

**T.C.
ISTANBUL AYDIN UNIVERSITY
INSTITUTE OF GRADUATE STUDIES**



**EXPLORING THE COMBINATION OF AI-POWERED
WRITING ASSISTANTS AND THE TEACHER-WRITTEN
FEEDBACK IN EFL WRITING CLASSES**

MASTER'S THESIS

Mihri DİŞLİ

**Department of Foreign Languages Education
English Language Teaching Program**

JULY, 2025

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JULY, 2025

THESIS EXAM REPORT

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30.06.2025 date and 2025/07 decision number, the thesis of Mihri Dişli , whose
thesis defense exam was held on 17.07.2025 before the jury members formed at the
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DECLARATION

I hereby declare with respect that the study “Exploring The Combination Of A1-Powered Writing Assistants And The Teacher-Written Feedback In Efl Writing Classes ”, which I submitted as a Master thesis, is written without any assistance in violation of scientific ethics and traditions in all the processes from the Project phase to the conclusion of the thesis and that the works I have benefited from those shown in the References. (17/07/2025)

Mihri DİŞLİ

FOREWORD

I would like to express my sincere gratitude to my thesis advisor, Dr. Hülya Yumru, for her invaluable academic guidance, constructive feedback, and continuous support throughout all stages of this study. Her mentorship has significantly shaped both the direction and the quality of this research. I am genuinely grateful to my family and friends for their unwavering encouragement and emotional support along this journey. My heartfelt appreciation goes to my partner, Enes Emir Dokgöz, whose motivation, patience, and belief in my potential have been a constant source of strength and focus during this process. Special thanks to my dear friend, Beyza Nur Çabuk. From the very beginning of this academic journey to its final stage, she has been by my side—offering genuine friendship, constant support, and the comfort of knowing she was always there. Her presence was not only a source of strength but also a steady source of motivation that kept me going along the way.

July, 2025

MİHRİ DİŞLİ

EXPLORING THE COMBINATION OF AI-POWERED WRITING ASSISTANTS AND THE TEACHER-WRITTEN FEEDBACK IN EFL WRITING CLASSES

ABSTRACT

In the world of language teaching and learning, written corrective feedback (WCF) has been acknowledged as a significant tool for correcting language errors and enhancing language skills. However, it remains challenging for educators, especially in situations where resources and teaching time are constrained. AI-powered writing assistants (AI-WAs), like Grammarly, are considered solutions to these issues. Still, there is no consensus on this matter. Some believe that teacher's corrective feedback is very effective in improving writing, as it provides personalized guidance, particularly in improving content and organization, whereas others argue that AI-WAs lead to significant improvements in writing proficiency, as they instantly correct grammar, spelling, vocabulary use, and punctuation mistakes. However, few empirical studies explore the combination of AI-WAs and teacher's corrective feedback. Since both are believed to have their advantages, this study was designed to explore the combination of AI-WAs with teacher-written feedback in improving writing. This study was conducted at a foundation English preparatory school, involving 50 English as a Foreign Language (EFL) Turkish students in an eight-week program where they wrote three opinion paragraphs. The participants were divided into two groups: one group received feedback from only the teacher, while the other group received a combination of teacher-written feedback followed by Grammarly. Both groups revised their work after each feedback cycle. Data were collected through a pre-test and a post-test. The results showed that AI feedback was more effective for accuracy, while teacher-only feedback contributed more to vocabulary development. The combination of both led to overall improvement, with gender differences reduced in the combined group.

Keywords: EFL writing, Turkish learners, AI Writing Assistants, Teacher Written Feedback, AI in education

EFL YAZMA SINIFLARINDA YAPAY ZEKA DESTEKLİ YAZMA ASİSTANLARI İLE ÖĞRETMEN GERİ BİLDİRİMLERİNİN KOMBİNASYONUNUN İNCELENMESİ

ÖZET

Dil öğretimi ve öğrenimi alanında, yazılı düzeltici dönüt, dil hatalarının düzeltilmesi ve dil becerilerinin geliştirilmesi açısından önemli bir araç olarak kabul edilmektedir. Ancak, özellikle kaynakların ve öğretim süresinin sınırlı olduğu durumlarda, bu uygulama eğitimciler için hâlâ zorluk teşkil etmektedir. Grammarly gibi yapay zekâ destekli yazma asistanı araçları (AI-WAs), bu soruna yönelik çözümlerden biri olarak görülmektedir. Bununla birlikte, bu konuda henüz bir fikir birliği bulunmamaktadır. Bazı araştırmacılar, öğretmen tarafından sağlanan düzeltici dönütün yazma becerilerini geliştirmede çok etkili olduğunu, özellikle içerik ve organizasyonu geliştirmede kişiselleştirilmiş rehberlik sunduğunu savunurken; diğerleri, AI-WAs araçlarının dilbilgisi, yazım, kelime kullanımı ve noktalama hatalarını anında düzelterek yazma yeterliliğinde anlamlı gelişmeler sağladığını ileri sürmektedir. Ancak, AI-WAs ile öğretmen dönütünün bir arada kullanımını inceleyen ampirik çalışmalar oldukça sınırlıdır. Her iki tür dönütün de avantajları olduğu düşünüldüğünden, bu çalışma yazma becerisini geliştirmede AI-WAs ile öğretmen dönütünün bir arada kullanımını incelemek amacıyla tasarlanmıştır. Çalışma, bir vakıf üniversitesinin İngilizce hazırlık okulunda yürütülmüş ve sekiz haftalık bir program kapsamında , yabancı dil olarak İngilizce (EFL) öğrenen 50 Türk öğrenci yer almıştır. Bu süreçte öğrenciler üç farklı görüş paragrafı yazmıştır. Katılımcılar iki gruba ayrılmıştır: bir grup yalnızca öğretmenden dönüt alırken, diğer grup önce öğretmenden, ardından Grammarly aracılığıyla dönüt almıştır. Her iki grup da her dönüt döngüsünün ardından metinlerini revize etmiştir. Veriler ön test ve son test yoluyla toplanmıştır. Sonuçlar, yapay zekâ dönütünün doğruluk açısından daha etkili olduğunu, yalnızca öğretmen dönütünün ise kelime dağarcığı gelişimine daha fazla katkı sağladığını göstermiştir. Her iki dönüt türünün birleştirilmesi genel bir gelişim sağlamış ve cinsiyet farklılıklarının birleşik dönüt grubunda azaldığı gözlemlenmiştir.

Anahtar Kelimeler: EFL yazma, Türk öğrenciler, Yapay Zekâ Yazma Asistanları, Öğretmen Yazılı Dönütü, Eğitimde Yapay Zekâ



TABLE OF CONTENTS

DECLARATION	i
FOREWORD	ii
ABSTRACT	iii
ÖZET	iv
TABLE OF CONTENTS	vi
LIST OF FIGURES	viii
LIST OF TABLES	ix
LIST OF ABBREVIATIONS	x
I. INTRODUCTION	1
A. Background of the Study.....	1
B. Significance of the Study	2
C. Statement of the Problem.....	3
D. Research Questions	3
II. LITERATURE REVIEW	4
A. Introduction to Writing Feedback in EFL Contexts.....	4
1. Written corrective feedback: definition and development	4
2. Types of written feedback.....	6
B. Teacher-written Feedback in EFL Writing	9
1. The role and effectiveness of teachers in providing written feedback.....	9
2. Perception of students and teachers on written feedback.....	11
3. Teachers' challenges in providing written feedback	13
a. Time constraints and large class sizes.....	14
b. Subjectivity and inconsistency	15
C. AI Writing Assistants in EFL Writing	16
1. The role and effectiveness of AI writing tools for written feedback	17
2. Grammarly: features and application in EFL writing	18
3. Students' and teachers' perceptions	20
4. Challenges and limitations of AI writing assistants.....	23

D. Combining AI-powered Writing Assistants and Teacher-written Feedback in EFL Writing	24
III. METHODOLOGY.....	27
A. Participants.....	27
B. Instrumentation	27
C. Instructional Intervention.....	29
1. Combination feedback group	30
2. Teacher-only feedback group.....	30
D. Data Collection.....	33
E. Data Analysis	35
IV. FINDINGS	36
V. DISCUSSION	43
VI. CONCLUSION.....	45
VII. LIMITATIONS OF THE STUDY.....	48
VIII. SUGGESTIONS FOR FUTURE STUDIES	50
IX. REFERENCES.....	52
APPENDIX.....	62
RESUME.....	64

LIST OF FIGURES

Figure 1 This figure provides a visual representation of mean writing test scores for both control and experimental groups in the pre-test and post-test.	37
Figure 2 This figure provides a visual representation of mean vocabulary scores for both control and experimental groups in the pre-test and post-test.	38
Figure 3 This figure displays the average grammatical accuracy scores of both the control and experimental groups across the pre-test and post-test	39
Figure 4 This figure presents the mean overall writing scores of the control group, categorized by time and gender.	41
Figure 5 This figure presents the mean overall writing scores of the experimental group, based on time and gender.	42

LIST OF TABLES

Table 1. Comparative Weekly Intervention Plan for Feedback Groups	32
Table 2 Skewness and kurtosis values of the research variables	35
Table 3 Results of the 2x2 Mixed ANOVA for Writing Scores Depending on Time and Feedback	36
Table 4 Results of the 2x2 Mixed ANOVA for Vocabulary Scores Depending on Time and Feedback	37
Table 5 Results of the 2x2 Mixed ANOVA for Accuracy Scores Depending on Time and Feedback	38
Table 6 Results of the 2x2 Mixed ANOVA for Writing Scores of the Control Group Depending on Time and Gender	40
Table 7 Results of the 2x2 Mixed ANOVA for Writing Scores of the Experimental Group Depending on Time and Gender	40

LIST OF ABBREVIATIONS

A2	: Pre-intermediate Level Language Proficiency in CEFR
AI	: Artificial Intelligence
AI-WAs	: Artificial Intelligence-powered Writing Assistants
ANOVA	: Analysis of Variance
CEFR	: Common European Framework of Reference for Languages
EFL	: English as a Foreign Language
SLA	: Second Language Acquisition
WCF	: Written Corrective Feedback

I. INTRODUCTION

This introductory chapter sets the foundation for the study by first outlining the background and context in which the research is situated. It continues with a clear statement of the study's purpose and emphasizes its potential significance in the field of EFL writing instruction. The chapter also identifies the specific problem the study aims to address and presents the research questions.

A. Background of the Study

In the realm of second language acquisition, particularly in EFL contexts, the development of writing skills has always posed significant challenges for both learners and educators. Writing, as a productive language skill, requires not only grammatical accuracy but also coherent organization, appropriate vocabulary use, and the ability to convey meaning clearly and effectively. (Hyland, 2019) Among the pedagogical practices implemented to support students' writing development, Written Corrective Feedback (WCF) has long been regarded as an essential practice in EFL learning and teaching. (Bitchener and Ferris, 2012; Ellis, 2009) Bitchener and Ferris (2012) define WCF as the process of responding to student writing by identifying and correcting errors, thus guiding learners toward more accurate and fluent language use. This kind of feedback provides the learner with clear indication of areas for improvement in their written language ability, enabling them to understand and correct errors. As Bitchener (2008) contended, WCF is effective and significant for EFL students to improve their writing both in the short and long term. Ferris (2018) reported that students could be informed of their areas of weakness and strength through individual and context-specific teacher-written feedback. However, Lee (2020) continued that providing individualized feedback requires a great deal of time and effort that might prove difficult to implement, especially when dealing with large classes or where resources are limited. Hence, the teachers must spend a substantial amount of time on the grammatical error correction. Therefore, considering the time and resource constraints faced by teachers, seeking alternative

and effective AI-WAs for writing instruction has become a necessity.

One of the most prominent AI-WA in this area is Grammarly (2009), founded by Max Lytvyn, Alex Shevchenko, and Dmytro Lider. Grammarly is an AI-based proofreading website that has emerged as a complementary tool in EFL learning through the offering of instant correction in grammatical mistakes, spelling, punctuation, and vocabulary usage. Therefore, it is utilized as an AI-based written feedback tool for improving the writing accuracy of learners (Burstein, Chodorow, and Leacock, 2004; Guo, Feng, and Hua, 2022).

B. Significance of the Study

In recent years, there has been an increase in studies examining the influence of AI-WAs like Grammarly on students' writing improvement. The research has yielded valuable data in the areas of writing where each type of feedback provided support in improving writing. Sanosi (2022) examined the effectiveness of teacher-written feedback and AI-WAs by comparing them and reported that Grammarly was superior at developing the students' linguistic accuracy compared to teacher-written feedback on vocabulary, grammar, writing conventions including punctuation and spelling. All the reports highlighted the possibility for Grammarly to give instant, easy to access, accurate feedback leading to measurable improvements in EFL learners' writing, while the overall quality of writing had some complexities which Grammarly was at times limited. Additionally, according to Ghufon (2019) teacher-written feedback was superior to Grammarly in its ability in improving writing with regard to content and organization. This shows that while AI-WAs are able to identify and resolve surface errors, they might not provide learner guiding instruction to develop ideas clearly and coherently, organize materials logically and meaningfully. In this regard, teacher-written feedback remains significant as it provides not only technical improvement, but also conceptual development. These findings suggested that each type of feedback has its own contributory benefits. Grammarly provides immediate, automated feedback that improves linguistic accuracy, while teacher-written feedback provides greater depth as a guide to promote the writing practices and improve text structure logically and meaningfully.

C. Statement of the Problem

Despite these promising possibilities, little is known about the combined use of AI-WAs and teacher-written feedback. Although previous studies have examined their individual effectiveness and even compared the two, very few have examined how their integration might impact EFL students' writing outcomes. This study, therefore, aimed to fill this gap by examining the combined effects of teacher-written feedback and Grammarly, and by investigating whether this combination feedback approach leads to more effective improvements in writing performance compared to relying on teacher-written feedback alone. Additionally, the study sought to examine whether this approach led to differential improvements in writing performance between male and female students.

D. Research Questions

In line with the above mentioned objectives, the research sought to answer the following questions:

- To what extent does the combination of Grammarly and teacher-written feedback improve EFL students' writing performance compared to Teacher-Only Written Feedback?
- What is the impact of Grammarly on writing accuracy and vocabulary development in EFL students' writing?
- Does the combination of Grammarly and Teacher-Only Feedback affect male and female students differently in improving EFL writing?

II. LITERATURE REVIEW

A. Introduction to Writing Feedback in EFL Contexts

This section introduces the concept of written feedback in EFL contexts by first exploring the definition and historical development of Written Corrective Feedback (WCF). It then categorizes the various types of WCF, discussing their distinct features and pedagogical implications for second language writing instruction

1. Written corrective feedback: definition and development

Written Corrective Feedback is a widely studied concept in second language (L2) writing research. It refers to the written feedback on linguistic errors in students' texts to help improve their language accuracy and writing performance. (Chandler, 2003; Bitchener and Storch, 2016; Hattie and Timperley, 2007; Tsui, 1996; Ellis, 2009; Ferris, 1999) Researchers have investigated WCF from multiple theoretical and empirical standpoints, leading to an ongoing discussion about its effectiveness. This debate was primarily initiated by Truscott (1996) and Ferris (1999), whose opposing viewpoints shaped much of the subsequent research on WCF. The discussion on WCF gained momentum with Truscott's (1996) seminal paper, "The Case Against Grammar Correction in L2 Writing Classes," in which he argued that grammar correction in L2 writing is ineffective and should be completely abandoned. According to Truscott, written error correction:

- Does not promote second language acquisition (SLA), since grammar learning follows a natural development sequence that cannot be sped up through corrective feedback,
- Frustrates learners and adds to their cognitive load, leading to negative effects on motivation and learning,
- Should be removed from writing instruction, since it is ineffective and can be detrimental

In response to this article, Ferris (1999) wrote "The Case for Grammar Correction in L2 Writing Classes: A Response to Truscott (1996)" in which she directly disagreed with Truscott's claims. She stated that:

- Not all types of WCFs are equally effective, and that benefitting from WCF can definitively depend on several factors including the type of feedback provided, the proficiency level of the learner, and the amount of effort the learner commits to in the revising process
- Focused and metalinguistic WCF can be especially effective in supporting learners to increase grammatical accuracy
- WCF should not be rejected but rather incorporated to suit learners' needs and writing goals.

Building on this debate, later researchers have refined and expanded the definition of WCF. Chandler (2003) defined WCF as the process of identifying and responding to language errors in student writing to enhance their linguistic accuracy, highlighting its role in revision and writing development. Similarly, Bitchener and Storch (2016) described WCF as a response to linguistic mistakes in students' writing, aiming to improve accuracy and encourage better performance in future writing.

Furthermore, to better categorize different types of WCF, Ellis (2009) proposed a widely adopted classification system as stated in the following:

- Direct feedback, where the teacher clearly supplies the correct linguistic form, providing students with an unambiguous model of correct language use.
- Indirect feedback, where errors are signaled but not corrected, so that students have to detect and correct their own mistakes. It is thought that this type of feedback encourages mental effort and student autonomy.
- Metalinguistic feedback, which provides explanations of grammar or linguistic cues related to the nature of the error, helping learners to develop a sense of grammatical rules.
- Focused feedback, which singles out specific kinds of errors (e.g., verb tense, articles), allowing learners to concentrate on single linguistic problems.

- Unfocused feedback, which corrects over a broad range of errors like grammar, vocabulary, content, and punctuation, providing an overview of writing problems.
- Reformulation where the teacher rewrites the learner's text such that the original meaning is retained but the linguistic structure is more natural, thus offering learners correct language use in context.

While these classifications helped structure WCF research, further studies have investigated the long-term impact of WCF on writing development. Bitchener and Knoch (2010) provided empirical evidence that both direct and metalinguistic WCF can lead to long-term improvements in grammatical accuracy among advanced L2 writers. In a subsequent study, Bitchener and Knoch (2015) conducted an approximate replication of their earlier work, further supporting the effectiveness of these feedback types. Similarly, Sheen (2007, 2011) compared focused and unfocused WCF, demonstrating that focused feedback is more effective in facilitating the acquisition of specific grammatical structures. Additionally, Chandler (2003) examined how students process and incorporate WCF into their revisions, revealing that WCF improves both accuracy and fluency in writing.

2. Types of written feedback

In Written Corrective Feedback, various types have been characterized, with varying pedagogical implications. While early discussions on WCF focused on whether or not it should be provided (Truscott, 1996; Ferris, 1999), later research investigated the effectiveness of various types of feedback in promoting writing accuracy. Ellis (2009) provided a widely used typology of WCF that includes direct feedback, indirect feedback, metalinguistic feedback, focused and unfocused feedback, and reformulation.

Second language writing extensively explored direct and indirect WCF. Direct WCF involves explicit correction in which the educator provides the error-free linguistic structure, thus showing learners a transparent model of right usage of the language. The indirect WCF simply points toward the existence of an error through underlining, circling, or marginal note, but expects learners to correct themselves (Ellis, 2009).

A study by Nematzadeh and Siahpoosh (2017) examined the effect of direct

and indirect WCF on the accuracy of writing among Iranian intermediate EFL students. The study involved 45 students, placed into three groups: direct WCF, indirect WCF, and control group. Results showed that both direct and indirect WCF significantly influenced writing performance, with no statistically significant difference between the two modes of feedback. This suggests that both methods could be useful, though neither was conclusively superior. Similarly, Hosseiny (2014) investigated the impact of direct and indirect WCF on Iranian university students learning English as a foreign language (EFL), supporting that both forms of feedback improved grammatical accuracy.

Contrary to these findings, Sherpa (2021) examined the long-term effect of direct and indirect WCF on Bhutanese EFL students. The sample population of 45 students, randomly assigned to three groups as direct WCF, indirect WCF, and control, were administered a writing accuracy measure through pre-tests, post-tests and delayed post-tests. The findings demonstrated that indirect WCF was more effective in permitting grammatical correctness over the long run; this incidental learning was possible because the learners self-corrected more often, which permitted a better long-term retention of grammatical frames. The findings, however, contradicted those of Wondim et al. (2024) who specifically compared direct and indirect WCF for Ethiopian university learners. Their quasi-experimental methodology consisted of three groups: one that received direct WCF with metalinguistic explanation, one receiving indirect WCF, and one control group that did not receive feedback. Outcomes indicated that the direct WCF group learned much more than the indirect WCF group, particularly in terms of grammatical accuracy when metalinguistic explanation was given. The diversity of findings suggests that metalinguistic explanations may be responsible for making a difference between the effectiveness of direct WCF and not. In another study, Göksoy and Nazlı (2016) evaluated the impact of direct and indirect WCF on Turkish EFL learners' English verb tense understanding. Their findings supported Sherpa (2021), demonstrating that indirect WCF was stronger in facilitating self-regulation, particularly for verb tense accuracy. However, for more complex grammar structures, direct WCF was stronger. This implies that the effectiveness of WCF strategies may depend on the linguistic feature being targeted, rather than a single solution to all.

Another important WCF research dichotomy is between focused and

unfocused feedback. Focused WCF targets specific error types such as verb tense, articles, allowing learners to concentrate on specific linguistic challenges. In contrast, unfocused WCF addresses an extensive range of errors, varying from grammar, vocabulary, and punctuation to content, providing the learner with a general picture of their writing (Ellis, 2009). Ellis et al. (2008) carried out an experiment comparing focused and unfocused WCF against the backdrop of EFL and concluded that the two-feedback improved grammatical accuracy but found that students subjected to focused WCF made fewer accurate corrections for future writing exercises. The authors concluded that focused WCF is relevant to internalizing rules of grammar to deeper levels, while unfocused WCF provides an overall writing improvement strategy. The relative efficacy of such strategies, however, may depend on learning objectives and students' proficiency levels.

Metalinguistic WCF provides linguistic cues or explicit grammar explanations to students in an attempt to enlighten them on the nature of errors they are making (Ellis, 2009). Unlike direct feedback, which gives the correction, metalinguistic WCF directs learners to engage with grammatical rules and apply them in revision. Pourdana, N., Nour, P., and Yousefi, F. (2021) examined whether metalinguistic WCF was effective in improving Iranian EFL learners' writing accuracy. They concluded that students who received metalinguistic feedback performed better than students who received only direct WCF in accuracy gains significantly. Similarly, Nemati, M., Alavi, S. M., Mohebbi, H., and Masjedlou, A. P. (2017) investigated the contribution of metalinguistic WCF and concluded that explicit grammatical explanation boosts long-term memory and grammatical accuracy. This supports the argument that WCF has to be part of instruction rather than simple correction of errors.

Reformulation is a less common but also effective WCF strategy, in which a learner text is represented by a teacher in more natural and syntactically appropriate form without losing intended meaning (Ellis, 2009). Learners are provided with corrected versions of the language in situations, giving learners implicit experience. Yang and Zhang (2010) explored the role of reformulation in EFL writing with findings suggesting that model text, original text, and reformulated text comparisons assisted learners to identify linguistic issues and acquire more native language vocabulary. The practice, especially combined with peer talk, caused students to

perceive grammatical as well as lexis issues with more revisions in turn. The study confirmed that model text reformulation significantly enhanced linguistic fluency and accuracy by supplying students with the example of usage of suitable language to be implemented in their writings.

According to the evidence, WCF is a pedagogical tool of high order that may come in numerous different forms, each with its benefits and potential constraints. While direct feedback permits immediate correction and is most beneficial for lower-level students, indirect feedback promotes deeper mental processing and ensures long-term retention of accuracy. Similarly, focused feedback facilitates grammatical improvement, whereas unfocused feedback offers a general approach to writing improvement. Metalinguistic remarks enhance overt consciousness of grammatical form, whereas reformulation provides covert exposure to correct usage. Modern pedagogical literature emphasizes the importance of context-sensitive employment of WCF, in which teachers select methods in relation to students' levels of proficiency, learning goals, and feedback response.

B. Teacher-written Feedback in EFL Writing

The present section focuses on the role of teacher-written feedback in EFL writing instruction. It begins by examining its effectiveness in improving learners' writing performance, followed by a review of how both teachers and students perceive this type of feedback. Finally, it addresses the key challenges teachers face in delivering effective feedback, such as time constraints, large class sizes, and potential inconsistencies in practice.

1. The role and effectiveness of teachers in providing written feedback

In EFL instruction and learning, teacher-written feedback contributes to enhancing the ability of students to write. Deciding whether feedback is effective depends on the quality of teacher-student interaction. Its impact on writing development is related to the nature of this interaction. As stated by Hattie and Timperley (2007), feedback is a powerful tool that, if used well, can contribute significantly to the learning achievements of students. Tsui (1996) opines that teacher-written feedback facilitates the provision of a platform for conversation in which students are involved in dealing with the feedback, leading to more effective

learning outcomes. Because WCF is tailored, it is better at addressing students' unique learning needs. Tailored feedback speaks to the unique student's areas of need, so the feedback is more meaningful and relevant to them. Not only does this approach tell students what they did wrong, but it also tells them what they can do differently next time. Personalized WCF encourages a more active teacher-student relationship, with students being more likely to act on the feedback since it is targeted at their individual problems and goals. As Shute (2008) argues, personalized feedback enhances learning and motivation because it becomes more student-centered and contextual. The efficacy of WCF is among the significant research domains of SLA. Feedback is an important contributing factor to students' writing competence. Researchers highlight that no matter whether the feedback is direct or indirect, focused or unfocused, feedback is significant in the construction of students' writing competence. Based on studies of the role which WCF plays in students' writing abilities in the context of EFL, Ferris (2003) confirmed that EFL students who are provided with clear and direct explicit teacher-written feedback are likely to show distinct changes in language correctness and writing proficiently. This concurs with the fact noted by Hattie and Timperley (2007) who argue that feedback is one of the primary facilitators of learning and it allows learners to see how they can work on weaknesses and build on strengths.

Similarly, Aghajanloo, Mobini, and Khosravi (2016) examined the effect of four kinds of written corrective feedback (focused direct, unfocused direct, focused indirect, and unfocused indirect feedback) on Iranian English learners at the intermediate level. In the study, 120 participants, who demonstrated an intermediate level of English as indicated by the Nelson English Language Test, were selected. The results of the study supported that overall, the impact of different types of feedback on students' written language skill was varied. Specifically, the results indicated that explicit corrective feedback was more efficacious for correcting students' errors and improving language accuracy. On the contrary, indirect feedback inhibited students' ability to identify their mistakes and as a result inhibited their learning processes more than originally anticipated. The study revealed that WCF produced different learning outcomes in terms of its nature and that pedagogical practices needed more research in terms of how students benefited from feedback. Additionally, the participants were assigned randomly into four groups of 30 and

were provided with one of the four kinds of feedback. The pre-test and post-test data were collected in that students had to perform writing tasks to see their performance before the feedback and after the feedback. According to the findings, all groups of students improved, which confirmed WCF as an effective approach in EFL classrooms, particularly in terms of writing fluency and grammatical accuracy, in facilitating change to writing performance. In addition, students' feedback attitudes were obtained through questionnaires. Based on the findings, students preferred direct and clear feedback, where they could readily comprehend and correct their errors. These findings support how teacher-provided WCF affects student writing development, as they align with the overall findings on the pivotal role of feedback in second language acquisition.

Ekanayaka and Ellis (2020) analyzed the effect of having students rewrite their writing after WCF. Participants were 91 students from three intact Sri Lankan classes, who produced three problem-solution pieces of writing over a period of four weeks. The students were randomly assigned to two experimental groups and one control group. One of the experimental groups revised their writing, half maintaining their corrections when they worked on a new task and half without the corrections being available. The second experimental group discussed the feedback in pairs but did not revise. The study aimed to examine the effect of these two types of feedback on the accuracy of the students' writing. The study used a quasi-experimental research design with pre-test, treatment, immediate post-test, and delayed post-test. The measures were obtained through three writing assignments, and participants received either focused indirect WCF, unfocused indirect WCF, or no feedback (control). The results showed that the focused and unfocused indirect WCF groups both outperformed the control group on accuracy at the immediate post-test, and the improvement was maintained in the delayed post-test. The findings showed that while the students did not fully perceive and recognize the target structure with metalinguistic awareness after one WCF episode, the indirect WCF served as a reminder to the students to improve the overall accuracy in subsequent writings.

2. Perception of students and teachers on written feedback

Identifying the conceptions of students' and teachers' on WCF is critical to its role within L2 teaching of writing. Analyses of studies examining students' attitudes and preferences toward WCF raised questions about both its effectiveness and how

students responded to it. Samuel and Akther (2021) conducted a quantitative survey among 1000 secondary school students (500 males and 500 females) of Pakistan, using two-stage cluster stratified random sampling from 60 schools. Teachers' WCF was found to be perceived by the students to assist them in identifying errors and improving their writing skill in English. The overwhelming majority of the students, however, preferred to receive hints regarding their errors rather than feedback directly, indicating that what students think and feel must be taken into consideration to maximize WCF usability. Saragih et al. (2021) similarly researched 387 undergraduate students from two universities in Yogyakarta, Indonesia. They discovered that students generally had positive perceptions of WCF, especially valuing it as a means of improving their writing and linguistic skills. Students had still favorable attitude toward direct feedback compared to other forms WCF. This method was followed by restructuring, metacognitive feedback and indirect feedback, respectively. These findings indicated that making feedback methods student-preference-oriented was a major factor in attaining the highest degree of development in EFL contexts. Related literature showed that WCF not only promoted language correctness, but significantly increased students' motivation and confidence level. According to a study by Danali et al. (2024), the perceptions of 61 Sintuwu Maroso University English learning students were explored. As a result of the study, it was found that the majority of the participants reported that not only did the feedback explain their written errors and provide methods for correction, but it also improved their confidence levels when writing. More specifically, the students who were provided with focused or unfocused direct feedback experienced increased confidence regarding their writing capabilities. Similarly, Rasool et al. 's (2024) study of Pakistani, Indian, Indonesian, and Moroccan international students studying in a multinational Chinese university also determined that 76.9% of the respondents felt more writing competent after they received written corrective feedback. Apart from that, 73.6% of the subjects stated that written corrective feedback really improved their writing skills, and 75.8% stated that it contributed to their overall improvement of writing skills. These findings confirmed that WCF not only improves writing accuracy, but also greatly improves students' motivation and self-confidence in academic writing tasks. Likewise, a study conducted by Al Kharusi and Al-Mekhlafi (2019) examined Oman-based teachers of English and involved supervisory practitioners concerning their perception of written corrective feedback.

In findings of a questionnaire administered among 156 teachers and 62 teaching supervisors, supervisors and teachers acknowledged WCF as an enormously important corrective strategy in reference to correcting writing flaws. The majority of the instructors used unfocused, indirect and coded feedback mechanisms, especially to correct grammatical errors, and work with the single-draft model. It was revealed from the study that supervisors and teachers were not divergent in assuming the efficacy of written corrective feedback. In addition, the supervisors and the instructors confirmed the role of WCF in solving writing mistakes as critical and concurred with the same opinion that the process was a non-negotiable means of enhancing writing skills. The findings of the study were also in line with those findings of Purnomo, Basthomi, and Prayogo (2021)'s research as well. In subsequent studies, it was found that teachers were positive towards WCF and that they found the method extremely helpful in improving students' writing ability. However, there were some challenges that teachers faced while providing written corrective feedback. Aspects like the number of students being large, lack of time to offer individual feedback, and the feedback not being critically assessed by the students were some of the key challenges that were encountered by the teachers while using this process. Despite this, it was observed that the teachers believed feedback was a useful tool for learning and continued to use different strategies in order to enhance the writing abilities of the students. Mulati, D. F., Nurkamto, J., and Drajati, N. A. (2020) explored EFL writing teachers' beliefs regarding WCF and its impact on student writing. The study determined the range of teachers' beliefs regarding the explicitness and amount of WCF provided. The two teachers agreed that their pedagogical education, from secondary school to university level, influenced their beliefs in providing feedback. Moreover, daily practical classroom teaching experience was also graded as an initial variable influencing their writing pedagogy style. This aligns with Lee (2003) and the point that although they spend considerable time grading students' writing, the teachers are not always certain if what they do is moving towards the tangible difference in the written work of the students. Diverse teacher belief and situated adversity are typically the indicators of teachers' reactions in providing feedback to the EFL class.

3. Teachers' challenges in providing written feedback

This section presents common challenges that teachers face while providing

WCF in EFL context. These include practical issues such as time constraints and large class sizes, as well as more subjective problems like inconsistency and the influence of personal beliefs. Addressing these difficulties is essential to understand the limitations of WCF to support student writing development more effectively.

a. Time constraints and large class sizes

Teachers are typically handicapped by time constraints and class size when providing individualized and meaningful WCF to all students. Therefore, time constraints and large class sizes create huge issues for teachers and overwhelm the process of providing feedback. This may lead to a tendency to provide feedback that is primarily corrective in nature and focuses on error rather than a deeper level of language use understanding (Leki, 1990). In a similar vein, Bitchener and Knoch (2009) explains that big classes compromise the quality of feedback with the consideration of the fact that feedback must be quick as well as effective, thus leading to less effective learning outcomes. To validate this argument, Gul, Tharani, Lakhani, Rizvi, and Ali (2021) studied the issues encountered by teachers in providing WCF in the EFL environment. Online survey data collection technique was employed in this research where teachers were asked about their experience and challenges while providing effective feedback. The findings identified that 78% of educators had not sufficient time to review their written feedback with pupils, which presented a critical problem imposed by time constraints that was hindering the feedback process. This supports the findings of several studies (Diab, 2005; Hamouda, 2011; Annury, Ma'mun, and Sutrisno, 2023; Nemati, Alavi, Mohebbi, and Masjedlou, 2017; Grimes and Warschauer, 2010), which indicated that concern over time pressure was one of the critical factors influencing teachers to provide WCF. A study by Alkhalaf and Alhojailan (2025) conducted an interview with 6 EFL teachers to examine what determined the approaches of the teachers in providing WCF. Based on the outcome of the interview, the limiting factors that affect teachers' capacity for giving effective feedback were time constraints and large class sizes. The outcomes highlighted that teachers struggled to customize feedback according to the individual needs of students. Similarly, Ouahidi (2021) highlighted the challenges that teachers encountered by investigating the challenge of large class sizes in Moroccan EFL environment. The outcomes stated that the biggest challenges that the teachers faced was the time constraint and enormous number of the students in a class to give

personalized WCF. Eight EFL teachers participated in the interviews in Moroccan higher education institution. The outcomes stated that time constraints and the lack of ability to leave detailed comments were significant barriers in giving effective written feedback. Therefore, it hindered the capability of the feedback due to the fact that it was concise and generic. In accordance with previous findings, Jamoom (2016) and Al-Bakri (2016) investigated different EFL contexts with the emphasis of the teachers' beliefs and practices in giving written feedback. According to the interviews, the most frequent challenges to teachers in carrying out their ideal practice of providing feedback were largely due to time constraints, workload and large classes.

b. Subjectivity and inconsistency

Teacher subjectivity significantly affects the kind of feedback offered to students, especially in EFL settings. Their personal belief systems tend to influence their assessment, and therefore the feedback given to students, leading to mismatches between their self-reported beliefs and actual feedback given. This was also supported by Şakrak-Ekin and Balçıkanlı's (2019) study, where they analyzed the instructor' beliefs and their actual practices on written feedback in the Turkish EFL context. As part of the data gathering process, 175 writing exercises, which were corrected by 5 volunteer teachers, were randomly selected by targeting language forms, vocabulary, content, and mechanics areas. The researchers further had a face-to-face interview with the same teachers. Based on the outcomes of the interview, the research concluded that many teachers felt WCF is critical and useful in order to meet the students' needs. On the other hand, the comparative analysis emphasized that teachers' belief contrasted with their actions due to reasons like limitation of the time and students' lower proficiency levels. These findings drew attention to the possible role of teacher subjectivity in written feedback practices in EFL settings. In the similar way, Alharbi (2021) examined the opinions of EFL students in Qassim University, Saudi Arabia. 5 teachers were interviewed with respect to the context of written corrective feedback. Although teachers reported written feedback as the most important procedure for students with respect to acquiring writing skills, beliefs didn't match practice due to the reason that they primarily focused upon the feedback regarding the grammatical structures, excluding content and organization. Their subjective beliefs with respect to the feedback by taking precedence of grammar

errors over others in writing could make the effectiveness of the process of feedback diminished.

Iqurashi (2022) explored the consistency among ESP writing instructors' beliefs and practices in relation to WCF within the preparatory year at Umm Al-Qura University, Saudi Arabia. Data was collected from four instructors and 40 students, using classroom observation, semi-structured interviews, and document analysis of students' essays. The study indicated that there was an inconsistency between the teachers' belief and practice concerning feedback, more specifically on direct versus indirect feedback and positive versus negative feedback although teachers believed they primarily provided direct and positive feedback, observations revealed that their actual feedback was more often indirect and negative. This discrepancy was especially noticeable in how they approached the use of different feedback types. This contradiction uncovered that there was a disparity between what they were supposed to do in terms of feedback and what they practiced in the classroom. Mao and Crosthwaite (2019), in a case study conducted in the context of Chinese EFL, also explored the contradiction between what teachers believed and what they actually practiced when providing written feedback, and reported similar findings. Five instructors were interviewed and surveyed who gave written feedback on 100 students' essays. Through pointing out the possible impact of teacher subjectivity and inconsistency on students' writing development and the feedback process of writing, this study examined a mismatch between teachers' practices, views, and beliefs. Beyond what was statistically observed, teachers' practice tended to be indirect and negative even when giving more direct and positive feedback. These studies led to the exploration of other technological tools as a response to the difficulty that teachers encounter, as well as in coping with subjectivity and inconsistency in feedback practice.

C. AI Writing Assistants in EFL Writing

This section examines the use of AI-WAs in EFL contexts, focusing on their role in providing automated feedback, their effectiveness in improving writing accuracy, and perceptions held by both students and teachers. It also discusses the limitations and potential challenges of relying on such tools in language learning environments.

1. The role and effectiveness of AI writing tools for written feedback

Over the past several years, the teaching of EFL writing changed drastically as technology advanced in educational contexts, resulting in change in many aspects of written feedback, and thus, in many aspects of feedback provision. As a result of technology being introduced into the feedback for writing process, many previous traditional approaches to feedback were complemented or supplanted by new components, including AI-WAs. The technological development significantly enhanced the timeliness and accessibility of feedback.

There has been a general shift to a more formative approach to feedback on the development of writing ability and in the learner experience of EFL participants. Given the positive impact of feedback on learner outcomes (Brookhart, 2016), there has been a recent focus on how AI-WAs have facilitated EFL (Houghton et al., 2022, Karpova, 2020). The findings of these studies were that AI-powered written feedback that not only improved students' accuracy in written texts, but also positively improved their motivation and self-efficacy, resulting in long-term improvement for the language acquisition process (Karpova, 2020). Within this context, Write & Improve, a computer-assisted writing tool developed by Cambridge University Press & Assessment (2023), was employed heavily in stimulating writing skill development for EFL learners. In a Taskiran et al. (2024) research, the effects of Write & Improve on Anadolu University Open Education Faculty students' writing skills in the Turkish EFL context were examined. During the research, the AI tool continuously provided feedback on the students' writing tasks and helped them improve their writings. Based on statistical analysis of post-test and pre-test scores, it was found out that the Write & Improve provided significant improvement in the writing skills of the students. In addition, the interviews with the participants revealed that AI-WAs increased motivation, provided immediate and accurate feedback. Similarly, a comparative study by Nugroho and Benecia (2022) evaluated the effectiveness of AI-WAs against teacher-written feedback. Two groups of students from Bunda Mulia University's English Department were chosen in the study and an experimental approach was used. The control group was given traditional teacher-written feedback, while the experimental group was provided with feedback through Grammarly. This was on the grammar, spelling rules, punctuation, capitalization, and vocabulary. According to the difference in the post-test and pre-

test scores, it was evident that the experimental group that received feedback using Grammarly demonstrated improved writing performance. There was a statistically significant increase in the performances of students who received AI-written feedback, especially in grammar and vocabulary. Recent research examined the influence of AI-WAs in developing writing abilities and other variables like motivation, self-efficacy, self-regulation, and writing anxiety. In this regard, El-Garawany (2024) examined the influence of an AI-WA named QuillBot on writing performance, writing anxiety, and self-efficacy of EFL students. The study with 18 fourth-grade students began by administration of the Writing Performance Test (WPT), Writing Anxiety Scale (WAS), and Writing Self-efficacy Scale (WSES). The students subsequently engaged in 6 weeks of collaborative writing with AI-supported feedback through QuillBot. The students revised and improved their drafts during the feedback process. Finally, at the end of the research, the same tests were taken again to check the differences among the students' writing ability, anxiety and self-efficacy. The results indicated that there was a noteworthy improvement in the students' writing performance and enhanced self-efficacy and a stronger sense of confidence. Wang (2024), conducted a study with three groups of EFL learners, to examine the comparative impact of explicit feedback, either through a teacher or an AI-WA (Poe), or no feedback on writing ability fluency and accuracy and reductions in anxiety toward writing. The results showed previously established benefits of AI-WAs, as a satisfactory performance was found in the students' writing performance with AI-powered written feedback, as compared to the teacher-written feedback. The study indicated the benefits of using AI-WAs as a resource that can create a stress-free and supporting learning environment.

Based on these results, it can be concluded that significant benefits were acquired using AI-WAs such as Write and Improve, Poe, ChatGPT and Grammarly not only for enhancing students' writing but also a beneficial effect on aspects such as motivation, anxiety, self-efficacy, contributing to students' self-regulated learning, and metacognitive awareness.

2. Grammarly: features and application in EFL writing

Grammarly is an AI-WA that supports learners for the purpose of developing the accuracy of writing through real-time corrective feedback (Grammarly, 2009). Grammarly checks for grammar, spelling, punctuation, and vocabulary, and can

provide instantaneous feedback to help students improve their writing. As a quickly developing tool for EFL classes, it provides direct suggestions so that students can correct errors themselves, promoting self-proofreading and writing fluency. Grammarly is useful as a means of simplifying grammar rules, clarifying writing and overall enhancing text quality. It is especially useful for students who need to receive instant and accurate feedback for grammatical, spelling, and stylistic errors (Ngoc-Ha, 2024). Parra and Calero (2019) examined the effectiveness of Grammarly in improving grammar accuracy in the sample of Ecuadorian undergraduate students. This research aimed to see if Grammarly's AI-written feedback helped the students reduce grammar issues and enhance their writing ability. The sample included Ecuadorian university students learning EFL, and variation in the students' proficiencies in the target language allowed measurement of various degrees of influence Grammarly had on participants. This research used a pre- and post-test design in which the students completed writing assignments without assistance from an AI-WA, and then those students who were informed about Grammarly began to incorporate the corrections into their writing. After the completion of this study process, the students completed a writing assignment again with Grammarly in the same amount of time. The results indicated that there was an outstanding level of accuracy improvement in the students' writings with Grammarly. The researchers concluded the students who used Grammarly in their writing produced far fewer grammatical errors on their post-test compared to their original writing drafts. To this extent, the findings suggested that Grammarly is a valuable resource for EFL students, giving instant feedback and grammar-based instructions (Parra and Calero, 2019). In the same vein, Guo, Feng, and Hua (2022) investigated the impact of Automatic Written Corrective Feedback (AWCF) through Grammarly, on accuracy in academic research writing. The research was conducted using Chinese university EFL students, and sought to evaluate the effectiveness of AI-WAs in generating texts that were particularly suitable for academic writing purposes. While conducting the study the students composed their drafts with no help from any AI. An intervention procedure was then carried out through Grammarly, with a procedure whereby the students would then revise their draft based on the feedback from the tool. With the study, the researchers would be able to measure the level of reduction in number of errors that the students could make, based on predetermined aspects identified by Grammarly. A comparison of pre-test and post-test scores, it was proposed that the

students that received feedback from Grammarly reduced their spelling errors by a considerable margin. The data indicated that the students corrected 85% of the errors flagged by Grammarly, thus confirming the benefits of AI-powered written feedback for improving academic writing accuracy (Guo, Feng and Hua, 2022). In conclusion, the findings indicated that Grammarly diminished grammatical errors and assisted the students to self-monitor and reflect on their writing, purposefully. The provision of AI-written feedback provided the students with the opportunity to identify their mistakes more immediately and to revise them immediately. For these reasons, Grammarly has an important role to play in language learning, having the capacity to improve writing accuracy and promote learner independence in writing. Ofrita, Darmis, and Rosmanizar (2023) examined how effectively Grammarly worked as an AI-WA to enhance EFL students' writing skills. This study included a sample of 74 high school-level students. The students were separated into two groups, the experimental group received feedback via Grammarly and the control group only received teacher-written feedback. The data was collected through a quasi-experimental design using a pre-test and post-test. The results indicated a statistically significant difference in the level of writing accuracy of the students in the experimental group who presented significantly higher post-test scores for grammar and spelling than the control group (Ofrita et al, 2023). Thus, these results indicated that Grammarly was an effective source of feedback in improving students' grammatical accuracy and writing competence.

3. Students' and teachers' perceptions

In investigating the impact of AI-WAs on EFL instruction, learners' insights need to be taken into account. Perceptions of learners concerning the effectiveness, usability, and general experience of AI-powered written feedback provides valuable data on the impact of the technology on learning. Recent studies have focused on students' perspectives toward AI-WAs, particularly to enhance writing accuracy, error reduction, and feedback at an appropriate time based on students' needs. These research revealed strengths of AI technology from students' perspectives (Hakiki, 2021; O'Neill and Russell, 2019; Yıldız and Kuru Gönen, 2024), also supported the argument noted by Teng (2024) by highlighting technology feedback needs alignment with learners to be maximally effective.

O'Neill and Russell (2019) intended to examine university students'

perceptions of the automated grammar feedback system, Grammarly, with their goal being to explore its ease of use, effectiveness, and how it influenced the students writing such as grammar and vocabulary. The study research participants were university students from a range of fields, and the intended research methods framed the students as two groups, as Grammarly users and non-users. The realm of the study research setting was a university environment where the students needed to complete assignments where they received feedback from Grammarly embedded in the writing process. The findings indicated that the students who used Grammarly had more positive attitudes with 9 of the 15 survey items as they were satisfied with the grammar suggestions. In addition, the students indicated they were happier with the feedback in taking care of the clarity and the instant correction, which helped the students improve their writing accuracy. These findings indicated that Grammarly was a helpful resource for grammar support in improving writing. Similarly, Hakiki (2021) revealed the students' perceptions as positive about Grammarly in receiving immediate feedback to correct themselves and the privilege to improve accuracy of writing. The students' attitudes in favor of AI-WAs were also uncovered by Yıldız and Kuru Gönen (2024) where both respondents viewed the speediness and tailored nature of feedback positively. However, possible limitations of such tools were investigated by Teng (2025) who conducted a study on the experiences and views of EFL students using ChatGPT. While positive effects on motivation to write, self-efficacy, and motivation were observed, there were also concerns about overdependence on the tool as well as its inability to encourage critical thinking.

It is also necessary to be aware of teachers' attitudes towards AI-powered written feedback tools, in addition to student attitudes, for such tools to be properly used in classrooms. Student attitudes are more about how such tools influence the learning outcomes directly, while teacher attitudes determine the integration, and the final success of such a technology in classrooms. Ghafouri, Hassaskhah, and Mahdavi-Zafarghandi (2024) described this by exploring the impact of ChatGPT on a three-phase writing instruction protocol (CGWIP) among 12 Iranian EFL teachers. Findings indicated that ChatGPT improved the teachers' self-efficacy by facilitating activities like brainstorming, revision, and provision of feedback, which made the attitude toward its use positive. The teachers valued the capacity of the tool to lighten their workload so that they could concentrate on more strategic teaching practices.

These results highlighted that teachers' awareness and satisfaction of their beliefs are key to empowering teachers, effective use of AI-WAs, and realizing their full potential to improve teaching and learning processes. Merkviladze (2024) also surveyed the attitudes of EFL and academic writing teachers in Georgia toward AI-WAs such as Grammarly, ProWritingAid, QuillBot, and the Hemingway App. The study reported that the teachers perceived these technologies in a positive manner, appreciating how they provided timely, individualized, and precise feedback to students. They also described how the tools enhanced the instructors' literacy with feedback to enable them to tackle higher-level writing concerns like content, organization, and critical thinking and leave lower-level concerns like grammar and spelling to the default routines. The instructors mentioned the time-saving benefit and how the AI-WAs enabled less efficient, focused feedback, leading to increased student motivation and writing engagement. Other instructors also pointed to the problem of overreliance on the AI-WAs and how they could detract from students' ability to develop good critical self-editing skills.

These results showed that teachers' awareness of their beliefs and satisfaction made them more resilient and enabled them to reveal their potential to the fullest to improve teaching and learning procedures. Research conducted to investigate how the use of AI-powered written feedback tools was measured in educational settings showed that teachers' attitudes towards such technologies were positive. Along these lines, a study by Merkviladze (2024) examined Georgian EFL teachers' and academic writing teachers' perceptions of Grammarly, ProWritingAid, QuillBot, and Hemingway App. According to the study's findings, the teachers and the instructors hold a positive perception of these technologies and view these tools to be useful, given that they provided students with timely and personalized feedback. Teachers attest that the computerized feedback provided by such programs provides them with the opportunity to focus on more advanced writing skills such as content development, writing organization, and critical thinking, and therefore they can entrust lower-level writing mistakes such as grammar, spelling, and punctuation to artificial intelligence programs. Therefore, it becomes possible to analyze students' writing skills in greater depth and specialize in innovative thinking. Educators also drew attention to the fact that most likely the best advantage of such tools lies in the saving of time. Due to AI-powered written feedback systems, teachers' feedback

processes are streamlined, and it is easy to provide more targeted feedback. Therefore, students' motivation was observed to increase, and they made greater contributions towards writing. However, other the instructors affirmed that excessive application of these aids negatively affects students' self-regulation skills. As part of the research, there were certain instructors concerned that the students who were too dependent on these software tools, would not be able to sufficiently enhance their own writing assessment, revision, and development skills. The results showed that the teachers viewed feedback software as a tool to improve pedagogical practices as well as acknowledging that fact that such technologies should be approached with caution due to its potential challenges.

4. Challenges and limitations of AI writing assistants

The application of artificial intelligence in learning settings has revolutionized language acquisition, particularly for EFL writing. AI-WAs provide instant feedback, detect grammatical and vocabulary errors with alternative sentences. These tools significantly enhance the ability of students at the mechanical level, with instant correction and suggestions enhancing linguistic accuracy. The ease and velocity of AI-written feedback make it an attractive tool for language students who require instant support on grammar, spelling, and word selection, particularly. Though these advantages have made AI-WAs invaluable teaching tools in the classroom because of the reliability and overdependence issues requiring further study. Mun (2024) reported that while students had enjoyed the suggestions of AI, there were some of the participants who lodged complaints about over-reliance on the software. Instead of engaging actively in the revision process, some of the students passively depended on AI-WAs without critically considering suggested revisions. This practice was problematic in the context of mental effort and learning retention since excessive reliance on AI might deter students from practicing independent writing skill and grammaticality through self-editing. Similarly, Apriani et al. (2024) found that the writing ability, self-efficacy, and motivation of EFL students were improved by AI-WAs, but qualitative evidence suggested that excessive dependence was a problem. Among the students, there were those who relied excessively on AI-WAs, raising doubts about whether they would be able to manage their learning on their own and apply writing strategies independently. These findings underscored the need for pedagogical interventions that encourage students

to apply AI-WAs as support and not substitute resources for writing development.

In addition to the issue of overreliance, concerns have also been raised regarding the reliability of AI-WAs for assessing higher-order writing capabilities. In an experiment conducted by Abu Qub'a et al. (2024), the effectiveness of Grammarly in content assessment in academic writing procedures was tested and it was discovered that although this tool was effective in detecting grammatical and lexical mistakes, it was not sufficient to effectively assess elements such as content, coherence, and logical structure. These findings showed that AI-WAs can optimize mechanical correctness but are yet to advance to the level of evaluating content and organization of the writing. While AI-WAs can identify and suggest revision of lower-order issues like grammar, vocabulary with acceptable consistency and efficiency, it cannot progress students through the complexities of writing like paragraph organization and content which involves some level of human judgment; therefore, teachers' facilitation of students' writing is needed. Given these limitations and complementary role of AI-WAs, a combined use of teacher-written feedback and AI-WAs appears to be a reasonable and effective approach to improve the writing skills of EFL students. Such an approach may provide students with an opportunity to benefit from the efficiency of AI-WAs in determining lower-order issues while retaining teacher-written feedback for improving higher-order writing abilities.

D. Combining AI-powered Writing Assistants and Teacher-written Feedback in EFL Writing

Despite the growing interest in AI-WAs and teacher-written feedback in EFL writing instruction, not much research has systematically examined the effectiveness of the way their integration can optimize writing development. AI-WAs like Grammarly and ChatGPT offer instant and consistent feedback on lower-order concerns (LOCs) like grammar, spelling, and mechanics. However, these tools are often criticized for their inability to handle higher-order issues (HOCs) such as content creation, coherence, organization, and critical thinking (Ghufron, 2019; Ayan and Erdemir, 2023). Meanwhile, teacher-written feedback, while more comprehensive and capable of guiding students through complex writing processes, are often constrained by workload, time, and class size (Chen et al., 2016; Suerni et al., 2020). Thus, a compensatory approach that makes use of the advantage of both

teacher-written and AI-powered written feedback may complement one another in rendering the efficacy of writing in EFL context.

According to the findings of Liu et al. (2023) AI-written feedback is insufficient to boost higher-level cognitive engagement and must be supported by pedagogical methods. Similarly, Etaat (2024) examined the impact of AI-assistant writing tools on writing mechanics and task fulfillment in an Iranian university setting. The study included 85 EFL undergraduate students and found that while AI significantly promoted the deployment of vocabulary and grammar, its influence was low on organizational issues and overall task completion. The finding suggested that teacher intervention is still indispensable in higher-order writing development, therefore in favor of the need for an integrated approach where AI-WAs focus on LOCs and teachers provide rich instruction on HOCs (Nang Kham Thi and Nikolov, 2021). In mixed-methods research on Indonesian university students' use of Grammarly in EFL writing, Ghufroon (2019) explored the application of Indonesian students. The findings showed that students gained from Grammarly's mechanical and grammatical corrective feedback but required the teacher-written feedback to improve essays' logical coherence and content quality. Ayan and Erdemir (2023) also corroborated these findings within a Turkish university context, in which they reported that teachers viewed Grammarly as an effective tool to remedy LOCs, but insufficient to teach students rhetorical and discourse-level issues. These studies underscored the importance of combining AI-powered written feedback with the teacher-written feedback to best utilize the potential of both types. In line with this, Suerni et al. (2020) conducted a study in a Malaysian university and found that students enjoyed explicit and straightforward feedback, as is the case with AI-WAs. However, the students also enjoyed teacher' explanations and contextualized comments, something that AI-WAs cannot yet offer. This trend reflects the potential for a combination model of feedback where AI-WAs assist in reducing teachers' workload by executing LOCs to enhance students' writing.

While the combination of AI-WAs and teacher-written feedback provides various advantages, careful consideration must be given to ensure maximum utilization of their deployment. Nang Kham Thi and Nikolov (2021) claimed that rather than applying AI-WAs as a substitute for copious feedback, teachers should systematically integrate them into instruction. Otherwise, students would become

overly dependent on AI-written feedback at the expense of building self-editing and critical thinking skills. Therefore, for maximum learning gains, AI-written feedback must be situated as a secondary mechanism within an overall pedagogical paradigm valuing teacher instruction and reflective student engagement. Thus, AI-WAs and teacher-written feedback has become two important tools that supplement but are distinct from each other in EFL teaching. AI-WAs provide convenience and rapidity of correction of surface language mistakes (LOCs), while teacher-written feedback enables students' deep learning and maturity in academic writing tasks through development of higher-order writing competencies (HOCs). Therefore, the use of both types of feedback together and in an equitable manner is essential to achieve the highest possible efficiency in writing pedagogy. Instead of considering them as two distinct factors, combining the two systems produces a more integrative system of writing instruction. Along these lines, this study attempted to make an addition to literature in this field by analyzing if the concurrent implementation of teacher-written feedback and AI-written feedback on improving the writing skill of EFL students has more favorable results than implementing any of the strategies separately.

III. METHODOLOGY

This section presents the methodological framework of the study, including the participants, data collection and procedure. It aims to ensure transparency, replicability, and validity by outlining each step clearly and justifying key methodological choices in relation to the research questions.

A. Participants

This research was carried out in an English preparatory school of a foundation university in İstanbul, Türkiye. There were two classes of A2 level EFL students participating in the study. To make the current language level of the students homogeneous in the participant determination process, the scores of the placement exam administered within the framework of the university's preparatory program were considered. Through this exam, the students' language levels were determined, and the students were ensured to be placed in suitable groups. Thus, it was ensured that all the students participating in the study were at A2 level. The participants were chosen by using the purposive sampling technique. The main reason behind the selection of the technique was to make sure that a specific group of students was examined in detail in accordance with the study purpose. To this end, it was intended that the sample group was well-structured to be able to contribute to the reliability of the findings of the study. In this matter, a total of fifty students participated in the study. To analyze the effects of the gender factor on the development of writing skills deeply, the participants were divided into two groups in equal numbers. There were twenty-five male and twenty-five female students in the study for more comparable results in case there were any gender differences in writing capacity.

B. Instrumentation

The instruments used in the present study were carefully designed to comprehensively assess the writing development of A2-level EFL students. The instrument employed enabled both systematic and objective evaluation of the

students' written production throughout the research process. Unlike a traditional pre-test, this research used the students' writing scores from the previous academic track as the baseline (pre-test) data. During that earlier track, the students wrote three opinion paragraphs and received only the teacher-written feedback, based on a rubric identical to the one used in this study. These earlier scores provided a valid and a consistent foundation for comparison. The rubric evaluated four key aspects of writing: content, organization, grammatical accuracy, and vocabulary use.

After the process of the study was completed, a post-test was administered to assess whether the students' writing skills improved. For this test, the students again wrote opinion paragraphs which were examined under the same circumstances as in the pre-test by using the same rubric for the evaluation. The pre-test and post-test results were compared, and the impact of the integration of using Grammarly and the teachers' feedback on the students' writing performance was assessed in detail.

A standardized scoring rubric (Appendix A) previously developed and used at the preparatory school was employed in this study to ensure the objectivity in the evaluation process and consistency in the analysis of the students' writings. The rubric evaluated the students' written texts in four basic dimensions. The first dimension, content, discussed the level of clarity and coherence of the arguments presented by the student. The second dimension, organization, examined the logical flow of the text, how ideas were organized, and the use of transitional expressions within the text. The third dimension, grammatical accuracy, included features such as the sentence structure of the student, use of tense, grammatical compliance, and spelling errors. The final dimension, word use, assessed the student's lexical variety, academic language, and the degree to which they favor words that were contextually appropriate. Each category was rated on a scale of 1 to 5, and the students' writing ability development process was described according to these ratings.

The highest mark, "5", was an indication that the student had almost no syntactic or grammatical errors and employed advanced forms of sentences as and when needed. Contrary to this, the lowest rating, "1", was an indicator that the student committed major grammatical errors and that sentence structures were incomplete. The scale showed the students' grammatical level and directed them towards improving their areas of weaknesses. The vocabulary category measured the student's vocabulary as well as whether he/she knew how to employ words in

situations appropriately. The students who used diverse and appropriate vocabulary were given the highest mark, and the lowest mark was given in instances where expression was greatly impaired because of a poor vocabulary use. This assessed the competence of the students in choosing words and showed how their vocabulary varies in the process of development. For this purpose, the content element analyzed the adequacy of the ideas covered by the students, their relevance to the topic, and their ability to defend their arguments. The highest mark was given to texts that address the topic holistically and had well-supported arguments, and the lowest mark was given to texts that were irrelevant, inadequate, or devoid of supportive elements. This kind of rubric not only tests students' familiarity with grammar and vocabulary, but also their ability to generate ideas and synthesize the text into a coherent whole. The organization component examined the structural coherence of the text, whether the ideas were well ordered in a logical manner, and how effectively the transitional phrases were utilized. The top-scoring compositions were those with a good and logical introduction, body, and conclusion, and those that had a good cohesion between paragraphs. The lowest-scoring compositions were those with an organization that comprises isolated, distinct ideas and were possibly difficult to follow for the reader. This category evaluated the way the students planned their writing process and how well they achieved writing fluency. This rubric provided an overall evaluation of the students' writing ability and identified areas where they were weak and strong. It provided a methodical measurement to track the students' developmental processes. It also allowed the teachers to have feedback sessions and apprised the students clearly about where they had to enhance their abilities. Furthermore, it emphasized that writing was not just about grammar and vocabulary, but also the production of content and the structure of the text. The students were thereby supported in developing more conscious and structured writing practices.

C. Instructional Intervention

The study was conducted over a period of eight weeks. The students were required to write three different opinion paragraphs to improve their writing skills. During this writing exercise, they were divided into different groups, each of which was exposed to a different type of feedback. One group received written feedback only from the teacher, while the other group experienced their writing exercises with

both the teacher and Grammarly (AI-WA).

1. Combination feedback group

The students were engaged in writing practices receiving feedback from both the teachers and Grammarly. The feedback was structured in accordance with the different stages of writing. In week one, the students were introduced to the Grammarly platform that provided them with information about what the software included in addition to feedback on various categories while suggesting its use in writing instruction. The students began with initial drafts for the first opinion writing about the topic "Benefits of Online Education" with no feedback. In week two, the students received feedback from Grammarly focusing on accuracy and vocabulary along with some revisions, based on using the Grammarly feedback. In week three, the students received the teacher-written feedback to their revised drafts addressing content and organization. The students submitted their final drafts after following the teacher's suggestions. In week four, the students wrote the second opinion paragraphs with no preliminary feedback titled "The Impact of Social Media on Society.", then Grammarly provided feedback to them to revise their writing, again focusing on their accuracy and vocabulary. In week five, students received feedback from the teacher; revised and submitted. In week six, the students started writing the third opinion paragraphs titled "The Importance of Physical Exercise," similar to previously written tasks. The students wrote the first drafts of the third opinion paragraph independently and they received feedback from Grammarly on accuracy and vocabulary, then revised accordingly. In week seven, the students received the teacher-written feedback again focusing on content and organization. They then revised their paragraphs and submitted the final drafts. In the final week, the students participated in a post-test (opinion paragraph) following the same conditions of the pre-test. The last measure was to assess the overall writing skills. The data collected from the process provided an opportunity to investigate their engagement with both types of feedback while providing measured frameworks for determining the effectiveness of combining teacher -written feedback and AIWATs in EFL writing instruction.

2. Teacher-only feedback group

The students participated in a writing program during the same timeframe,

but they received feedback only from the teachers. The design of the study allowed for a concentrated investigation into the effects of teacher-only feedback on students' writing performance in EFL context. In Week 1, the participants wrote their first opinion paragraphs "Benefits of Online Education" independently without receiving any feedback. This initial entry represented the current level of the students' writing ability. In Week 2, the students received the teacher-written feedback based on the dimensions of content, organization, accuracy, and vocabulary. They then revised their drafts based on the feedback and submitted another draft. In Week 3, the teachers read the revised drafts and provided additional feedback which was more specific. After this final revision, the students submitted their final drafts of their first opinion paragraphs. In Week 4, the students were assigned to write their second opinion paragraphs "The Impact of Social Media on Society." The students wrote the second opinion paragraphs without feedback as these initial drafts would be submitted. In Week 5, after the second drafts had been submitted, the teacher-written feedback was given again, and the students were asked to revise and resubmit their drafts, and they were provided with the possibility of a second round of the teachers' comments if necessary to help them improve even more. In Week 6, the students began their third opinion paragraphs, "The Importance of Physical Exercise," following the same sequence: first drafts were composed independently. In Week 7, no feedback was provided initially to the students. Then, the students made their final revisions and submitted their drafts. A post-test was administered in Week 8, under similar conditions as the pre-test. The study reviewed progress in the areas of language accuracy, appropriate vocabulary, structural organization, and the students' overall quality of writing.

Table 1 presents a weekly summary of the instructional plan of the study for both teacher-only feedback and combination feedback group.

Table 1. Comparative Weekly Intervention Plan for Feedback Groups

Week	Teacher-Only Feedback Group	Combination Feedback Group
1	Students wrote the first drafts of their opinion paragraphs on "Benefits of Online Education" without receiving any feedback.	Students were introduced to Grammarly, including its features and usage; they wrote the first draft of their first opinion paragraphs on "Benefits of Online Education" without receiving any feedback.
2	Students received the teacher-written feedback focusing on content - organization - accuracy - vocabulary.	Students received feedback from Grammarly focusing on accuracy and vocabulary and revise their drafts.
3	Students revised their drafts based on additional the teacher-written feedback and submit final versions.	Students received the teacher-written feedback focusing on content and organization they revised and submit final versions.
4	Students wrote the first drafts of the second opinion paragraphs drafts on "The Impact of Social Media on Society" without feedback.	Students wrote the first drafts of the second opinion paragraphs on "The Impact of Social Media on Society" without feedback then received feedback from Grammarly with a focus on grammatical accuracy and vocabulary use and revised their drafts accordingly.
5	Students received the teacher-written feedback; revised their drafts and resubmitted.	Students received the teacher-written feedback; revised their drafts and resubmitted.
6	Students wrote the first drafts of the third opinion paragraphs on "The Importance of Physical Exercise" without feedback.	Students wrote the first drafts of the third opinion paragraphs on "The Importance of Physical Exercise" without feedback, then received feedback from Grammarly with a focus on grammatical accuracy and vocabulary use and revised their drafts accordingly.
7	Students received the teacher-written feedback focusing on content, organization, accuracy, vocabulary; revised and submitted final drafts.	Students received the teacher-written feedback focusing on content and organization, then revised and submitted final drafts.
8	Post-test: students wrote an opinion paragraph about 'Should Students Wear School Uniforms?' 'Under the same conditions as the pre-test.	Post-test: students wrote an opinion paragraph about 'Should Students Wear School Uniforms?' 'Under the same conditions as the pre-test.

In designing the writing tasks used for this study, particular attention was paid to selecting prompts that were authentic, relevant, and appropriate for the learners' age, background, and lived experiences. Three opinion paragraph topics were chosen

in alignment with these considerations to ensure that the students were engaged meaningfully with the tasks and drew on their prior knowledge.

The first writing task focused on the topic “*Benefits of Online Education.*” This prompt was selected because the participants had direct experience with online learning during the COVID-19 pandemic, making the topic highly familiar and personally relevant. The second task, “*The Impact of Social Media on Society,*” was chosen due to the students’ regular and active engagement with social media platforms in their daily lives, which positioned them well to express informed opinions and reflections. The third topic, “*The Importance of Physical Exercise,*” was considered appropriate based on the students’ age group and general exposure to health-related discussions in both educational and social contexts.

For the post-test writing task, the topic “*Should Students Wear School Uniforms?*” was selected based on its relevance to the participants’ personal educational experiences. All students had previously attended high schools in Türkiye, where wearing a school uniform is mandatory. In contrast, as university students, they no longer have such a requirement. This contrast enabled them to reflect on both experiences and express their own perspectives with concrete examples. The familiarity and relatability of the topic were expected to facilitate meaningful engagement and allowed students to demonstrate their writing competence through authentic, experience-based arguments.

By incorporating writing prompts grounded in the learners’ real-life experiences and interests, the study aimed to increase the authenticity of the writing tasks and promote higher engagement and more thoughtful written responses.

D. Data Collection

The data for this study were collected over an eight-week period in the first semester during the English preparatory school at a foundation university in Türkiye. The sample consisted of 50 A2 level EFL students from two different classes. To ensure the students were at the same level of language proficiency, the foundation university's standardized placement exam served as the metric for inclusion in the sample. When faculty administered the exam, they identified the students at the same level of proficiency to participate in the study, which reduced variability caused by

the participants' initial language ability, thus increasing the internal validity of the study.

A purposive sample was employed to select the participant group. Since it means that selecting participants intentionally based on specific characteristics or qualities that are directly relevant to the research question, purposive sampling was appropriate for this study as it permitted to study a particular subgroup of interest, A2 level learners, in a particular setting. The participant pool was balanced to include 25 male and 25 female students with the intention of conducting gender-based comparisons for analysis.

In order to demonstrate how writing skills improved during the intervention, pre-test and post-test measures were utilized. In discernible traditional experimental designs, the pre-test was administered immediately before the treatment; this study employed the students' previous writing scores from a prior academic module as the pre-test data. In that academic module, students completed three opinion paragraphs and received the teacher-written feedback based on the same rubric used in this project. Consequently, the scores served as a valid contextualized baseline measurement to compare.

The writing rubric utilized in both the pre-test and post-test phases was a standardized scoring tool at English Preparatory School. This rubric assessed the students' written texts in four areas: (1) content, (2) organization, (3) accuracy, and (4) vocabulary. Each category assigned a level between 1 to 5—five being most proficient. Content evaluated the relevance and development of ideas; organization assessed the logical flow and coherence; accuracy included grammatical/syntactic correctness; and vocabulary assessed lexical range and contextual appropriateness.

During the study, the students wrote three opinion paragraphs on assigned topics over a duration. Feedback practices varied per group. The Teacher-Only Feedback Group received the teacher-written feedback regarding all four areas of the rubric. The Combined Feedback Group first received feedback from Grammarly -- focusing primarily on accuracy and vocabulary -- followed by the teacher-written feedback regarding content, organization. At the end of the eight-week, all students undertook the same final writing task in a controlled environment. These measures, along with previous pre-test writing scores, were analyzed quantitatively.

All feedback on the student writing was provided by a single instructor who had been trained in the use of the standardized rubric; furthermore, the only evaluator in the process in the scoring and measuring of the students' writing was done through institutional means.

E. Data Analysis

In the present study, SPSS 26.0 was used to carry out data analyses. Skewness and Kurtosis values were used as an indicator of normality (Table 2). Critical values for Skewness and Kurtosis were +2 and -2 (George and Mallery, 2010). Research variables mostly fell within this range. The ones that exceeded the limits were not considered as ANOVA is known to be robust against the violations to the normality assumption (Schmider et al., 2010). Thus, parametric tests (i.e., ANOVA) were conducted for hypothesis testing.

Table 2 reveals the skewness and kurtosis values for the research variables

Table 2 Skewness and kurtosis values of the research variables

Variable	Group	Skewness	Kurtosis
Writing pre-test	Control	-.82	.64
	Experimental	-1.50	1.34
Writing post-test	Control	-.71	.30
	Experimental	-1.52	2.32
Accuracy pre-test	Control	.35	-.96
	Experimental	-.88	-.13
Accuracy post-test	Control	.36	-.70
	Experimental	-.85	.25
Vocabulary pre-test	Control	-1.29	2.09
	Experimental	-1.39	1.18
Vocabulary post-test	Control	-1.65	1.84
	Experimental	-.55	-.51
Writing pre-test	Female	-1.60	2.10
	Male	-.87	.64
Writing post-test	Female	-1.66	2.52
	Male	-.64	.55

IV. FINDINGS

A 2×2 mixed-design ANOVA was performed to examine the effects of feedback type (i.e., the teacher-written feedback vs. Grammarly and the teacher-written feedback combined) and time (i.e., pre-test vs. post-test) on EFL students' writing test scores over 8 weeks (Table 3, Figure 1). Those who received feedback only from their teacher were labeled as the control group whereas those who got Grammarly and the teacher-written feedback were dubbed as the experimental group.

Table 3 summarizes the results of the 2X2 mixed-design ANOVA conducted to examine the effects of time and feedback type on students' writing scores.

Table 3 Results of the 2x2 Mixed ANOVA for Writing Scores Depending on Time and Feedback

Effect	F	p	Partial η^2
Time (pre-test vs. post-test)	70.90	.000	.52
Feedback type	.19	.89	.00
Time x feedback type	.36	.55	.01

As illustrated in table 3, the main effect of time was significant, $F(1, 65) = 70.90$, $p = .000$, partial $\eta^2 = .52$, demonstrating that students scored higher on writing in the post-test ($M = 86.87$, $SD = 11.57$) than the pre-test ($M = 75.27$, $SD = 17.53$).

The main effect of feedback was not significant, $F(1, 65) = .19$, $p = .89$, partial $\eta^2 = .00$, pointing out that combined feedback ($M = 81.30$, $SD = 13.86$) and teacher only feedback ($M = 80.83$, $SD = 3.86$) resulted in similar writing scores.

The interaction effect between feedback type and time was not significant either, $F(1, 65) = .36$, $p = .55$, partial $\eta^2 = .01$, suggesting that the increase from pre-test to post-test writing scores did not depend on the feedback type. In other words, control and experimental groups experienced similar levels of increase in their writing performances.

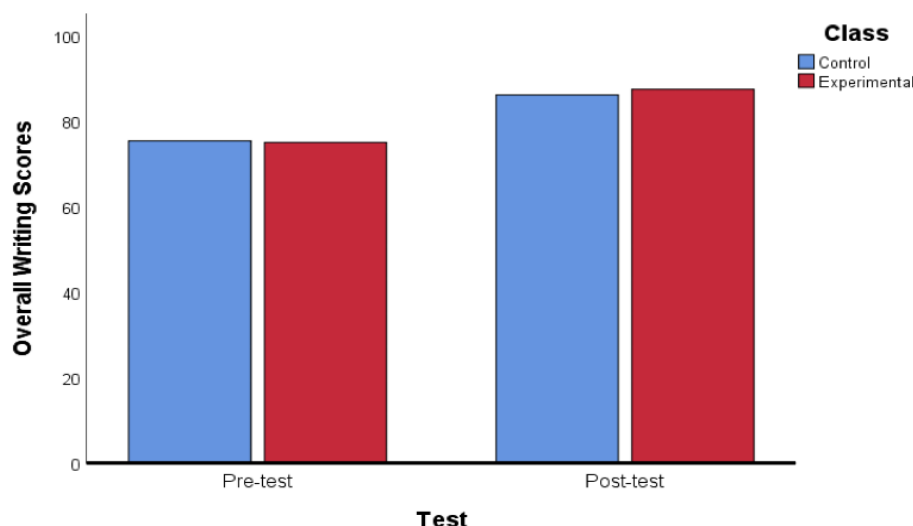


Figure 1 This figure provides a visual representation of mean writing test scores for both control and experimental groups in the pre-test and post-test.

Mean Writing Test Scores for Control and Experimental Groups

A 2×2 mixed-design ANOVA was carried out to examine if feedback type (i.e., the teacher-written feedback vs. Grammarly and the teacher-written feedback combined) and time (i.e., pre-test vs. post-test) affected EFL students' vocabulary test scores over 8 weeks (Table 4, Figure 2).

Table 4 reveals the results of the 2x2 mixed ANOVA for Vocabulary scores depending on time and feedback.

Table 4 Results of the 2x2 Mixed ANOVA for Vocabulary Scores Depending on Time and Feedback

Effect	F	p	Partial η^2
Time (pre-test vs. post-test)	42.81	.000	.40
Feedback type	7.57	.01	.10
Time x feedback type	.08	.78	.001

As shown in table 4 ,the main effect of time proved significant, $F(1, 65) = 42.81$, $p = .000$, partial $\eta^2 = .40$, suggesting that students' scores on vocabulary in the post-test ($M = 4.39$, $SD = .78$) were higher than the pre-test ($M = 3.87$, $SD = .98$).

There was also a significant main effect of feedback type, $F(1, 65) = 7.57$, $p = .01$, partial $\eta^2 = .10$, specifically teacher-only feedback ($M = 4.39$, $SD = .78$)

resulted in higher vocabulary scores than combined feedback ($M = 3.87$, $SD = .78$).

Yet, the interaction effect between feedback type and time was not significant, $F(1, 65) = .08$, $p = .78$, partial $\eta^2 = .001$, suggesting that the control group scored higher on vocabulary both in pre-test and post-test. Put another way, combined feedback failed to close the gap between the classes in terms of vocabulary acquisition.

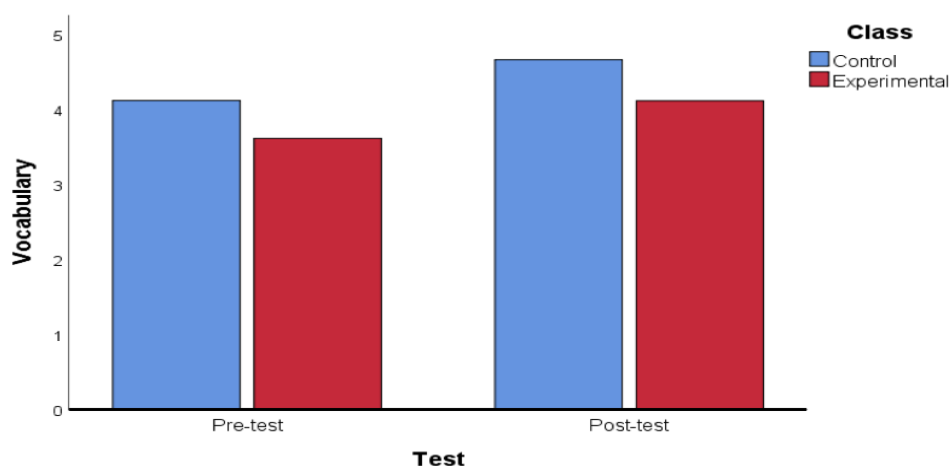


Figure 2 This figure provides a visual representation of mean vocabulary scores for both control and experimental groups in the pre-test and post-test.

Mean Vocabulary Scores for Control and Experimental Groups

A 2×2 mixed-design ANOVA was conducted to check whether feedback type (i.e., the teacher-written feedback vs. Grammarly and the teacher-written feedback combined) and time (i.e., pre-test vs. post-test) influenced EFL students' accuracy scores on writing tests in the span of 8 weeks (Table 5, Figure 3).

Table 5 presents the *results of the 2x2 mixed ANOVA for accuracy scores depending on time and feedback*.

Table 5 Results of the 2x2 Mixed ANOVA for Accuracy Scores Depending on Time and Feedback

Effect	F	p	Partial η^2
Time (pre-test vs. post-test)	40.03	.000	.38
Feedback type	5.79	.02	.08
Time x feedback type	.25	.62	.004

The main effect of time was significant, $F(1, 65) = 40.03$, $p = .000$, partial $\eta^2 = .38$, meaning that students became more accurate in writing in the post-test ($M = 3.81$, $SD = .91$) compared to the pre-test ($M = 3.26$, $SD = .97$).

Feedback type was significantly effective on writing accuracy as well, $F(1, 65) = 5.79$, $p = .02$, partial $\eta^2 = .08$. To be more specific, students in the combined feedback condition ($M = 3.78$, $SD = .85$) received higher scores on writing accuracy than those receiving only the teacher-written feedback ($M = 3.28$, $SD = .84$).

However, there was a non-significant interaction effect between feedback type and time, $F(1, 65) = .25$, $p = .62$, partial $\eta^2 = .004$, indicating that the experimental group scored higher on accuracy both in pre-test and post-test. Alternatively, combined feedback failed to widen the gap between the classes in terms of writing accuracy.

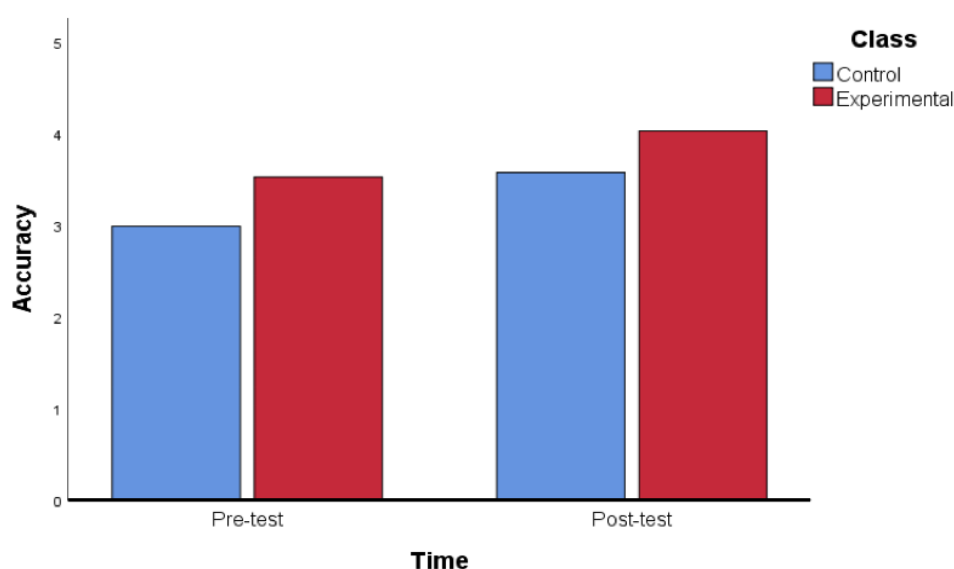


Figure 3 This figure displays the average grammatical accuracy scores of both the control and experimental groups across the pre-test and post-test

Mean Accuracy Scores for Control and Experimental Groups

Lastly, two 2×2 mixed-design ANOVA were performed to investigate how overall writing scores of students from each class were affected separately by feedback (i.e., the teacher-written feedback vs. Grammarly and the teacher-written feedback combined) and time (i.e., pre-test vs. post-test) based on their gender (Table 6, Table 7, Figure 4, Figure 5).

Table 6 demonstrates the results of the 2x2 mixed ANOVA for writing scores of the control group depending on time and gender

Table 6 Results of the 2x2 Mixed ANOVA for Writing Scores of the Control Group Depending on Time and Gender

Effect	F	p	Partial η^2
Time (pre-test vs. post-test)	23.78	.000	.43
Gender	8.13	.01	.21
Time x gender	1.06	31	.03

Table 7 shows the results of the 2x2 mixed ANOVA for writing scores of the experimental group depending on time and gender.

Table 7 Results of the 2x2 Mixed ANOVA for Writing Scores of the Experimental Group Depending on Time and Gender

Effect	F	p	Partial η^2
Time (pre-test vs. post-test)	53.18	.000	.62
Gender	.09	.76	.003
Time x gender	.10	75	.003

The main effect of time was significant for both the control group [$F(1, 31) = 23.78$, $p = .000$, partial $\eta^2 = .43$] and the experimental group [$F(1, 32) = 53.18$, $p = .000$, partial $\eta^2 = .62$], meaning that students from both classes scored higher on overall writing scores on post-test compared to the pre-test. The control group's writing scores increased from 75.45 ($SD = 17.74$) to 86.21 ($SD = 11.11$) while students from the experimental group elevated their scores from 75.09 ($SD = 17.59$) to 87.50 ($SD = 12.14$).

There was a significant main effect of gender in the control group, $F(1, 31) = 8.13$, $p = .01$, partial $\eta^2 = .21$, specifically female students ($M = 87.03$, $SD = 12.12$) outperformed their male peers in their writing exams ($M = 75.00$, $SD = 12.11$). Conversely, there was no significant main effect of gender in the experimental group in terms of writing performance, $F(1, 32) = .09$, $p = .76$, partial $\eta^2 = .003$. In other words, female ($M = 80.54$, $SD = 14.50$) and male students ($M = 82.06$, $SD = 14.50$) performed similarly on writing.

The interaction effect between feedback type and time was significant neither for the control [$F(1, 31) = 1.06, p = .31, \text{partial } \eta^2 = .03$] nor the experimental group [$F(1, 32) = .10, p = .75, \text{partial } \eta^2 = .003$], suggesting that the increase from pre-test to post-test writing scores did not depend on gender in either of the classes. Put differently, female and male students showed similar levels of improvement in writing in both classes.

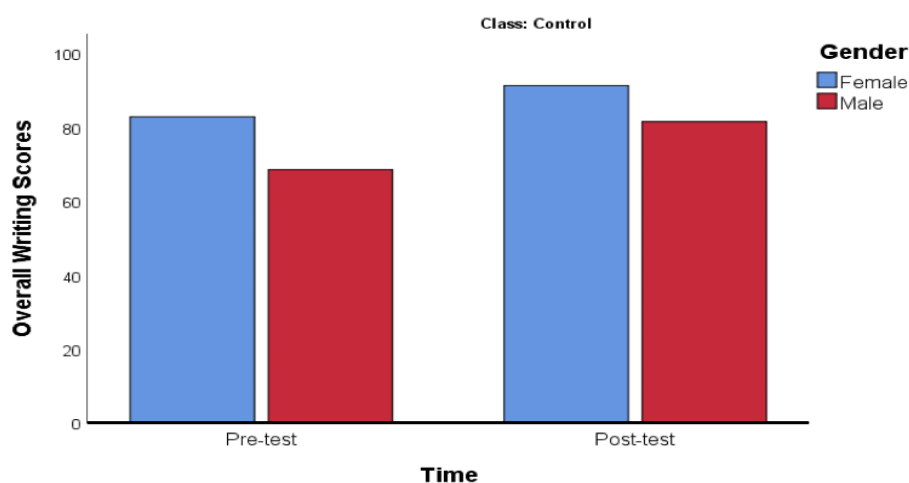


Figure 4 This figure presents the mean overall writing scores of the control group, categorized by time and gender.

Mean Overall Writing Scores of the Control Group Depending on Time and Gender

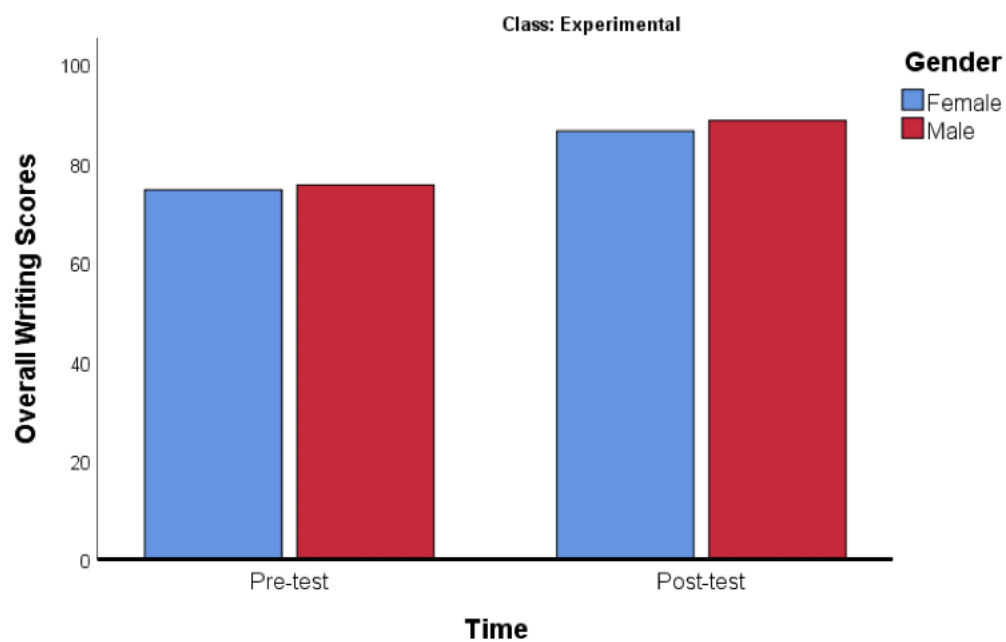


Figure 5 This figure presents the mean overall writing scores of the experimental group, based on time and gender.

Mean Overall Writing Scores of the Experimental Group Depending on Time and Gender

V. DISCUSSION

The first research question examined how much students' writing performance improved with the use of Grammarly and the teacher-written feedback compared to the group who received teacher-only written feedback. While both groups showed meaningful improvement in their overall writing performance throughout the study, the improvement between two groups was not statistically differentiated. This result implied that there was no greater overall gain from the combination feedback group compared to the teacher-only written feedback group. One explanation for this result might be that the teacher-written feedback, which includes both surface-level errors and higher-order writing issues such as development and organization, provides substantial support that helps students make progress (Ferris, 2003; Bitchener and Knoch, 2010). In this sense, the Grammarly overlapped with the overall feedback already discussed with the teacher, rather than extending or enriching the scope of the feedback.

The second research question investigated the effects of Grammarly on grammatical accuracy and vocabulary. The results showed a differentiated effect with the group that received both the Grammarly and the teacher-written feedback demonstrating greater outcomes in terms of grammatical accuracy, while the group that received teacher-only feedback showed greater advances in vocabulary. The results confirmed other research that has shown the strengths and limitations of AI-WAs. Grammarly has been shown to be more adept at identifying and correcting rule-governed grammatical errors and providing feedback on grammatical errors in a way that is consistent, immediate, and non-intrusive (Burstein, Chodorow, and Leacock, 2004; Guo, Feng, and Hua, 2022). Thus, all things considered, it was a rational conclusion that the contribution of Grammarly to the students' vocabulary development was more limited. When it came to vocabulary, the lexical suggestions provided often seemed generic and uncontextualized, whereas the teacher-written feedback was more semantically accurate and considerate of the context, particularly when the teacher understood the learner's message and the overall content (Lee,

2008; Hyland, 2019). These results underscored that the teacher-written feedback remained more effective in developing lexical awareness and growth by including metalinguistic awareness and content-based assistance.

The third research question investigated whether the effectiveness of the two types of feedback differed for male versus female students. The results showed that, within the teacher-only written feedback group, the female students had meaningful performance outcomes when compared to the male students inconsistent with previous findings. This suggested that the female students may respond better to the teacher-written feedback and revision (Hakiki, 2021). Further, in the combined feedback group there were no observable gender differences. This result may suggest that AI-powered written feedback creates a more balanced and equitable learning space as it offers non-judgmental, uniform, and non-anxiety provoking feedback which lends itself to appealing to both male and female learners equally. The neutrality and immediacy of AI-powered written feedback could also help reduce emotional or affective impediments which may limit feedback uptake, particularly among male learners.

Overall, this study's findings indicated that AI-powered written feedback was not meant to replace the teacher-written feedback but was a useful complement in areas of grammatical accuracy and in helping to maintain equitable access to learning between different student subgroups. The teacher-written feedback continued to be more beneficial in helping to develop vocabulary and overall writing trajectory. These results expressed the potential advantages to a combined feedback model where AI-WAs can help surface-level accuracy and teachers can help higher-order concerns like lexical choice, cohesion, and clarity of content. It is also important to acknowledge that in the study, feedback and learning were measured at a short-term perspective throughout an eight-week period. The longer-term retention of improvements, particularly for grammar and vocabulary, remain to be seen. Previous work on feedback recognized or advocated delayed revision and the need for the learners to internalize feedback for longer lasting benefits (Teng, 2024).

VI. CONCLUSION

The study investigated the effects of the teacher-written feedback combined with AI-WAs on the writing development of A2 EFL learners. It specifically examined the overall performance, grammatical accuracy, vocabulary development, and outcomes for gender variables. Overall, while both the teacher-only written feedback group and the combination feedback group statistically improved in overall writing development during the eight weeks of instruction, the improvement difference between the two groups was not statistically significant. This did indicate that the teacher-written feedback alone had significant value when supporting EFL writing development. Although both groups improved, the combination feedback group did not lead to significantly greater overall writing gains than the teacher-only feedback group. However, the data indicated a specific skill improvement benefit with using AI-WAs. The students in the combination feedback group improved in grammatical accuracy more than the teacher-only feedback group. This was consistent with prior literature suggesting that AI-WAs, such as Grammarly, were particularly effective at identifying and correcting rule-based errors in EFL students' writing. Grammar, being largely prescriptive and governed by consistent linguistic rules, lends itself well to automated detection and correction. AI-WAs are designed to process such patterns efficiently and can provide immediate, repeated, and context-specific feedback that may be especially helpful for learners who need more support with structural aspects of language. As such, the integration of AI-WAs appears to offer an effective supplement to the teacher-written feedback, especially in contexts where grammatical accuracy is a key instructional focus. On the other hand, the the teacher-written feedback resulted in significantly higher vocabulary scores than the combination feedback, suggesting that it provided more effective support for lexical development. This was noteworthy because vocabulary development in EFL contexts encompasses significantly more than just knowing definitions or identifying synonyms, and it can be complicated by factors such as understanding collocations, connotation, register, and appropriate usage in genres.

These distinctions are often not clearly available for AI-WAs to address appropriately. Teachers can utilize their pedagogical knowledge and understanding of their students' language development to provide differentiation in their guidance that gives attention to such complexities of language. Furthermore, teachers understand how to scaffold students' learning by embedding vocabulary instruction as part of more comprehensive rhetorical or genre-based strategies that promote more salient and enduring vocabulary learning. This contrast between grammatical and lexical development underscored the importance of understanding the distinct affordances and limitations of different feedback sources. While AI-WAs offer efficiency, consistency, and instant accessibility, teacher-written feedback brings pedagogical insight, affective support, and the ability to engage with broader discourse-level issues. Therefore, a nuanced approach to writing instruction in EFL contexts would not seek to replace teacher-written feedback with AI-powered writing assistants but rather to integrate both in a complementary manner.

Interestingly, the gender component for the teacher-only feedback group revealed that the females outperformed the males. Yet, in the combination feedback group, the performance gap between the genders was not apparent; the males and the females performed similarly. This suggested that the use of AI-powered written feedback might contribute to reducing gender disparities in writing performance. Although the underlying reasons for this pattern were not fully understood, it was plausible that AI-WAs offer a less judgmental space for revision and practice, which may reduce anxiety or self-consciousness often associated with receiving teacher-written feedback—particularly among male learners who might be less likely to seek clarification or engage deeply with teacher comments. The neutrality and consistency of AI-powered written feedback may thus foster a more equitable and less emotionally charged learning environment, supporting all learners more uniformly.

The combination models reflect a broader trend in education toward technology-enhanced learning. As AI-WAs has become more sophisticated and more integrated into everyday language learning environments, it is increasingly important for educators to understand how best to balance technological affordances with pedagogical principles. This study contributed to that discussion by showing that thoughtful integration rather than replacement of the teacher-written feedback with AI support can enhance certain aspects of learner development while preserving the

value of teachers. Ultimately, writing instruction benefits from a balanced approach, where the strengths of AI-WAs are strategically employed alongside the pedagogical insight and adaptability of teachers. Focusing on grammatical accuracy through AI-powered written feedback and on lexical development through teacher-written feedback offers a balanced and effective approach to writing instruction in EFL contexts. The results of this study demonstrated that using both feedback types together can support more comprehensive improvements in EFL learners' writing. This integrated approach has practical value for classroom teaching, instructional material development, and teacher education, especially in a time when digital tools are becoming increasingly central to language learning.



VII. LIMITATIONS OF THE STUDY

While there were valuable pedagogical contributions made by this study, there were also several limitations to note that could affect the understanding and generalizability of the findings. One of the limitations concerned the time and assessment framework. Conducted over an eight-week instructional period without a delayed post-test, the research provided insights into short-term learning outcomes but could not determine the long-term retention of improvements, particularly in grammar and vocabulary. Future studies that draw on more longitudinal methodologies and utilize delayed assessments could answer whether there are gains that persist.

One noteworthy constraint relates to the technological scope of the intervention. The study used the free version of Grammarly ; thus, it utilized limited feedback functions that were mainly centered on grammar and style. It is possible that the AI-WAs pedagogical promise was not fully realized—especially concerning vocabulary supports, tone adjustments, or genre specific feedback. Future studies could compare multiple AI-WAs as a means to gauge the pedagogical potential of such tools, or could access higher service levels to assess the potential even further.

Another limitation is the absence of qualitative data sources such as learner reflections, teacher interviews or classroom observations which would have provided insight into how the students make meaning and interaction with the feedback. Qualitative data could add a depth of understanding to feedback uptake and students' perspectives of the teacher-written feedback and AI-written feedback. Therefore, learner variables such as motivation, metacognitive awareness, digital literacy and anxiety were not mentioned or examined, which could also have a significant impact on how feedback is received, understood and applied.

The part of the study that noted gendered outcomes revealed patterns of interest; however, , given the quasi-experimental nature of the study, any potential conclusions related to the impact of feedback type on gender would not imply causation. Consequently, the observation that gender gaps disappeared in the

combination group must be regarded as correlational rather than causal.

Moreover, the study was conducted within the specific context of a Turkish foundation university, involving A2-level EFL students. While the findings contributed to the understanding of feedback practices in this particular setting, the results might not be fully generalizable to different cultural, institutional, or linguistic contexts. Educational environments vary in terms of teacher-student dynamics, digital tool integration, and pedagogical norms. Therefore, future studies carried out in diverse geographical and educational contexts could help determine whether the outcomes observed in this study can be replicated elsewhere

Lastly, findings were potentially less generalizable given the sample profile like A2 level university learners from one academic institution within this study. Replicating the study with a greater range of proficiency levels, ages, and educational contexts could support the addition of applicability to the findings and help to add more complexities to our understanding of feedback practices in varying EFL contexts.

VIII. SUGGESTIONS FOR FUTURE STUDIES

In light of the limitations outlined above, several directions for future research are recommended to build upon the findings of this study and provide a more comprehensive understanding of combination feedback practices in EFL writing instruction. One important area for future investigation is the future impact of combined feedback. It is unknown whether the results from this study will have lasting impact, as this study did not include a delayed post-test to assess the long term retention of students' improvement in writing accuracy and vocabulary over time. Longitudinal research designs, particularly those which include follow-up measures, would be beneficial for learning outcomes retention and would provide researchers with insight into how feedback affects writing development over time.

Future studies could also build on the technology aspect of AI-WAs. Because this study offered limited feedback categories associated with the free Grammarly version, there may be advantages to using premium AI-WAs, or contrasting them with others such as ChatGPT, Write & Improve, or QuillBot, which may provide more nuanced insights into general pedagogical potential of different AI-WAs feedback especially for higher-order concerns related to coherence, tone and genre awareness.

In addition, studies that include qualitative data would help to enrich the understanding of students' perspectives. For the most part, interviews, learner reflections, or classroom observations, the researcher might garner insight into learners' interpretations and takeaways from both teacher and AI-written feedback as well as how learner factors -such as motivation and writing anxiety- relate to that interaction.

Another promising line of inquiry involves examining how other learner variables such as motivation, digital literacy, prior experiences with technology-enhanced learning, and how these variables impact student interpretation of, response to, and use of feedback. This study examined A2-level learners and included comparisons by gender, but future studies might consider other individual difference

variables having an impact on how students engage with AI-WAs and teacher-written feedback.

This study took place at a Turkish university with A2 EFL learners, the majority of whom were domestic students, but some international students were involved in the study. The results provided insight into similar contexts and locally relevant findings but did not allow generalizability to other educational or cultural contexts. Future research with wider diversity nationally, institutionally, and in terms of linguistic context would facilitate the investigation of whether the results found here could be replicated. The possible cross-contextual comparisons provide further clarification about effective aspects of blended feedback generally versus in-context. The ultimate aim of these suggestions is to enhance the effectiveness feedback practices of EFL classrooms.

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APPENDIX

Appendix A *Rubric for Assessing Writing Performance in Opinion Paragraphs*

1. Accuracy 5 (Excellent): Almost no grammatical or syntactical errors. Sentences are complex and varied with appropriate structures. 4 (Good): Minor grammatical or syntactical errors that do not affect understanding. Sentence structure is mostly correct and varied. 3 (Satisfactory): Some grammatical and syntactical errors that occasionally hinder understanding. Sentence structures are basic and repetitive. 2 (Needs Improvement): Frequent grammatical and syntactical errors that often affect understanding. Limited sentence variety. 1 (Poor): Numerous errors in grammar and syntax that significantly impede understanding. Sentences lack proper structure.	2. Vocabulary 5 (Excellent): Vocabulary is diverse, precise, and used appropriately in context. Effective use of advanced words. 4 (Good): Vocabulary is varied and mostly appropriate. Few word choice errors. 3 (Satisfactory): Vocabulary is limited but adequate for basic expression. Occasional errors in word choice. 2 (Needs Improvement): Vocabulary is very limited or repetitive. Frequent word choice errors. 1 (Poor): Vocabulary is inadequate and significantly limits expression. Words are often misused or inappropriate.
3. Content 5 (Excellent): Ideas are fully developed, highly relevant, and demonstrate deep understanding of the topic. Arguments are well-supported. 4 (Good): Ideas are relevant and well-developed but may lack depth or detail in some parts. 3 (Satisfactory): Ideas are somewhat relevant but lack sufficient development or clarity. Some supporting details may be missing. 2 (Needs Improvement): Ideas are minimally developed or only partially relevant to the topic. Supporting details are weak. 1 (Poor): Ideas are off-topic, underdeveloped, or lack coherence. No supporting details are provided.	4. Organization 5 (Excellent): The writing is logically organized with a clear introduction, body, and conclusion. Transitions are smooth and enhance coherence. 4 (Good): The writing is well-organized but may have minor issues with flow or transitions. 3 (Satisfactory): The organization is evident but somewhat inconsistent. Transitions are basic or occasionally missing. 2 (Needs Improvement): Writing lacks a clear structure. Ideas are disjointed, and transitions are poorly used. 1 (Poor): Writing is disorganized, with no evident structure or flow. Transitions are absent or ineffective.

Appendix B Ethics Committee Approval

Evrak Tarih ve Sayısı: 29.01.2025-144361



T.C.
İSTANBUL AYDIN ÜNİVERSİTESİ REKTÖRLÜĞÜ
Lisansüstü Eğitim Enstitüsü Müdürlüğü

Sayı : E-88083623-020-144361
Konu : Etik Onayı Hk.

29.01.2025

Sayın Mihri DİŞLİ

Tez çalışmanızda kullanmak üzere yapmayı talep ettiğiniz anketiniz İstanbul Aydın Üniversitesi Eğitim Bilimleri Etik Kurul Komisyonu'nun 21.01.2025 tarihli ve 2025/01 sayılı kararıyla uygun bulunmuştur.

Bilgilerinize rica ederim.

Dr.Öğr.Üyesi Hüseyin KAZAN
Müdür Yardımcısı

Bu belge, güvenli elektronik imza ile imzalanmıştır.

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