of CALL tools in ESL/EFL classrooms, such as ChatGPT, Grammarly, and Google Translate. To make learning more interesting and applicable, these tools could be utilised to receive instant individual feedback. Teachers could use these tools to help students improve their writing and gain a better grasp of English grammar. This study has some limitations, such as particular classroom settings and the selection of CALL tools, which might not represent every aspect of available educational technologies. Furthermore, the emphasis on immediate error correction might not entirely depict the long-term impacts of learning for ESL/EFL learners. Future research studies should examine a wider range of tools and analyse their effects over time to fully understand how CALL tools foster sustained language competency and skills. They could explore how technology could be tested in diverse learning situations and how it affects language acquisition beyond writing.

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Authors' contributions

Dr. Abduh Almashy and Dr. Mohammad Jamshed conceptualized and prepared the manuscript. Dr Mohd Sajid Ansari and Dr. Abu Saleh Md Manjur Ahmed facilitated and supervised the intervention. Sameena Banu and Wahaj Unnisa Warda revised the manuscript. The article was read and approved by all writers. All authors contributed equally to the work.

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