GRADUATE SCHOOL
ISTANBUL MEDENIYET UNIVERSITY
DEPARTMENT OF FOREIGN LANGUAGES EDUCATION

The Impact of Artificial Intelligence-Based Feedback on Students' Self-Efficacy in Academic Writing Classes

Master's Thesis

Sinem Aydın

June 2025

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THESIS JURY APPROVAL

This MA thesis titled "The Impact of Artificial Intelligence-Based Feedback on Students' Self-Efficacy in Academic Writing Classes," written by Sinem Aydın at the Department of Foreign Languages Education, was accepted by our jury.

JURY MEMBERS **SIGNATURE**

Supervisor:
Prof. Dr. Selami Aydın
İstanbul Medeniyet University

Other Jury Members:

Dr. Ferdane Denkci Akkaş
İstanbul Medeniyet University

Doç. Dr. Burcu Ünal
Yıldız Technical University

Title Name Surname
Institutional Affiliation

Title Name Surname
Institutional Affiliation

Date of Defense: 17/ 06 / 2025

STATEMENTS

Style and Reference Manual Statement

Having reviewed this thesis, which was written under my supervision, I confirm that it has been written in accordance with the APA (7th Edition) Manual of Style and consistently uses its [footnote/in text] reference format throughout the text.

Prof. Dr. Selami Aydın

Declaration of Originality

I declare that all information in this dissertation has been obtained and presented under academic rules and ethical conduct. I also declare that, as required by these rules and conducts, I have fully cited and referenced all material and results that are not original to this work.

Sinem Aydın

GENİŞ ÖZET

Akademik Yazma Derslerinde Yapay Zekâ Tabanlı Geribildirimin Öğrencilerin Öz Yeterlilikleri Üzerindeki Etkisi

Aydın, Sinem

Yüksek Lisans Tezi, Yabancı Diller Eğitimi Anabilim Dalı

Danışman: Prof. Dr. Selami Aydın

Haziran 2025

Yazma becerileri, öğrencilerin akademik başarılarını doğrudan etkileyen önemli bir unsurdur. Öğrenciler, edindikleri bilgi ve düşünceleri yazma becerileri ile aktardıkları için, öğrencilerin yazma yeterlilikleri akademik başarıları ile doğrudan orantılıdır (Hosseini et al., 2013). Ayrıca yazma, dilbilimsel kalıplar kullanarak anlamı doğru aktarabilmek için dilin retorik geleneklerini doğru anlamayı gerektirir (Ariyanti, 2016b) ve dil öğrencilerinin tüm bilgi, beceri ve deneyimlerini kullanmalarını gerektiren ve öğrenme, taslak oluşturma, düzeltme ve düzenleme gibi çeşitli aşamalardan oluşan bir detaylı üretim sürecidir. (Yusof et al., 2012). Yazı, titiz bir içerik organizasyonu gerektirdiğinden (Pysarchyk & Yamshynska, 2015), öğrencilerin bir düşünceyi ya da tezi planlı bir şekilde yapılandırabilme becerilerini de ortaya koyar ve bu nedenle bir öğrencinin dil becerilerini değerlendirmek için yazma geçerli bir araçtır. Ancak, karmaşık yazma becerileri bilinçli bilişsel süreçler gerektirdiğinden, çoğu yabancı dil olarak İngilizce öğrenen öğrenci tarafından fazlasıyla zorlayıcı bulunur (Ariyanti, 2016b).

Yazma öz yeterliliği, yazma süreçlerinde öğrencilerin yazma becerilerine olan inançlarını artırarak, daha etkili ve yaratıcı yazılar ortaya koymaları konusunda büyük

öneme sahiptir. Akademik öz yeterlilik inançları, akademik başarıyı doğrudan etkiler (Multon et al., 1991a). Öz yeterlilik, hedef koyma, dayanıklılık, ortaya koyulan çaba, duygusal eğilim ve stres seviyeleri gibi başarıyı belirleyen birçok unsuru etkilediği için davranış ve alınan sonuçların en büyük belirleyicisidir (Bandura, 2006) Detaylandırmak gerekirse, öz yeterlilik, yazma yeteneğini doğrudan etkilemesiyle değil, öğrencilerin yazma becerilerini geliştirmek için ortaya koyduğu çabayı doğrudan etkilemesiyle bilinir ve bu nedenle yazma performansı ile pozitif açıdan ilişkilidir. (Sabti et al., 2019a).

Özellikle yabancı dil olarak İngilizce öğreniminde, öğrencilerin yeterli akademik yazma öz yeterliliklerinin olmaması akademik hayatlarında bazı zorluklar yaşamasına sebep olmaktadır (Y. Zhang, 2018a). Öncelikle, akademik hayatlarına zaten düşük dil seviyeleri ile başlayan birçok üniversite öğrencisinin, yabancı bir dilde dilbilimsel kalıplar kullanarak anlam yaratma konusunda karşılaştığı zorluklar, yazma becerilerine olan inançlarını olumsuz yönde etkilemektedir (Nasrollahi & Barjasteh, 2013). İleri düzey yabancı dil öğrencilerinin bile yazım hataları yapmaktan korkması, öğrencilerin yazma derslerinde daha fazla öz yeterlilik destekleyen aktivitelere yer verilmesine duyulan ihtiyacı ortaya koyar (Erkan & Saban, 2011). Ayrıca, yazma kaygısı, öğrencilerin sıkılması, gerginleşmesi ve yazma süreçlerinden tamamen kaçınması gibi yazma performanslarına zarar veren davranışlarda bulunmalarına sebep olur (Klassen, 2002) ve düşük akademik yazma öz yeterliliğe sebep olan en önemli etkenlerden birdir. (Kırmızı & Kırmızı, 2015; Martinez et al., 2011; Sabti et al., 2019a). Öğrencilerin yazma öz yeterliliği ne kadar artarsa, yazma kaygıları o kadar azalır, bu da etkili yazma eğitimi için olumlu bir dil öğrenme ortamı sağlar. Buna ek olarak, pratik eksikliği öğrencilerin düşük öz yeterliliğe sahip olmalarının en yaygın sebeplerindendir (Troop et al., 2015). Pratik sayesinde öğrencilere, adım adım

ilerlenen, küçük değişiklikler ile gerekli bir öğrenme desteği sağlanır ve öğrencilerin yazma gelişimlerine ivme kazandırılır (Nourazar et al., 2022). Bu yapılan küçük değişiklikler, öğrencilerde bir "ustalık deneyimi" hissi oluşturarak öz yeterliliklerini artırır (Deri, 2022). Bandura'ya göre, bir bireyin kendi kapasitesine olan algısını değiştirebilmek ve kendi öz yeterlilik inançlarını yeniden yapılandırabilmek için en etkin yöntem deneyimlerdir (Bandura, 2006). Bu nedenle, akademik yazma derslerinde öğrencilerin yazma öz yeterliliğinin pratik ile desteklenmesi önemlidir. Son olarak, akademik yazma derslerinde düşük öğrenci öz yeterliliğinin önemli sebeplerinden bir diğeri, öğrencilerin yeterli geribildirim alamamasıdır (Bandura, 1986; Zarrinabadi & Rezazadeh, 2023). Birçok eğitim kurumunda öğretmenler, öğrencilere geribildirim sağlama konusunda birincil role sahiptir (Furqoni, 2019). Ancak öğretmenler, zaman kısıtlaması, kalabalık sınıflar, ya da uzmanlık bilgisi eksikliği gibi sebeplerden dolayı, yazma derslerinde öğrencilerin ihtiyaçlarına uygun geribildirim vermelerinin önemini bilmelerine rağmen, yeterli geribildirim sağlama konusunda zorluklar yaşamaktadır (Ruegg, 2018; Seker & Dincer, 2014).

Bu bağlamda, yapay zekâ araçları, öğrencilerin akademik yazma öz yeterliliklerini ve becerilerini destekleme konusunda değerli bir çözüm sunabilir. Yapılan araştırmalar, bilgisayar destekli dil öğrenme uygulamalarının ya da yapay zekâ tabanlı bilgisayar destekli dil öğrenme uygulamalarının öğrenci öz yeterliliğini artırmada etkili olduğunu göstermiştir (Chen & Hsu, 2022; Y. Liu, 2023). Sosyal Bilişsel Teori, teknolojinin öğrenci öz yeterliliği üzerindeki etkisini açıkça vurgular (Bandura et al., 1999). Üretken yapay zekâ, İngilizce yazma derslerine, beyin fırtınası yapmak, metin üretmek ya da geliştirmek, geribildirim almak, yazım düzeltmeleri yapmak gibi birçok şekilde dahil edilebilir. Yapay zekâ araçlarıyla öğrenciler, hızlı, doğru ve kişiselleştirilmiş destek alarak, yazma becerilerinde

daha yüksek bir başarı ve öz yeterlilik hissi geliştirir (Washington, 2023) ve yazma kaygılarını azaltır (Dizon & Gold, 2023). Ayrıca, yapay zekâ araçları, öğrencilerin davranışsal, duygusal ve bilişsel etkileşimini artırarak akademik duygularını pekiştirir (Nazari et al., 2021). Son olarak, yapay zeka araçları öğrencilerin yazma becerilerini geliştirmesi için pratik yapmasına ve geribildirim almasına olanak sağlar (Mun, 2024). Yapay zekâ araçları, belirlenen ihtiyaçlar doğrultusunda kişisel rehberlik sağlamaları için tasarlanmıştır; bu nedenle doğru ve kişiselleştirilmiş geribildirim verme potansiyelleri ile yazma derslerinde öğrenci öz yeterlilikleri üzerinde önemli bir rol oynayabilir.

Yapay zekâ tabanlı geribildirim, akademik yazma derslerinde, öğretmen geribildirimine birkaç açıdan etkili bir alternatif olabilir. Öncelikle zaman ve enerji kazandırır ve öğretmen geribildirimden daha etkili bir içeriğe sahip olabilir (Jacobsen & Weber, 2023). Örneğin, öğrencilerin yazılarındaki fikirleri anlar, onlara yazılarını geliştirebilmeleri için tavsiyeler sunar (Abdalgane & Othman, 2023). Öğrencilere organizasyon ve dilbilgisi gibi çeşitli yazma zorluluklarını yenme konusunda destek olarak yazma performanslarını geliştirir (Syahnaz & Fithriani, 2023). Dilbilimsel kalıplar, bütünlük, stil, noktalama, yazım kuralları yazma becerisinin çeşitli alanlarında doğru ve yüksek kalitede geribildirim verebilir (Leiping, 2024). Buna ek olarak, İngilizceyi yabancı dil olarak öğrenen öğrenciler, sözbilimsel ve kültürel farklılıklardan dolayı akademik yazmada referans verme, alıntı yapma, intihal ya da bir düşünceyi başka kelimelerle ifade etme konularında birçok zorluk yaşamaktadır (Ho, 2024); yapay zekâ tabanlı geribildirim, öğrencileri sadece yazma becerilerini geliştirme konusunda değil, yaşadıkları sözbilimsel ve kültürel zorluklar konusunda da destekler (Roy & Swargiary, 2024; C. Song & Song, 2023). Sağladıkları bu kişiselleştirilmiş öğrenme ortamı sayesinde, yapay zekâ araçları, öğrenciler

için ideal dil öğrenme arkadaşı ya da öğretmeni haline gelirler (Guo et al., 2022). Ayrıca, pozitif geribildirimin öğrenci öz yeterliliği ve performansı üzerinde olumlu etkileri bulunmaktadır (Hadden & Frisby, 2019). Zaman kısıtlamaları nedeniyle çoğu zaman istemeden hatalara odaklanmak zorunda kalan öğretmenlerin aksine, yapay zekâ araçları, uygun komut istemleri kullanıldığı takdirde, öğrencilere saniyeler içinde öğretici ve destekleyici geribildirim sağlayabilmektedir.

Bu çalışmada, akademik yazma derslerinde yapay zekâ tabanlı geribildirim kullanmanın öğrencilerin öz yeterlilikleri üzerindeki etkisi araştırılmıştır. Bu çalışma aynı zamanda, akademik yazma derslerinde geleneksel yöntemlerle verilen öğretmen geribildirimin etkisini araştırmış ve bu iki geribildirim yönteminin karşılaştırmalı etkilerini analiz etmiştir. Yarı-deneysel olarak yapılandırılmış ve Türkiye'de bir devlet üniversitesinin İngilizce hazırlık biriminde 33 öğrenci ile gerçekleştirilmiş olan bu çalışmada, rastgele belirlenmiş 16 katılımcıdan oluşan bir kontrol grubu ve 17 katılımcıdan oluşan bir deney grubu yer almaktadır. Katılımcılar, uygulama sürecine başlamadan önce 2 haftalık bir akademik yazma eğitimi sürecinden geçmiştir. Bu oryantasyon sonrasında gruplar rastgele belirlenmiş ve katılımcıların yaş, cinsiyet, bölüm, İngilizce yeterlilik seviyesi gibi demografik bilgilerini toplamak için bir ön anket gerçekleştirilmiştir. Yapılan bu ön anket, aynı zamanda öğrencilerin önceki akademik yazma ve yapay zekâ kullanma deneyimleri, bu deneyimlerin kaynakları ve amaçları gibi çeşitli değişkenleri belirlemek üzere tasarlanmıştır. Ayrıca, öğrencilerin akademik yazma öz yeterlilik seviyelerini anlamak için ön test ve son test ölçüm aracı olarak Likert tipi 16 madde ve üç alt boyuttan oluşan Mitchell et al. (2021) tarafından geliştirilen ve sonrasında Doenyas et al. (2023) tarafından Türkçe literatüre kazandırılan, Bağlamsal Akademik Yazma Öz Yeterlik Ölçeği

kullanılmıştır. Ön testlerin gerçekleşmesinden sonra, 5 haftalık uygulama süresi boyunca, her hafta öğrenciler, giriş paragrafı, gelişme paragrafları, sonuç paragrafı ya da makale gibi çeşitli akademik metinler yazmışlar ve bu metinleri aldıkları geribildirim doğrultusunda yeniden düzenlemişlerdir. Kontrol grubundaki katılımcılar, her hafta akademik yazılarının ilk taslaklarını yazmış, öğretmen geribildirimi almış ve bu geribildirim üzerine düzeltmeler yaparak ikinci taslaklarını oluşturmuşlardır. Deney grubundaki öğrenciler ise aynı akademik yazma görevlerini gerçekleştirmişler ama ikinci taslaklarını oluşturmadan önce, kendilerine sağlanan komut istemleri ile ChatGPT aracılığıyla geribildirim almıştır. Bu 5 haftalık uygulama sürecinin sonunda, öğretmen geribildirimi ve yapay zekâ tabanlı geribildirimin öğrencilerin akademik yazma öz yeterlilikleri üzerindeki etkilerini karşılaştırmak için son test gerçekleştirilmiştir. Elde edilen tüm veriler, SPSS programı kullanılarak analiz edilmiştir.

Gerçekleştirilen veri analizi, bazı önemli sonuçlar ortaya koymuştur. Uygulama öncesinde yapılan ön test sonuçlarına göre, Türkiye'de bir devlet üniversitesinin hazırlık biriminde yabancı dil olarak İngilizce öğrenen öğrenciler, orta düzeyde bir akademik yazma öz yeterliliği seviyesine sahiptir. Ön test sonuçlarında, kontrol grubu ile deney grubu arasında akademik yazma öz yeterlilik seviyeleri açısından istatiksel bir fark bulunmamıştır. 5 haftalık uygulama sürecinin ardından, son test sonuçları her iki grubun da akademik yazma öz yeterlilik seviyelerinin orta seviyeden yüksek seviyeye çıktığını ve istatiksel olarak önemli ölçüde yükseldiğini göstermiştir. Öğretmen geribildirimi alan kontrol grubu, genel akademik yazma öz yeterliliklerinin yanında, öz yeterliliğin *Yaratıcı kimlik* alt boyutunu da istatiksel anlamda geliştirmiştir. Yapay zekâ geribildirimi alan grup ise, genel akademik yazma öz yeterlilik seviyelerinin yanında, öz yeterliliğin *İlişkisel düşünsel yazma*

ve *Yaratıcı kimlik* alt boyutlarını istatiksel anlamda geliştirmiştir. Buna ek olarak, gruplar arası yapılan karşılaştırmalı analizler, kontrol ve deney gruplarının akademik yazma öz yeterlilik artış seviyeleri arasında anlamlı bir fark ortaya koymamıştır. Bu çalışmanın sonuçları, hem geleneksel öğretmen geribildirimin hem de yapay zekâ tabanlı geribildirimin akademik yazma öz yeterlilik seviyelerini yükseltme konusundaki güçlü potansiyelini açıkça ortaya koymaktadır.

Bu anlamda, akademik yazma derslerinde yapay zekâ tabanlı geribildirim, geleneksel öğretmen geribildirimine pedagojik olarak geçerli bir alternatif sunabilir. Hem yazma sürecinin hem de yazma geribildirimi vermenin bilişsel olarak yorucu ve zaman alıcı bir süreç olması, yazma derslerindeki zaman kısıtlamaları, öğretmenlerin iş yükü gibi birçok etkenden dolayı, çoğu öğretmen yazma derslerinde düzenli ve etkili geribildirimi verme konusunda zorluklar yaşamaktadır. Bu araştırmanın da gösterdiği gibi, doğru komut istemi verildiğinde (Bkz. Ek 4), ChatGPT gibi yapay zekâ araçları, öğrencilere anında, doğru, detaylı ve kişiselleştirilmiş akademik yazma geribildirimi verme (Bkz. Ek 5) ve öğrencilerin akademik yazma öz yeterliliklerini en az öğretmen geribildirimi kadar yükseltme potansiyeline sahiptir. Ayrıca, bu çalışmada elde edilen bulgular çerçevesinde, öğrencilerin zaten akademik yazma ödevleri ve çalışmaları için, özellikle ChatGPT olmak üzere, yapay zekâ tabanlı araçları kullandığı görülmüştür. Bu yüzden çeşitli kaygılarla bu uygulamalardan kaçınmak yerine, eğitimciler ve araştırmacılar, yapay zekâ araçlarının yazma süreçlerinde etik ve etkili kullanımı konusunda öğretici ve destekleyici olmalı; öğrencileri intihal, aşırı bağımlılık ve yapay zekâ halüsinasyonları konularında bilgilendirmeli ve verilen geribildirimi her zaman eleştirel düşünme süzgecinden geçirmeleri konusunda yönlendirmelidir.

Anahtar Kelimeler: Yabancı dil olarak İngilizce öğrenimi, akademik yazma öz yeterliliği, öğretmen geribildirimi, yapay zeka tabanlı geribildirim, teknoloji destekli eğitim araçları

ABSTRACT

The Impact of Artificial Intelligence-Based Feedback on Students' Self-Efficacy in Academic Writing Classes

Aydın, Sinem

Master's Thesis, Department of Foreign Language Education

Supervisor: Prof. Dr. Selami Aydın

Haziran 2025

Academic writing self-efficacy is critical in shaping students' academic performance and success (Sabti et al., 2019). Although still scarce, research on AI-based feedback shows promise in enhancing learners' academic writing self-efficacy (Bouzar et al., 2024; Y. Liu, 2023; Sari & Han, 2024; Washington, 2023). Therefore, this study aimed to examine the impact of AI-based feedback on academic writing self-efficacy. Additionally, the study examined the impact of teacher feedback and compared it with AI-based feedback to determine their relative effectiveness in enhancing academic writing self-efficacy. A quasi-experimental design was employed in this study, involving 33 Turkish EFL students enrolled at a preparatory school of a state university in Turkey. After receiving two weeks of academic writing instruction, the participants were randomly assigned into two groups: the control and experimental groups. A background questionnaire and the Situated Academic Writing Self-Efficacy Scale (SAWSES) developed by Mitchell et al. (2021) and adapted to Turkish by Doenyas et al. (2023) were administered as the data collection tools. During a 5-week intervention, the control group received teacher feedback, while the experimental

group received AI-based feedback on their academic writing texts before revising them with the feedback received. After the implementation period, the analyses were conducted using the Wilcoxon Signed-Rank Test and Mann-Whitney U Test via SPSS. The findings revealed that Turkish EFL students had moderate levels of academic self-efficacy. The data within groups demonstrated a statistically significant improvement in students' academic writing self-efficacy levels in both the teacher and AI-based feedback groups, transitioning from moderate to high levels. Moreover, the comparative analyses between the groups revealed no statistically significant differences in the effects of these two feedback types on academic writing self-efficacy. Within the framework of this study, AI-based feedback serves as a pedagogically valid tool to enhance conventional methods to support academic writing self-efficacy. In this regard, a balanced approach that integrates AI-based feedback into academic writing instruction is recommended, provided it is supplemented by human expertise to ensure ethical, institutional, and pedagogical standards.

Key Words: English as a foreign language learning, academic writing self-efficacy, artificial intelligence-based feedback, teacher feedback, technology-enhanced learning

ACKNOWLEDGEMENTS

First and foremost, I would like to express my heartfelt gratitude to my thesis advisor, Prof. Dr. Selami Aydın, who not only helped me define the topic of this study but also taught me that overthinking won't write my thesis but action will. His calm guidance and constant support were invaluable at every step of this challenging journey.

I am also profoundly grateful to my students and the participants of this study, who contributed their time, effort, and diligence. This research would not have been possible without them.

I would like to extend my sincere thanks to my professors, who have enhanced my understanding of research and teaching through their inspiring mentorship. Prof. Dr. Selami Aydın, thank you once again for your explanations of complex methods and SPSS, both in your book and lectures. Dr. Ferdane Denkci Akkaş, thank you for your rigorously designed lectures and assignments that pushed me to think critically and deeply. Dr. Abdullah Yıldız, thank you for making the fascinating world of corpus linguistics so engaging. Dr. Derya Oruç, thank you for bringing your lectures to life with your contagious passion for literature and drama.

I would like to express my deepest gratitude to my parents. To my mother, Gülgün Ergün, whose emotional support has been the grounding force behind every step of my education, and to my father, Ahmet Bünyamin Aydın, for instilling in me a lifelong curiosity for learning and exploration. Your love has been my most precious inheritance.

Last but not least, I also want to give special thanks to my cat, Pırtık, who patiently tolerated me stealing her favorite sleeping spot, the desk chair, and brought comfort through the long days and late nights of reading, writing, stressing, and editing.

Sinem Aydın

Dedicated to my mom and dad with much affection.

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LIST OF ABBREVIATIONS

EFL	**:** English as a Foreign Language
FLL	**:** Foreign Language Learning
AI	**:** Artificial Intelligence
SPSS	**:** Statistical Package for the Social Sciences
CALL	**:** Computer-assisted Language Learning
ICALL	**:** Intelligent Computer-assisted Language Learning
EAP	**:** English for Academic Purposes
SCT	**:** Social Cognitive Theory
SRL	**:** Self-Regulated Learning
NLP	**:** Natural Language Processing
LLM	**:** Large Language Model
HE	**:** Higher Education
L2	**:** Second Language
CEFR	**:** The Common European Framework of Reference for Languages
SAWSES	**:** The Situated Academic Writing Self-Efficacy Scale
ZPD	**:** Zone of Proximal Development

1.INTRODUCTION

This section presents the rationale behind the study and research contributions to the EFL field. It aims to familiarize readers with the key terminology related to the topic. Additionally, it provides background information on the study, including its problem statement, aims, significance, and research questions.

1.1. Background of the Study

For significant reasons, writing skills constitute a vital role and pace in the EFL learning process. First, in the information age, writing has undoubtedly been integral to language education as it allows learners to communicate the knowledge they have gained. Therefore, writing correlates with students' content scores (Hosseini et al., 201), as it is a prerequisite for conveying their inner thoughts. Moreover, writing is a credential tool to evaluate a student's mastery of a language. It requires understanding the rhetorical conventions of the language to convey meaning accurately through linguistic patterns (Ariyanti, 2016). Writing is a productive process that necessitates all the acquired skills and experience of language learners. Writing also demonstrates students' ability to organize ideas and arguments progressively; thus, it demands careful content organization (Pysarchyk & Yamshynska, 2015). Learners, including university students, often consider writing incredibly challenging, as it requires a conscious cognitive process (Ariyanti, 2016) that involves learning, drafting, revising, and editing (Yusof et al., 2012). By this means, self-assessment is crucial for an effective writing process; learners who can realistically assess their writing skills can enhance their beliefs in these skills, in other words, their self-efficacy.

Self-efficacy is of great importance in the field of EFL writing. It positively correlates with writing skills (Sabti et al., 2019) as it is a massive predictor of behavior and outcome, impacting numerous determinants that affect success, such as goal-setting, resilience, the amount of effort learners put into a task, affective tendencies, and stress levels (Bandura, 2006). Self-efficacy is generally recognized as not directly affecting writing ability but rather as determining the effort students put into improving their writing performance (Sabti et al., 2019), thereby directly predicting their writing proficiency. As academic self-efficacy beliefs predict academic success (Multon et al., 1991b), learners with higher writing self-efficacy tend to accomplish more than learners who do not believe in their capabilities. Furthermore, there is a negative correlation between writing self-efficacy and writing anxiety (Erkan & Saban, 2011; Sabti et al., 2019). The higher the students' self-efficacy, the lower their writing anxiety, resulting in a positive language learning environment in writing instruction. However, even proficient students fear writing errors, indicating their need for more self-efficacy-accelerating activities in writing instruction (Erkan & Saban, 2011). In this regard, SCT emphasizes the significance of technologies in influencing student self-efficacy (Bandura et al., 1999), acknowledging that experiences can transform one's perceived capacity and restructure one's efficacy beliefs (Bandura, 2006). Therefore, utilizing AI-based tools to enhance writing skills may play a crucial role in improving student self-efficacy.

Technology is very effective in boosting learner self-efficacy (Chen & Hsu, 2022). AI-supported English environments, known as ICALL, can significantly enhance students' self-efficacy (Liu et al., 2023). Considering that students' writing self-efficacy predicts

students' writing outcomes and performance, educators must leverage technological tools to enhance student self-efficacy in writing classes. Generative AI can be implemented in English writing classrooms for various reasons, such as brainstorming ideas, generating and improving texts, writing corrections, and receiving feedback. AI tools are designed to provide personalized guidance tailored to each student's specific needs. By receiving instant, precise, and personalized advice, learners can develop a higher sense of competence and self-efficacy in their writing abilities (Washington, 2023). Furthermore, AI tools that improve writing skills can enhance student self-efficacy due to their immense potential to provide accurate and individualized feedback.

AI feedback is an ideal alternative to teacher feedback for multiple reasons. First, it saves time and energy and could be of higher quality than expert feedback (Jacobsen & Weber, 2023). AI tools can provide constant and personalized writing feedback, which many educators worldwide struggle to provide their students due to heavy workloads or crowded classes. AI tools also have the capacity to comprehend students' ideas in a text and advise on improvements for rewriting (Abdalgane & Othman, 2023). They help students overcome challenges in writing, such as content organization and grammar mistakes, thus improving their overall writing performance (Syahnaz & Fithriani, 2023). These language models, supported by AI, provide personalized learning environments and can become ideal language-learning peers or instructors that EFL learners struggle to find (Guo et al., 2022). Furthermore, positive feedback can increase student self-efficacy and performance (Hadden & Frisby, 2019). Instead of focusing only on errors, like most teachers reluctantly do due to time limits, crowded classes, and workload, AI tools can provide learners with limitless,

encouraging corrective feedback in seconds when used with the correct prompts to formulate the intended feedback. In short, AI tools for personalized student feedback in writing instruction can enhance students' writing self-efficacy, thereby improving their writing performance.

1.2. Statement of the Problem

1.2.1. Problems Related to Academic Writing

All university students must acquire proficiency in academic writing skills to prosper in their studies; however, mastering this skill can be challenging. The primary reason is that writing requires cognitive abilities (Alves et al., 2008) and high-level thinking processes (Moller et al., 2012). Many students require assistance in comprehending and interpreting writing tasks, as well as generating and organizing ideas. In addition, critical thinking skills are indispensable in academic writing (Zhang, 2018), as students must analyze, evaluate, and interpret information and make judgments accordingly (Álvarez Fernández, 2014). This is particularly significant in the Turkish EFL context, where many students do not receive adequate support for developing their critical thinking abilities in their formative years, which poses an obstacle later in their academic education (Genç, 2017; Tosuncuoglu, 2018). Secondly, students need to understand and distinguish the distinct characteristics and organizational patterns of various academic writing genres to meet the expectations of writing assignments (Chauhan, 2022; Roald et al., 2021). Without understanding the expectations associated with specific genres, such as research papers, reports, or essays, it will be difficult for students to communicate their ideas, make

meaningful contributions to the literature, and excel in their academic journey. Additionally, particularly in second language education, even when students master the structure of academic writing genres, they may still lack the necessary linguistic skills to convey meaning through their writing. Writing favors a strong command of grammar and vocabulary knowledge (Zhang, 2018), and inadequacies in these areas can result in students struggling to convey meaning through their texts. Students also face challenges in distinguishing between formal and informal English. Even if there is a tendency towards more informal language in academic writing (Hyland & Jiang, 2017), authors are still expected to adopt a formal tone, follow correct writing rules, and cite evidence to support their arguments (Ankawi, 2020). Furthermore, L1 interference, known as interlanguage, presents another issue in academic writing (Malip, 2022; Watcharapunyawong & Usaha, 2012). It can manifest in numerous diverse ways, from vocabulary selection to discourse coherence, making it imperative to address. Last but not least, writing demands a significant amount of time and effort from both students and teachers. Minimizing errors and increasing writing quality requires substantial time and energy (Phoophuangpairoj & Pipattarasakul, 2022). Additionally, students must undergo a complex writing process, which includes re-writing, writing, and post-writing stages (Listyani, 2018; Wang, 2014). In the post-writing stage, feedback plays a crucial role, but it is often lacking or primarily focused on form rather than content due to time or energy constraints (Wang, 2014). In conclusion, academic writing is crucial for all scholars, and addressing the challenges students face worldwide is noteworthy.

1.2.2. Problems Related to Self-Efficacy in Academic Writing

Building strong student self-efficacy for higher academic writing performance can be problematic, particularly in the EFL context, and requires associated interventions (Zhang, 2018). Writing anxiety is a significant factor contributing to lower levels of self-efficacy in academic writing (Kırmızı & Kırmızı, 2015; Martinez et al., 2011; Sabti et al., 2019). It causes nervousness, boredom, and avoidance of writing tasks, which hinders students' writing performance (Klassen, 2002). Additionally, students' language proficiency levels can hinder self-efficacy in writing. A positive correlation exists between language proficiency and perceived writing self-efficacy (Demirkol & Demiröz, 2022). Starting their academic education with lower language proficiency, some EFL students face challenges in constructing meaning through linguistic patterns, ultimately affecting their beliefs in their writing capabilities (Nasrollahi & Barjasteh, 2013). Lack of practice is another common cause of low student self-efficacy (Troop et al., 2015). Practice is essential for academic writing students to improve their language skills and confidence in their writing abilities. Making small changes and scaffolding with gradual steps helps students gain momentum in writing (Nourazar et al., 2022). These small changes contribute to a sense of "mastery experience" for students (Deri, 2022). Students' actual performances are considered the best determinant of student self-efficacy (D. H. Schunk & Zimmerman, 2007), and by scaffolding and providing support, students can experience mastery success in their writing. However, writing requires significant time and energy both from students and teachers. Traditional writing instruction strategies often struggle to develop students' writing skills and self-efficacy (Fathi et al., 2023). Even when language proficiency is achieved, students

may still encounter difficulties in academic writing, particularly in expressing themselves effectively, due to differences in rhetorical style and culture (Gao, 2015; Setyaningsih & Larassati, 2021). This can lead to decreased self-efficacy, even if they were highly accomplished in their second language. Another crucial reason for lower student self-efficacy in academic writing is the lack of effective feedback from their instructors or peers (Bandura, 1986; Zarrinabadi & Rezazadeh, 2023). In most educational settings, teachers play a central role in providing student feedback (Furqoni, 2019). On the other hand, they may sometimes fail to provide adequate feedback due to constraints such as limited time, crowded classes, or a lack of expertise, although feedback based on student needs and preferences is essential for writing classes (Ruegg, 2018; Seker & Dincer, 2014). Furthermore, self-efficacy is a set of self-beliefs associated with each distinctive function and skill or subskill, and unique to each individual (Bandura & Bandura, 2005). Therefore, it must be addressed in accordance with individual differences. Do students need assistance generating ideas, brainstorming, linguistics, or organization? Are they struggling with writing anxiety? In most educational settings, limited resources are available to identify and address individual differences with personalized approaches. Lastly, peer comparison is crucial in building writing self-efficacy (Lee & Evans, 2019). Therefore, creating a positive environment in writing classes is highly important. Collaborative writing and peer review strategies significantly boost writing self-efficacy (Afzali & Parsa, 2021; Herwiana, 2021; W. Wei et al., 2024). On the other hand, in exam-oriented environments, such as those in Turkey, students feel that they are falling behind their peers and experience a decrease in student motivation (Bulut, 2022), as well as high levels of anxiety, which affects their

writing performance (Sabti et al., 2019); consequently, their self-efficacy. In a supportive environment, witnessing others succeed, known as a vicarious experience, can have a notable impact on student self-efficacy (D. H. Schunk, 1995). Given these difficulties, integrating cutting-edge tools like AI-based feedback into academic writing may offer a supportive and personalized learning environment that promotes self-efficacy.

AI-based feedback may hold promise in addressing the challenges that students and teachers worldwide face in academic writing classes. First, AI tools might serve as a valuable substitute for in-class practice by providing a platform for students to enhance their writing skills (Mun, 2024). Mastery experience is the critical source of self-efficacy (Cone, 2009) and improves students' actual performance and achievement. (Özcan & Kültür, 2021). AI tools can alleviate writing anxiety (Dizon & Gold, 2023) and foster academic emotions and writing self-efficacy, thereby enhancing students' behavioral, emotional, and cognitive engagement (Nazari et al., 2021). Second, AI tools can provide limitless and immediate feedback in academic writing. Even when energy and time are abundant, teachers can still face problems related to their expertise. AI tools are promising in providing high-quality and accurate feedback on various aspects of writing, including linguistic patterns, coherence, style, punctuation, and spelling (Leiping, 2024). Due to rhetorical and cultural differences, many EFL students also encounter difficulties in academic writing, such as referencing and citation, plagiarism, and paraphrasing (Ho, 2024). AI-based feedback supports students in developing their rhetorical style and cultural understanding, as well as improving writing proficiency (Roy & Swargiary, 2024; C. Song

& Song, 2023). Moreover, AI tools can provide personalized, tailored feedback (Roy & Swargiary, 2024), fostering independent learning experiences and potentially increasing learner autonomy (Dizon & Gold, 2023). Lastly, AI can provide positive feedback, which is often overlooked in writing classes due to concerns about time and energy. Most AI tools possess a unique tone that encourages learning and appreciates performance, regardless of its magnitude. By providing both positive and constructive feedback, AI tools can enhance students' writing motivation (Song & Song, 2023), confidence, and self-efficacy (Nazari et al., 2021). For all these reasons, implementing AI-based feedback in academic writing classes might help address the challenges students and educators face regarding writing skills and self-efficacy.

1.3. Aims of the Study

Academic writing skills have a direct impact on a student's academic performance and success. Yet, it is a complex skill with various challenges that can impede students' progress. Writing self-efficacy is prominent in academic writing achievement, directly impacting students' writing performance. When students have lower self-efficacy levels, they tend to avoid writing tasks or approach them with less effort, which negatively affects their writing quality. Low self-efficacy levels cause higher anxiety and reduced motivation, impacting their academic performance. Feedback is also crucial to improving both writing self-efficacy and performance. The absence or inefficacy of feedback in academic writing classes hinders students' comprehension of the writing tasks, limits their learning, and reduces their engagement, motivation, and self-efficacy. In this sense, AI feedback has the

potential to revolutionize the process by providing limitless, high-quality feedback at any time and from anywhere. Therefore, this study aims to explore the potential of AI-based feedback to enhance self-efficacy in academic writing classes. It is designed to assess students' self-efficacy levels in academic writing classes in the Turkish EFL, compare traditional feedback with AI-based feedback, and determine if AI-based feedback improves students' beliefs about their ability to succeed in academic writing tasks. Ultimately, the study aims to inform pedagogical practices related to writing self-efficacy and provide recommendations for instructors on integrating AI feedback into academic writing classes.

1.4. Significance of the Study

This study has the potential to make a valuable contribution to the literature by investigating the impact of AI-based feedback on academic writing self-efficacy, specifically for the following reasons. First, AI-based feedback can transform academic writing processes by providing a valuable alternative to traditional feedback methods such as peer or teacher feedback. Second, understanding how AI-based feedback can enhance self-efficacy in writing is crucial for research on self-efficacy. Third, given the inseparable integration of technology within EFL instruction, ensuring technology literacy for both teachers and students is imperative. Fourth, learner autonomy and independent learning are increasingly vital, and AI tools can support this need. Fifth, in addition to contributing to the global literature, this study offers a unique perspective on the Turkish EFL context in a university setting. Turkish EFL students exhibit moderate levels of writing self-efficacy (Kırmızı & Kırmızı, 2015), and AI-based feedback may be a solution to enhance their

writing self-efficacy. Furthermore, the findings can offer practical applications for teachers to enhance students' writing self-efficacy through AI-based feedback, as well as provide ideas for developers to create better AI tools tailored to the specific needs of academic writing students. Finally, this study is significant since the existing studies investigating the impact of AI-based feedback on self-efficacy in academic writing are scarce, and the existing EFL literature examining the effect of AI-based feedback on self-efficacy in academic writing in the Turkish context is non-existent.

To this end, the study has four aims. First, the study aims to evaluate the level of academic writing self-efficacy among Turkish EFL students. Second, it investigates the impact of traditional teacher feedback on academic writing self-efficacy. Third, it aims to investigate the impact of AI-based feedback on academic writing self-efficacy. Finally, the study aims to compare the effects of traditional and AI-based feedback on self-efficacy in academic writing.

1.5. Research Questions

As mentioned above, writing performance is strongly influenced by a student's belief in their ability to do well. AI-generated feedback has emerged as a substitute for traditional feedback, promising to enhance students' academic writing self-efficacy. Despite the growing body of research on AI, a gap exists in the literature concerning the impact of AI-based feedback on self-efficacy in academic writing. Thus, the study aims to contribute insights to help educators enhance students' self-efficacy in academic writing and offer

recommendations for integrating AI feedback in academic writing instruction. With these considerations in mind, this study aims to address the following research questions:

1. What is the level of academic writing self-efficacy among Turkish EFL students?
2. Does traditional teacher feedback affect self-efficacy in academic writing?
3. Does AI-based feedback affect self-efficacy in academic writing?
4. Is there a difference between the impact of AI-based feedback and teacher feedback on self-efficacy in academic writing?

2. RELATED LITERATURE

This section includes two subsections. First, it presents a comprehensive theoretical framework that encompasses approaches to EFL writing and theories related to teaching writing, as well as self-efficacy, feedback, and the use of AI tools and AI-based feedback in foreign language learning. Second, it presents research findings on academic writing, feedback, self-efficacy, the impact of feedback on self-efficacy, and the impact of AI-based feedback on writing self-efficacy.

2.1. Theoretical Framework

2.1.1. Writing

Writing is a critical component in language learning as one of the four essential language skills (Zuhri & Sukarnianti, 2015). Writing is a vital form of communication for expressing personal thoughts and ideas, encompassing a wide range of genres, from journaling to academic writing. Iftanti (2016) suggests that the definition of writing depends on the approaches used to teach it. The product-based approach defines writing as the ability to produce accurate language forms. In contrast, the process-based approach views it as a cognitive process involving the generation of ideas, drafting, editing, revising, and publishing. On the other hand, the genre-based approach views writing as making sound judgments about the audience, using structural patterns and content appropriately in the given discourse (Iftanti, 2016).

2.1.1.1. Academic Writing

Academic writing is a vital skill in scholarly communities, enabling individuals to convey their thoughts and knowledge with clarity and precision across a wide range of contexts. Wischgoll (2016) defines academic writing as a task that requires academic writers to anticipate their readers' expectations, employ cognitive strategies such as planning and reviewing, as well as metacognitive strategies like facilitating and monitoring the process, and carefully consider structure and content through recursive processes to achieve an end product. Therefore, academic writing is not "merely ordinary writing" but thinking, analyzing, proving, and presenting factual and academic data (Ariyanti, 2016). It is a complex process that requires the cooperation of various metacognitive skills (Olinghouse & Leaird, 2009) and psycho-physical activities (Gautam, 2019). As Gautam (2019) expresses, despite being considered a secondary skill by the masses, writing is a prominent "emblem of knowledge" for scholars.

2.1.1.2. Approaches to Writing

In the EFL context, there are five primary approaches to teaching writing: *product-based, process-based, genre-based, process-genre, and reader-dominated*. *The product-based approach* is a traditional method of teaching writing based on Audiolinguism, which prioritizes accuracy over form and final product over the writing process (Mourssi, 2013). According to Steele (as cited in Hasan & Akhand, 2010; Tran-Thanhi Vu, 2017), a typical product-based lesson follows four stages: first, students are presented with a sample text including the target structure and style; second, they practice the sample text in isolation

through controlled practice; then, they organize their ideas, by focusing more on the organization of the ideas than the ideas themselves; lastly, they produce an end product by imitating the model text, replicating its structure, style, and content (Hasan & Akhand, 2010; Tran-Thanhi Vu, 2017). Abdulrahman and Kara (2022) highlight the advantages of the product-based approach in teaching writing. Teachers find this approach very effective in writing instruction, particularly when time is limited. The authors emphasize that providing a sample model in advance instills confidence in students and fosters familiarity and a sense of security. In addition, this approach can equip learners with the skills to compare and contrast their written products with well-written samples, facilitating the development of their writing techniques such as brainstorming, introducing topic sentences, and incorporating thesis statements. In this way, it promotes self-study under the guidance of the teacher (Abdulrahman & Kara, 2022). Suryana and İskander (2015) also support the idea that the product-based approach has benefits. This approach systematically teaches the logic of English rhetorical patterns to familiarize students with the target genre, enhancing students' awareness of writing structures, particularly grammar. However, they propose that an integrated approach could better assist learners, as the product-based approach also has drawbacks. The product-based approach in teaching prioritizes accuracy, which can potentially hinder students' motivation due to the high pressure. Additionally, it tends to overemphasize grammar, syntax, and structure, neglecting the audience and the writing purpose (Suryana & Iskandar, 2015). In contrast with the traditional product-based approach, *the process-based approach* emphasizes the writing process rather than just the final product (Sun & Feng, 2009). It guides learners

through various stages of writing, including pre-writing, drafting, evaluating, and revising. (Rusinovci, 2015). According to Rusinovci (2015), a typical process-based lesson starts with a pre-writing activity to help students discover the topic and generate ideas. Students create multiple drafts, focusing on content and meaning rather than the final product. Editing and revising are done through discussions and feedback from readers in a recursive process (Rusinovci, 2015). Studies have shown that implementing the process-based approach is critical for improving students' writing abilities (Bayat, 2014; Dokchandra, 2018; Göçen, 2019; Rusinovci, 2015). Sholikah et al. (2019) suggest that the process-based approach is more effective than the product-based approach in enhancing students' writing abilities and self-confidence. This approach also encourages students to find their inner voice and develop positive attitudes towards writing (Göçen, 2019). Spending more time on the writing process can help reduce students' anxiety and improve their success (Bayat, 2014). However, the process-based approach is criticized for overemphasizing language skills through repetitive drafts and revisions without focusing on linguistic skills (Thanh Tuyen et al., 2016). Some researchers also suggest that implementing this approach in overcrowded classes (Dokchandra, 2018) and limited periods (Bayat, 2014) could be challenging for writing students and teachers. Unlike the process-based approach, *the genre-based approach* prioritizes the communicative function of writing rather than its process; it sees language as "a meaning-making resource" to make meaning in social contexts (Halliday & Matthiessen, 2013; Pham & Bui, 2021). The genre-based approach is favored for teaching writing because it introduces language in real-world contexts by demonstrating texts within their respective genres and social contexts (Pham & Bui, 2021).

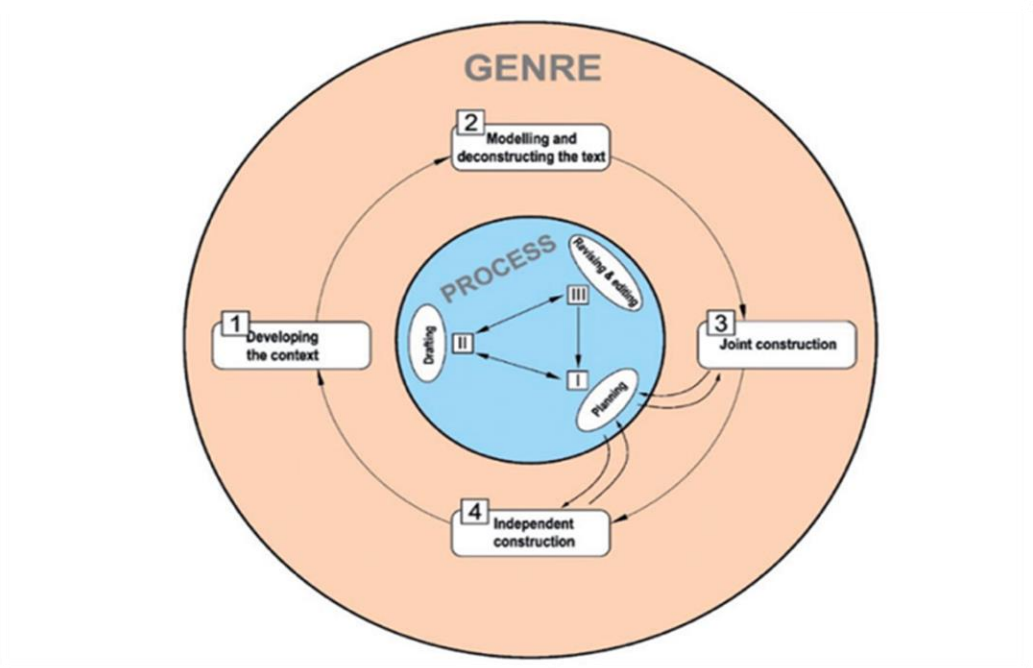
According to Tuan (2011), the genre-based approach to writing is necessary to help students effectively communicate in their academic lives for several reasons. First, it enhances genre awareness by encouraging students to explore the social and cultural contexts of the writing texts, as these contexts determine a text's purpose and structure. Second, students need to meet the expectations of their readers by following specific linguistic conventions regarding grammar, content, and organization to be accepted by a certain English-language discourse community. Additionally, Tuan (2011) states that having originated from the SCT, this approach encourages collaboration, support, social interaction, and group participation among students to develop new knowledge, thereby alleviating the feeling of isolation that writing lessons is often associated with. However, the genre-based approach has been criticized for its strict adherence to genre structure, which limits students' creativity (Ahn, 2012). In addition, explicit teaching of a particular genre can make students overly reliant on teachers (Rusinovci, 2015). Therefore, after comparing and analyzing the strengths and weaknesses of the product-based, process-based, and genre-based approaches, Bagner and White (2000) found that these approaches are complementary. Thus, to address the issues with the approaches as mentioned earlier, a new teaching approach to writing has been introduced, known as *the process-genre approach*. The process-genre approach aims to improve learners' linguistic and contextual skills. In other words, linguistic forms, such as grammar and vocabulary, should be taught in meaningful contexts related to genres (Zhang, 2018). As shown in Figure 1 (Rose & Martin, 2012), a process genre lesson includes genre and process levels (Huang & Zhang, 2020). At the genre level, teachers engage students in the writing process by first

identifying the communicative purpose and audience, which helps establish the context. Next, they model and deconstruct the genre, allowing students to become familiar with it through teacher-led analysis. Using models, the teacher highlights the genre's metalanguage, structure, and rhetorical conventions. At the process level, during the joint construction stage, students work collaboratively to plan their writing, with teachers providing explicit modeling and guidance on generating and organizing ideas using tools such as mind maps and spidergrams (Huang & Jun Zhang, 2020). The process-genre approach enhances students' writing performances in terms of content, organization, vocabulary, grammar, and mechanics. (Cahyono, 2017; Huang & Jun Zhang, 2020; Pujianto & Emilia, 2014) Furthermore, according to Zhang's study (2018), adopting the process-genre approach improves students' self-efficacy and confidence in academic writing. However, Pujianto and Emilia (2014) suggest careful implementation is necessary for lower-achieving students, who require more modeling and teacher-student conferences. Selvaraj and Aziz (2019) note that while this approach has advantages, planning and teaching lessons based on the process-genre approach can be time-consuming. Finally, *the reader-dominated approach*, also known as EAP, focuses on teaching language skills and genres specific to academic settings (Crosthwaite, 2016). In this approach, learners are considered members of the academic community, prioritizing readers' expectations over those of writers (Selçuk & Aydin, 2024). EAP instruction enhances academic language, skills, and proficiency and assists students with subject-specific terminology (Bayram et al., 2022). Moreover, it has a positive impact on learner production (Crosthwaite, 2016). Moreover, Bayram et al.'s study (2022) revealed an increase in students' perceived self-

confidence and readiness for their future careers, even though some learners may still require more explicit instruction on linguistic and content knowledge, as well as how to research academic resources. All in all, as Bhowmik (2021) suggests, "*There is no one-size-fits-all approach to EFL writing instruction; instructors should be prepared to adopt any context-appropriate approach that works best for them*."

Figure 1

The Adapted Process-Genre Writing Instructional Framework



2.1.1.3. Theories Related to Teaching Writing

2.1.1.3.1. *The Input Hypothesis*

According to Krashen's Monitor Model, The Input Hypothesis suggests that second-language acquisition is only facilitated when learners are exposed to

comprehensible input that includes structures slightly above their current level of competence, known as the "i + 1" theory (Bahrani et al., 2014; D. Liu, 2015; Ren & Cheng, 2023). Krashen (1991) asserts that comprehensible input alone is not enough; it requires three conditions: the input must be at the "i+1" level, learners need to have low affective filters, and they must be open and ready to acquire the input. Krashen (1983) also recommends increasing the meaningfulness of the instructional experience by integrating language teaching with the subject matter, conversational techniques, or reading. In EFL writing practices, the theory emphasizes the importance of providing students with challenging input that is slightly above their current level to support instruction (Alkhalaf, 2022). Therefore, writing teachers should focus on giving abundant comprehensible input and reducing students' emotional anxiety to optimize language acquisition (Wang, 2023). Moreover, a reciprocal relationship exists between reading and writing skills; thus, providing students with comprehensible written input can significantly enhance their written output (Alkhalaf, 2022; Graham & Hebert, 2010).

2.1.1.3.2. *The Output Hypothesis*

Swain's Output Hypothesis underlines the importance of producing language in second language acquisition (Uggen, 2012). While Swain (1995) acknowledges the importance of input, she argues that output plays a more critical role in language acquisition, enabling deeper language processing with more mental effort than input. By generating output, learners can gain a deeper understanding and notice the gaps in their knowledge (Izumi & Bigelow, 2000). Realizing mistakes and correcting them with

feedback enhances accuracy and fluency (Swain, 1995). In EFL writing practices, the Output Hypothesis plays a significant role by emphasizing the importance of language production. The production of the target language triggers mental processes, helping learners consciously identify their linguistic difficulties (between what they want to speak or write and what they can speak or write) so that they can recognize and modify their output (Swain & Lapkin, 1995). Furthermore, utilizing various writing tasks impacts writing skills by promoting engagement and writing motivation (Wei, 2018).

2.1.1.3.3. The Noticing Hypothesis

According to the Noticing Hypothesis, output is not always sufficient to lead learners to pay attention to the target form (Izumi & Bigelow, 2000). Second-language learners must actively focus on the linguistic features in the input to aid in language learning (Truscott, 1998). Noticing and conscious awareness help convert input into intake (R. Schmidt, 2012). Noticing plays a crucial role because the emergence of knowledge is preceded by noticing new forms and concepts in the target language (Yuvienco, 2012). In terms of writing skills, learners must consciously observe and analyze various language elements, such as grammar, sentence structure, or vocabulary usage, to comprehend and apply them in their written work, producing more effective written texts. Moreover, Qi and Lapkin's study (2001) highlights the importance of quality feedback in noticing during writing tasks. The feedback given to students should create conditions that help them identify their errors and notice the gaps in their knowledge (Qi & Lapkin, 2001). Therefore, students' attention should be directed to specific grammatical structures or

vocabulary in model texts, and they should be encouraged to notice and correct the errors in their written work with the assistance of teacher or peer feedback, as well as through self-editing.

2.1.1.3.4. *The Interaction Hypothesis*

The Interaction Hypothesis posits that a second language is acquired significantly through interaction, particularly with the negotiation of meaning between learners and proficient users (Owusu et al., 2022) or between learners and machines (Ebadi & Amini, 2024; Peterson, 2012). According to this hypothesis, language learning is facilitated by negotiating meaning, in which learners seek clarification, elaboration, and confirmation to produce more accurate and contextually appropriate language (Ranaweera, 2015). Al Khateeb (2014) explains that meaningful negotiation makes the input comprehensible since the negotiation of meaning provides direct or indirect feedback through correction, comprehension checks, clarification requests, topic shifts, repetitions, or recasts. Through this feedback, learners become aware of the mismatches between their input and output. (Al-Khateeb, 2014). As a productive skill, writing is an interactive process that allows learners to engage with their peers or teachers. This interaction enables learners to receive feedback or negotiate meaning in collaborative writing tasks or peer review sessions. In group or pair work activities, they can brainstorm ideas, clarify their thoughts, productively criticize each other's work, and refine their writing. Maftoon and Ghafoori (2009) found that pair work activities before writing assignments and collaborative interaction with their partners positively impacted students' writing skills. Engaging

writing tasks, particularly those encouraging students to build collaborative dialogue with others, help teach strategic processes and grammatical and lexical structures (Maftoon & Ghafoori, 2009).

2.1.1.3.5. The Feedback Hypothesis

The Feedback Hypothesis emphasizes the importance of feedback in enhancing learners' language proficiency. Extensive research supports this hypothesis, indicating that feedback considerably enhances language learning (Althobaiti, 2014; Hosseiny, 2014; MacKey, 2006; MacKey et al., 2000; Zhang & Zhang, 2024). Additionally, this hypothesis is supported by various theoretical frameworks, including the Noticing, Interaction, and Output Hypothesis, which collectively emphasize the importance of feedback in facilitating language learning processes (Alharbi, 2021; Althobaiti, 2014; Patra et al., 2022).

Feedback plays a crucial role in EFL writing instruction for several reasons. Corrective feedback in academic writing lessons facilitates learners' writing competence, reduces students' academic writing anxiety, and enhances their attitude toward learning (Patra et al., 2022). Feedback also proves helpful for grammar correction in writing (Alharbi, 2021). Hosseiny's study (2014) emphasizes the importance of both direct and indirect corrective feedback in developing grammatical knowledge in writing. When students receive feedback, they can practice and improve their skills in structure, which is impossible when they do not have a chance to receive feedback. Interactional feedback

also positively impacts noticing and correcting L2 forms (MacKey, 2006). However, Robb et al. (1986) argue that directing students' attention to the surface error may be sufficient, and detailed explanations may not be necessary, allowing for more focus and time on other aspects of students' writing. Mackey et al.'s (2000) study on learners' perception of interactional feedback reveals that learners accurately perceive lexical, semantic, and phonological feedback but not as much morphosyntactic feedback on form and structure. They emphasize the importance of the content and the nature of the feedback, suggesting that an optimal condition for the learner might be a small amount of feedback at the right time in their developmental stage, as receiving too much feedback could lead to cognitive overload. Therefore, the quantity, timeliness, nature, and L2 developmental stage of feedback are all factors to be considered in language learning (MacKey et al., 2000).

Feedback in EFL writing settings can take various forms, such as teacher, peer, or automated feedback. Zhang and Zhang's research (2024) reveals that all feedback from teachers, peers, and automated systems encouraged planning and self-evaluation strategies. Their study emphasizes the importance of teachers understanding that all types of feedback positively affect the use of metacognitive strategies in writing instruction. Additionally, teachers should be aware that different types of feedback affect different subcategories of metacognitive strategies and should employ a variety of feedback types to enhance the development of these strategies. Teachers can, for example, employ automated feedback to teach self-evaluation techniques and teacher feedback to promote students' language accumulation strategies (Zhang & Zhang, 2024).

2.1.2. Self-Efficacy

Bandura's SCT states that perceived self-efficacy, which strongly predicts behavior, is one's belief in one's capability to produce specific attainments (Bandura, 1978, 2006). Schwarzer and Luszczynska (2008) define self-efficacy as a realistic and optimistic belief in one's ability to handle challenging expectations and functioning, considering it the "resilience factor." Self-efficacy is crucial since it determines effort, persistence, perseverance, the degree of anxiety or serenity, strategizing, performance, goal-setting, academic achievement, problem-solving strategies, and recovery from setbacks (Heslin & Kleche, 2006; Schwarzer & Luszczynska, 2008; Usher & Pajares, 2008). Learners' self-efficacy beliefs are individual differences; each student has a different self-efficacy level (Yelgeç & Dağyar, 2022). Also, self-efficacy is domain-specific; individuals can have higher self-efficacy in one area and lower self-efficacy in another. Individuals with high self-efficacy in a specific domain are more likely to set ambitious goals and undertake significant challenges (Schwarzer & Luszczynska, 2008). Thankfully, self-efficacy can be developed to increase its benefits (Heslin & Kleche, 2006).

Various sources help increase self-efficacy. First, *personal accomplishments and mastery* can enhance self-efficacy (Schwarzer & Luszczynska, 2008). Students' confidence to achieve related or similar activities increases when they believe their efforts are successful. Conversely, their confidence in similar pursuits decreases when they perceive their efforts fail to produce the desired outcomes (Usher & Pajares, 2006).

Mastery experience, the strongest predictor of self-efficacy, has long-term, enduring effects on individuals' lives (Usher & Pajares, 2006, 2008). Second, *vicarious experiences* can strengthen self-efficacy (Schwarzer & Luszczynska, 2008). When a role model, a person who is similar in ability to the individual, successfully masters a challenge, the favorable social comparison helps to improve self-efficacy. Students who are uncertain may be persuaded that they can also succeed when they witness a peer whom they perceive as similar in ability to achieve a task successfully (Usher & Pajares, 2006). Third, *the verbal and social persuasions* from others may enhance self-efficacy (Schwarzer & Luszczynska, 2008). The support can increase students' confidence in their abilities from teachers, parents, and peers. Students, especially those still developing their ability to make correct self-appraisals, rely on others to give evaluative feedback on their achievements. (Usher & Pajares, 2006). Lastly, *emotional and physiological states* such as arousal, stress, anxiety, and fatigue influence self-efficacy (Usher & Pajares, 2006). Students frequently perceive their physiological arousal as a measure of competence. For instance, anxiety often undermines students' confidence in their abilities. Emotional reactions to specific tasks can indicate whether a student is likely to succeed or fail in a particular area. Improving students' physical and emotional well-being and decreasing negative emotional states boosts self-efficacy.

In summary, there are various sources to improve self-efficacy. The most effective sources of self-efficacy come from personal mastery experiences (Usher & Pajares, 2006). Self-efficacy is positively influenced when a person is allowed to attempt a new behavior

(mastery experience) rather than simply observing others (vicarious experience), listening to others (social persuasions), and trying to manage their anxiety levels (affective factors), in this specific order (Schwarzer & Luszczynska, 2008).

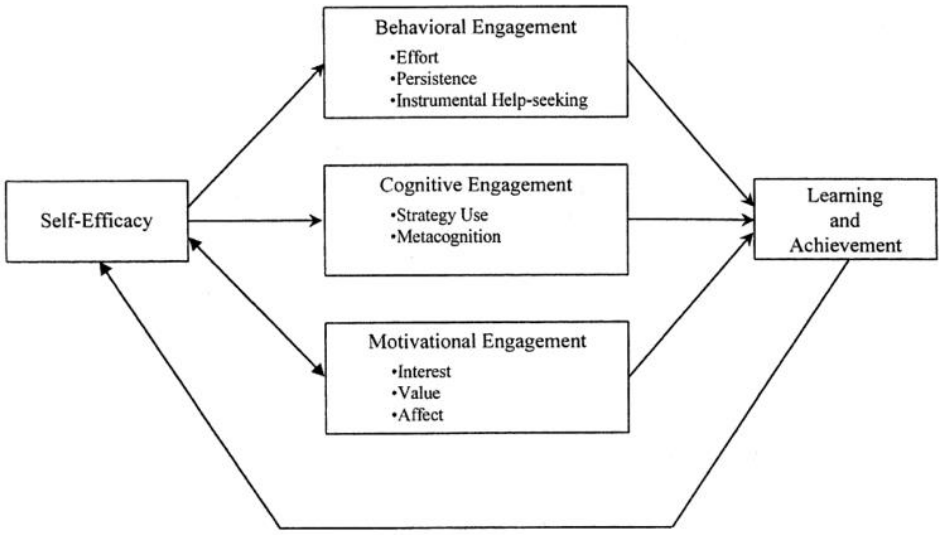
2.1.2.1. Self-efficacy in Foreign Language Learning

Self-efficacy is particularly relevant in FLL, where learners often face challenges that can directly influence their motivation and confidence. Self-efficacy strongly enhances behavioral, cognitive, and motivational engagement, thus directly improving foreign language proficiency and performance (Çubukçu, 2008; Linnenbrink & Pintrich, 2003; Raoofi et al., 2012). As shown in Figure 2 (Linnenbrink & Pintrich, 2003), self-efficacy leads to increased engagement and improved language achievement (Linnenbrink & Pintrich, 2003). Students with higher self-efficacy levels tend to engage in more tasks, and this increased engagement leads to improved learning and performance (Çubukçu, 2008; Linnenbrink & Pintrich, 2003). Behavioral engagement involves observable actions, such as effort, help-seeking, and persistence. In contrast, cognitive engagement occurs in students' minds, where engagement with material at a deeper level leads to improved comprehension. Self-efficacy has been shown to significantly correlate with the use of effective language learning strategies (Nosratinia et al., 2014). Students with higher self-efficacy tend to employ more metacognitive learning strategies, which are vital to language learning. Motivational engagement encompasses personal interests (likes and dislikes), value (importance and utility), and affect. Self-efficacy has a strong influence over students' emotions (Linnenbrink & Pintrich, 2003). Students with low self-efficacy

may experience an increase in negative emotions due to a lack of belief in their ability to achieve their goals, leading to depression and pessimism. Low self-efficacy can also lead to increased anxiety in situations where performance is crucial, as in FLL. Hence, students with lower levels of self-efficacy tend to experience more foreign language anxiety, which hinders their engagement and success in language learning (Yelgeç & Dağyar, 2022).

Figure 2

A General Framework for Self-efficacy, Engagement, and Learning



Self-efficacy is also a strong predictor of academic success (Özer & İşpınar, 2021; Usher & Pajares, 2006). Students' beliefs about their abilities to excel in academic tasks strongly influence their academic performances; they engage in more challenging activities, thus improving their competencies. Academic and self-regulatory self-efficacy can be strengthened through various sources, including mastery experience, vicarious experience, social persuasion, and physiological states, each contributing to an individual's

self-efficacy (Usher & Pajares, 2008). Understanding the roles of teachers, parents, and classmates in forming and developing students' academic confidence would guide academic practices to cultivate and nurture these critical self-beliefs. Effective academic education can enhance student self-efficacy, leading to increased classroom engagement and learning.

Linnenbrink and Pintrich (2003) suggest four teacher practices to enhance student self-efficacy: First, assist students in maintaining high, yet realistic, self-efficacy beliefs. Second, assign challenging academic tasks that most students can accomplish with effort. Third, promote the understanding that competence or capacity is a controllable growth feature that can be developed. Last, the focus should be on fostering students' domain-specific self-efficacy beliefs rather than their overall self-esteem.

2.1.2.2. Theories and Models Related to Self-Efficacy

2.1.2.2.1. *Social Cognitive Theory*

Albert Bandura developed SCT in response to behaviorism, which shifted its focus from behavior to cognition in the 1970s (Luszczynska & Schwarzer, 2015). This theory posits that forethought is key to human motivation and action. Forethought shapes expectations and determines the outcomes of actions (Luszczynska & Schwarzer, 2015; Woodcock & Tournaki, 2023). According to SCT, humans are both experiencers and agents of their experiences (Bandura, 2001). Being an agent involves taking deliberate action to achieve specific outcomes. SCT presents humans as the producers and products

of their social systems. They are not merely passive subjects controlled by external circumstances; they utilize their sensory, motor, and cognitive systems to fulfill objectives that provide purpose, direction, and satisfaction (Bandura, 2001).

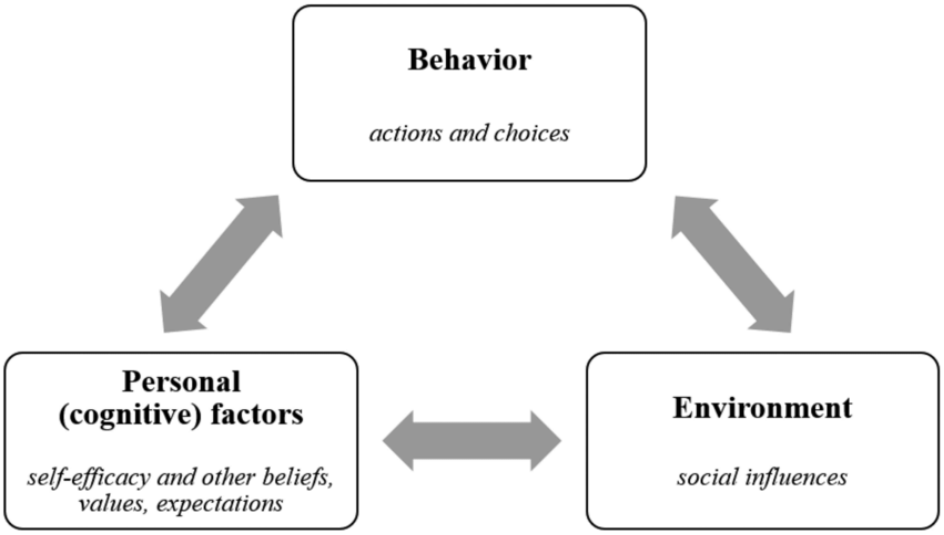
One of the critical concepts of SCT is observational learning (Ilmiani et al., 2021; H. W. Kim, 2020; S. Song et al., 2019). It emphasizes the significance of social contexts in learning new behaviors and skills. Individuals acquire behaviors and skills through imitation, modeling, and observation. Observational learning suggests that humans learn through direct experience and by observing others. This process involves attention, retention, motor reproduction, reinforcement, and motivation (Humeijia, 2021). For instance, Bandura and Ross's well-known Bobo doll experiment (Bandura et al., 1963) demonstrates that children can easily mimic and replicate aggressive behaviors after observing others act in an aggressive manner, in this case, using a doll aggressively. No rewards, punishments, or consequences are necessary for learning. Instead, the likelihood of learning increases if the observer identifies with the model (Bandura et al., 1963).

Triadic reciprocal determinism is another critical concept of SCT (Woodcock & Tournaki, 2023). The relationship among our environment (external factors such as social influences), personal factors (internal factors like self-efficacy, beliefs, and expectations), and our behavior (our actions and choices) is reciprocal, influencing one another. Figure 3 (Kuznetcova et al., 2022) illustrates how triadic reciprocal determinism accounts for human behavior through personal, behavioral, and environmental influences. According to

Bandura, self-efficacy is one of the most important individual factors in the triadic reciprocal determinism relationship (S. Song et al., 2019; Woodcock & Tournaki, 2023). For instance, the link between academic self-efficacy and achievement is well-documented (Ismail et al., 2017). When students possess high self-efficacy regarding their ability to pass an exam (personal factor), it directly impacts the effort they invest in studying, which can enhance the outcome (behavior) and shape teachers' responses (environment).

Figure 3

The Triadic Causation (= Reciprocal Determinism) Model



All in all, SCT offers valuable insights and is applied in various fields, including education. The theory presents essential principles for educational practices. Using observation as an instructional strategy, promoting methods to enhance academic self-efficacy, and encouraging positive behavior through modeling exemplify some applications of the theory in classroom instruction.

2.1.2.2.2. Self-Regulation Theory

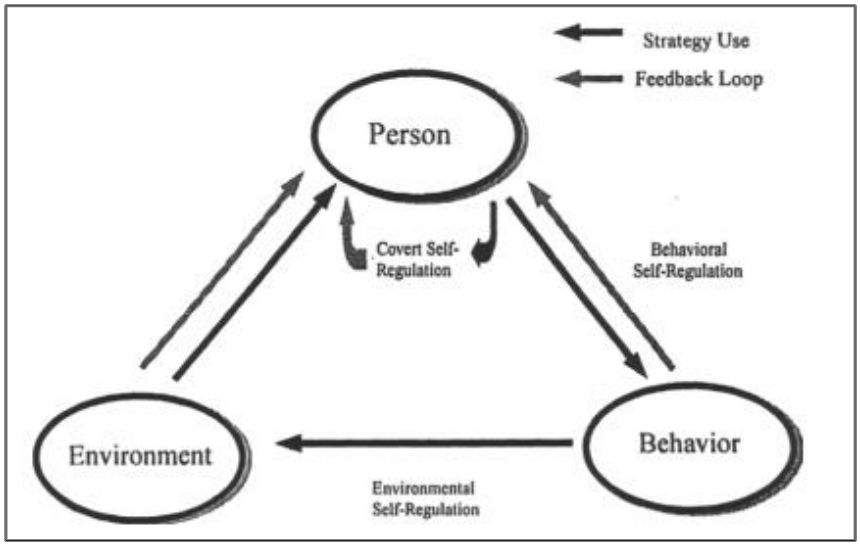
Developed by Zimmerman (2000a, 2000b), SRL presents the remarkable relationship between self-regulation and self-efficacy. The concept of self-regulated learning emerged from Bandura's work in SCT (Bandura, 1989, 1997). The Bobo doll experiments demonstrated how individuals quickly adapt their behaviors based on the actions of others, which moved the understanding of human behavior beyond traditional behaviorism (Bandura et al., 1963). Children's rapid imitation of models was a striking discovery, meaning individuals can control situations by self-regulating their behaviors, emotions, and thoughts.

Self-regulation enables the management of both external and internal responses to achieve long-term goals (Inzlicht et al., 2021). Self-regulated learning encompasses goal setting, cognitive strategies like planning and rehearsing, and monitoring goal achievement before learning (Murphy et al., 2008). As illustrated in Figure 3 above, SCT posits that behavior is mutually influenced by personal factors and the environment (Kuznetcova et al., 2022). Figure 4 below further demonstrates how Zimmerman (1989) views behavior as a feedback loop system involving information from the self and the environment. The triadic feedback from both the self and the environment (see Figure 4) enhances the individual's understanding of their belief in their capability to complete a task; consequently, there is a correlation between self-regulation and self-efficacy (Bandura et al., 2001; Murphy et al., 2008; Zimmerman, 2000a, 2000b). All in all, individuals' beliefs about their abilities mediate behavioral changes (Abramson et al., 1978; Dweck, 2017).

The ability to guide and sustain one's learning is potent, making self-regulated learning essential for enhancing teaching and learning, including academic performance (Bahir & Wang, 2023; Bembenutty, 2023; Broadbent & Poon, 2015; Zimmerman, 2000a).

Figure 4

Triadic Forms of Self-regulation



2.1.3. Feedback

Feedback refers to information regarding the gap between a parameter's actual and reference levels, which can be used to modify the gap in some way (Ramaprasad, 1983). When this information is applied to change the gap, it becomes feedback. It cannot be considered feedback if it is stored without being utilized to close the gap (Ramaprasad, 1983). Thus, the feedback must be effectively used by the receiver (Winstone et al., 2017). This process requires essential components, including self-regulation, self-assessment, and self-knowledge. The receiver needs to understand the feedback to take action, believing

that the task is achievable and that there is not an unconquerable gap between the actual and desired performance (Wilson, 2012). To provide effective feedback, teachers should focus more on the task than the learner (Al-Hattami, 2019). Although the most common feedback often includes phrases like "Good!", “Well done!" or “Try harder!”, these have minimal impact on learning; instead, systematic feedback promotes positive learning and practical instruction. Feedback is considered constructive if it provides students with clear expectations for their performance, motivates them to put in more effort, and offers guidance for future learning (Al-Hattami, 2019).

There are various types of feedback in language education based on purpose, timing, and delivery, each serving a specific function to enhance learning. First, feedback can be categorized as *formative or summative*, each with a distinct purpose (Bratanych & Myroshnychenko, 2022). Formative feedback is a process-oriented, continuous, and interactive approach that aims to improve learning throughout the instructional process (Fakeye, 2016). It provides quick insights, enabling learners to refine their skills in real time. Formative feedback helps students monitor their learning, promotes participation, enhances language proficiency, fosters interaction, and creates a dynamic learning environment (Bratanych & Myroshnychenko, 2022; Fakeye, 2016; Yu & Xu, 2021) while also increasing academic performance and attitudes and alleviating academic anxiety (Patra et al., 2022). In contrast, summative feedback, which is typically given at the end of instruction through grades, is result-oriented (Komorowska, 2018). It offers a broader perspective for evaluating skills but lacks the detailed insights of formative feedback (Patra

et al., 2022). Formative feedback can also be more effective in enhancing student self-efficacy than summative feedback (Han & Lam, 2008). Additionally, *corrective feedback* addresses errors to help students understand how language functions and to identify and prevent mistakes, particularly in academic English, where students often struggle to pinpoint errors and require more explicit guidance (Rohmah & Halim, 2023). Furthermore, feedback can be classified as *implicit or explicit*, depending on the degree of directness in the instruction. Explicit feedback directly identifies students' mistakes and provides the correct usage of structures, whereas implicit feedback allows learners to correct errors without paying attention to them (Yılmaz & Granena, 2019). While explicit feedback guides students toward language accuracy by encouraging them to notice and monitor their output (Nassaji, 2010), implicit feedback provides opportunities to improve language acquisition without disrupting the flow of conversation (Kang, 2009). Lastly, feedback can be *oral or/and written*, depending on the mode of delivery. Written feedback offers delayed, comprehensive guidance that can gradually enhance grammatical and lexical accuracy (Al-Hazzani & Altalhab, 2018). Conversely, oral feedback provides immediate and interactive support to elevate students' language proficiency (Ashrafi & Foozunfar, 2018). Furthermore, while written corrective feedback aids university students in improving writing accuracy (Kisnanto, 2016), the detailed and constructive nature of oral feedback fosters clarification by allowing negotiation between learners and teachers, thereby enhancing writing skills (Küçükali, 2017). These various feedback forms demonstrate how teachers can promote and improve language learning.

In educational settings, feedback serves several crucial functions in student learning and engagement. First, it facilitates self-regulation and independent learning (Singh, 2019). Effective feedback enables students to monitor, evaluate, and regulate their knowledge, promoting their autonomy as learners. This is particularly important in HE, where students must take responsibility for their learning. Second, feedback is vital for student motivation (Farmer, 2022). Self-assessment and peer feedback enhance engagement motivation, which can improve academic performance (Muho, 2013). Moreover, effective feedback fosters a supportive classroom environment in HE, which is crucial for increasing student motivation and engagement (Ghulam Mujtaba Yasir et al., 2023). Students' reluctance to engage with feedback often stems from negative learning dispositions and a lack of appreciation, making it essential to create a supportive classroom environment (Jin et al., 2022). Third, feedback is a necessary source of information that can enhance student self-efficacy, depending on its nature and delivery (E. J. Kim & Lee, 2019; K.-H. Yang & Wu, 2013). The way feedback is delivered can either enhance or diminish self-efficacy levels. Positive and constructive feedback enhances students' emotional states and boosts their self-efficacy. Conversely, critical or negative feedback can have an adverse effect on self-efficacy, particularly in students with low self-efficacy (Duijnhouwer et al., 2012). Last but not least, feedback guides students through their learning journey. Feedback is not simply about correcting mistakes; it is a process that helps students understand their current learning status and identify the gap between their performance and the expected outcome (A. M. Selvaraj et al., 2021). Therefore, effective feedback should guide students to make

necessary adjustments in their learning; it needs to be timely, specific, and actionable (MacKey, 2006; Pan & Gan, 2019).

2.1.4. AI in Foreign Language Learning

The term “artificial intelligence" was first used in 1956 (Zhou, 2020) and refers to computer systems that can interact with the world through visual perception and speech recognition, as well as sophisticated behaviors such as evaluating available information and making informed decisions to achieve predetermined goals (Pokrivcakova, 2019). However, the foundations of AI extend even further back, as Turing first defined the concepts of “machine” and “thinking” in 1950 (Arf, 1969, as cited by Aydın, 2023). In 1959, Cahit Arf initiated discussions in Turkey about the potential of AI. He explored to what extent machines could think, questioned whether they could possess thinking processes similar to those of humans, and posed an intriguing question: *“Can a machine be designed to solve problems that were not foreseen at the time of its creation?”* (Arf, 1959; Aydın, 2023). This theoretical question has now developed into a research-driven field, with various theoretical frameworks designed to clarify the role of AI in FLL.

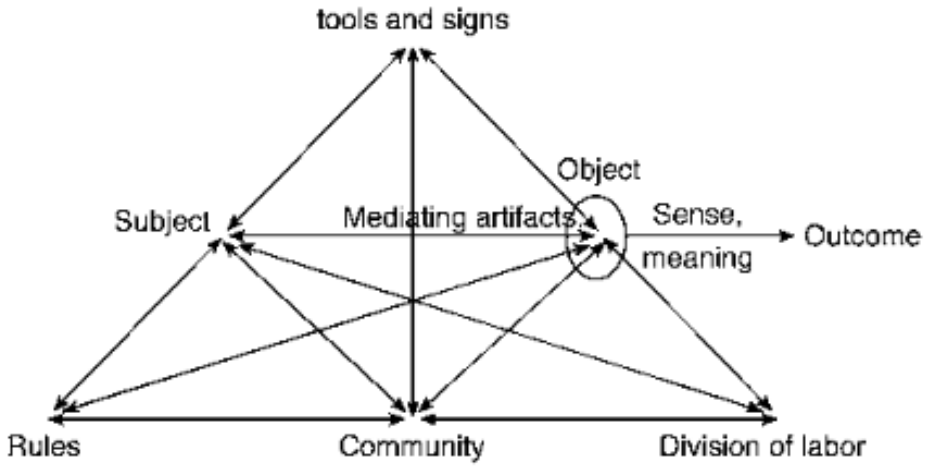
Several key theoretical frameworks can establish a foundation for understanding how the integration of AI influences FLL. First, the *Technology Acceptance Model* can explain how and why students adopt AI-based feedback tools for learning a foreign language, highlighting perceived usefulness and perceived ease of use as the main factors determining students’ engagement with a learning tool (Vo & Nguyen, 2024). Students are

more likely to integrate AI tools, such as Grammarly, Duolingo, and ChatGPT, into their language learning if they find them helpful and user-friendly. Regardless, it is essential to acknowledge that the efficacy of these AI tools in classroom instruction relies not only on the technology itself but also on teachers' capacity to incorporate them effectively (F. Huang et al., 2024; Yao et al., 2025). Second, highlighting the importance of social interactions and cultural tools in learning (Zhou, 2020), SCT emphasizes that human action is intentional and shaped by cognitive processes and the environment (Aydın & Zeinolabedini, 2024). According to the sociocultural perspective, AI technologies in FLL, including chatbots and AI tutors, serve as mediating tools that help learners personalize their self-assessment through social and technological engagement, providing learners with scaffolded learning experiences and fostering meaningful social interactions (Cai et al., 2024). Moreover, personalized learning that considers individual differences can help ensure learners are situated within the appropriate ZPD (Ferguson et al., 2022). Third, *Cognitive Load Theory* further suggests that performance in cognitive tasks is adversely affected by overloading working memory (Khan et al., 2024). The total cognitive load is influenced by how a task is presented, instructed, and navigated; therefore, extraneous load is aimed to be minimized to allow for greater capacity (Ferguson et al., 2022). AI tools can help reduce cognitive load by providing automated feedback and guiding learners to concentrate on language skills instead of struggling with complex learning processes. Moreover, real-time feedback can challenge underloaded students by presenting less information within their ZPD (Ferguson et al., 2022). Finally, based on Vygotsky's triadic model of subject, object (goal), and tools, *Activity Theory* (see Figure 5) suggests that

subjects perform actions to achieve goals by utilizing mediating artifacts such as technology (Yao et al., 2025). As in this study, AI-based and teacher feedback function as mediating artifacts. All aspects of the activity system (including rules, community, and division of labor) interact with each other and influence subjects' behaviors, resulting in the desired outcomes (Yao et al., 2025). AI tools can transform traditional dynamics and learning environments, reshaping learners' engagement with learning tasks (H. Yang & Kyun, 2022). In this sense, tools and environments can be integrated into cultural contexts with technical elements in FLL (Aydın & Zeinolabedini, 2024).

Figure 5:

The Triadic Model Suggested by Activity Theory



Building on these theoretical foundations, AI-powered language tools have innovated FLL, and have been increasingly implemented in language instruction (Çobanoğulları & Özbek, 2025). Countless applications, chatbots, and software powered by AI, including LLMs like ChatGPT, can support foreign language learning (Çobanoğulları & Özbek, 2025). First, chatbots, which are part of LLMs that support

language learning, integrate linguistics with artificial intelligence, focusing on the automated processing of human language (T. Schmidt & Strassner, 2022). Chatbots are based on NLP, which enables them to engage in human-like conversations and simulate intelligent human-language interactions in real time (Çobanoğulları & Özbek, 2025; Pokrivcakova, 2019). By employing NLP and machine learning, chatbots can provide learners with customized feedback on their foreign language acquisition (Zaghlool & Khasawneh, 2023). Applications with chatbot features, such as Duolingo, Memrise, and Babbel, are favored by younger generations (Pokrivcakova, 2019). These language learning platforms utilize multimedia interfaces, enabling learners to interact in the target language through images, audio, and videos (T. Schmidt & Strassner, 2022). This is particularly beneficial for anxious learners who tend to avoid in-person conversations in traditional classrooms (Haristiani, 2019; T. Schmidt & Strassner, 2022). Implementing chatbots in foreign language education can help improve students' speaking proficiency and provide enhanced instruction by establishing customized learning environments and offering user-focused functions, such as personalized error correction (Yuan, 2024). Additionally, AI-powered writing tools like Grammarly and Language Tool are frequently preferred for spelling and grammar checks, as well as for improving clarity and coherence in writing (T. Schmidt & Strassner, 2022). Lastly, although not regarded as the most effective method for language learning, machine translation tools such as Google Translate and DeepL are still used by learners for foreign language learning (T. Schmidt & Strassner, 2022).

As noted above, AI-based language tools have been widely acknowledged in FLL for their growing benefits (Çobanoğulları & Özbek, 2025; Karataş et al., 2024). First, AI tools can facilitate language teaching and learning (Aydın & Zeinolabedini, 2024; Haristiani, 2019). They improve language skills, particularly in writing, grammar, and vocabulary (Karataş et al., 2024), and enhance language learning outcomes and retention (Yuan, 2024). AI tools assist learning tasks by offering instant feedback, correcting errors, generating ideas, proofreading, summarizing, and paraphrasing (Aydın & Zeinolabedini, 2024). Second, AI-powered tools can personalize learning by providing tailored and flexible learning experiences (Çobanoğulları & Özbek, 2025; Haristiani, 2019; Karataş et al., 2024; Pokrivcakova, 2019; Zaghlool & Khasawneh, 2023). Personalized learning is one of the significant contemporary ideals in modern pedagogy (Pokrivcakova, 2019). When teachers are unable to identify each student's unique needs, learning preferences, and strategies and provide immediate and accurate feedback, tools can serve as a vital alternative to support learning (Pokrivcakova, 2019). Third, AI tools can enhance student engagement and motivation (Karataş et al., 2024; Pokrivcakova, 2019; T. Schmidt & Strassner, 2022) and reduce anxiety (Aydın & Zeinolabedini, 2024; Wiyaka et al., 2024). With the transition from CALL to ICALL in education, the quality of student-computer interaction has substantially improved, enhancing learner engagement and providing numerous educational benefits (Pokrivcakova, 2019). Fourth, AI tools can foster learning environments that promote positive emotional experiences. Emotions play a crucial role in shaping attitudes toward language learning (Oz et al., 2015). Affective AI technologies can

enhance students' emotional management and regulation, strengthen their self-efficacy when confronting learning challenges, and support their mental health (W. L. Sun, 2024).

However, the ethical implications of integrating AI into FLL should not be overlooked. First, AI tools can pose a threat to data privacy and user acceptance; therefore, implementation must be cautiously approached (W. L. Sun, 2024). Improper use of information can substantially endanger students' privacy and security. Second, misinformation represents a major concern among academic communities. Generative tools such as *ChatGPT* may hallucinate or make inaccurate corrections, leading to further confusion among learners (Aydın & Zeinolabedini, 2024; Çobanoğulları & Özbek, 2025). Third, algorithmic bias represents another concern regarding the integration of AI in language instruction, especially when interacting with different cultures or minority groups (Çobanoğulları & Özbek, 2025). Fourth, AI language tools may not be as proficient in spoken language as they are in written language, as they primarily derive their data from written sources (Çobanoğulları & Özbek, 2025). Fifth, these tools pose potential risks in assessment processes (W. Alharbi, 2023; Çobanoğulları & Özbek, 2025). For instance, AI-based writing tools now provide more than just vocabulary and grammar corrections; they offer "human-like" support, leading language educators to struggle to identify the originality of students' submitted texts (W. Alharbi, 2023). These tools can now produce human-like translations, paraphrasing, and substantial amounts of text with a single click, allowing students to copy and paste without actively engaging in the learning process. Finally, students' over-reliance on AI tools can hinder students' learning by impairing their

creativity in writing and speaking (Aydın & Zeinolabedini, 2024; Khatri & Karki, 2023), diminishing their critical thinking skills (Khatri & Karki, 2023), and reducing their ability to navigate through learning challenges (W. L. Sun, 2024). Therefore, establishing guidelines for incorporating AI tools in language instruction is critical. A balanced strategy that harnesses the revolutionary benefits of AI while recognizing the need for human expertise is necessary (Karataş et al., 2024). Educators and researchers must identify methods that enable learners to correctly use these tools and integrate them into language learning whenever feasible (W. Alharbi, 2023).

2.1.5. AI and Feedback

Due to the shortage of financial and human resources, students in HE often struggle to receive high-quality feedback. In this regard, AI feedback has proven efficient by suppressing peer feedback and even challenging expert feedback, offering a cost-effective and enriching alternative (Jacobsen & Weber, 2023). First, AI is capable of using NLP to identify and fix errors in students' work, referred to as automated correction. Automated feedback can yield significant benefits in writing classes where students may not receive detailed feedback due to teachers' time management limitations (Herda et al., 2024). Automated corrective feedback offers numerous advantages, including quick response time, minimal emotional harm, and personalized feedback (Y. Liu, 2023). Next, personalized feedback extends beyond error correction, enhancing learner satisfaction and progress by providing content, clues, and additional resources tailored to learners' profiles and development aligned with academic standards (Morales-Chan et al., 2024).

Additionally, AI can deliver adaptive feedback, which entails providing the right feedback at the right time based on the student's performance and interaction with the feedback. They can adjust the content difficulty and offer extra materials to promote autonomy. With timely and precise feedback, students can monitor their development, spot areas for growth, and take charge of their learning (Joshi, 2024).

Nonetheless, the effectiveness of AI-generated feedback is directly influenced by the quality of the given prompt. According to Jacobson and Weber (2023), it is essential to acknowledge the impact of prompt engineering on the efficacy of AI use in HE. Prompt engineering involves designing questions to elicit clear and precise answers and tuning inquiries to yield the intended outcomes. The outcome relies on the *"mission, context, precision, and clarity"* of the given prompts. Teachers require a certain degree of application skills to implement AI feedback efficiently in educational settings. LLMs can only produce consistently high-quality results when provided with high-quality prompts. Moreover, it is crucial to remember that LLMs can make errors and experience hallucinations. Human experts are still required, even though their responsibilities have shifted from providing feedback to monitoring and editing AI-generated responses (Jacobsen & Weber, 2023).

Research on AI feedback in educational contexts categorizes feedback based on its purpose and delivery method, specifically distinguishing between formative and summative types while acknowledging that it can be presented in both explicit and implicit

forms (Onasanya & Ajamu, 2024). Formative AI feedback aims to enhance learning in real time by offering precise guidance that identifies errors and recommends actions for improvement. Students and educators can utilize this immediate feedback to assess comprehension, identify areas that require additional study, and prepare for summative evaluations (Onasanya & Ajamu, 2024). Generative AI tools, such as ChatGPT, present innovative solutions for providing formative feedback (Herb & Lloyd, 2024). Summative AI feedback, on the other hand, functions to validate performance rather than facilitate immediate enhancements in learning. Automated appraisal can relieve educators' assessment burdens as long as it is supported by human expertise (Brian et al., 2024). Additionally, some automated feedback systems provide formative and summative feedback within a unified framework (Hamilton, 2009). In these systems, explicit feedback is provided during the formative phase to enhance learning, whereas the summative phase typically depends on implicit evaluative cues. Despite the undeniable advantages of AI feedback, whether formative or summative, recent research consistently emphasizes that combining AI feedback with human expertise yields the best results in ensuring the quality of feedback (Brian et al., 2024; Herb & Lloyd, 2024; Y. Liu, 2023; Yeung et al., 2023).

2.2. Literature Review

2.2.1. Research on academic writing

With the growing number of non-native speakers in HE, research on L2 learners' academic writing has gained momentum in recent decades. Within this scope, researchers examined academic writing from various perspectives, including genre-based learning,

discourse, formulaic sequences, strategy instruction, and inquiry-based learning. These studies have highlighted the technical and rhetorical difficulties in academic writing, addressing its cognitive, affective, and social aspects (AlHassan & Wood, 2015; Bruce, 2013; De Silva, 2015; Paltridge, 2004; Wale & Bogale, 2021). As an example, Partridge (2004) conducted a comprehensive examination of academic writing, emphasizing the differences across disciplines and the significance of genres in academic texts to help students write their texts in an acceptable format. He emphasized the importance of sociocultural contexts in comprehending academic texts. Similarly, Bruce (2013) proposed a dual genre-based model that combines social and cognitive aspects of academic writing in EAP instruction. This model enhanced genre awareness, allowing for the practical application of discourse competence knowledge in writing instruction. In their qualitative study, AlHassan and Wood (2015) demonstrated that explicit instruction in formulaic sequences substantially improved the academic writing proficiency of L2 learners. These sequences served as linguistic scaffolds for learners, facilitating coherent and proficient writing. De Silva (2015) highlighted the importance of strategy use in academic writing in her longitudinal experimental study, which revealed that undergraduate students substantially improved their strategy use and overall writing quality after receiving instruction on writing strategies. In their quasi-experimental study, Bogale and Wale (2021) found that inquiry-based instruction facilitated the development of academic writing skills, including task achievement, coherence, cohesion, lexical use, grammatical range, and accuracy. Thus, they recommended that scholars direct students to ask questions to acquire information rather than spoon-feed knowledge. Finally, Perpignan et al. (2007)

discussed the “unplanned outcomes” of academic writing instruction in HE, which they termed *by-products*. They discovered that academic writing instruction enhanced not only cognitive outcomes but also social and affective skills. Their study demonstrated that students developed in many areas, including self-awareness, critical thinking skills, world knowledge, and habits for lifelong learning. All in all, these studies collectively show that writing is a complex skill that requires attention to linguistic, rhetorical, social, cognitive, and affective dimensions.

2.2.2. Research on Feedback

The literature on feedback consistently emphasizes whether conventional or innovative, effective feedback processes are significant for fostering language development. Hattie and Timperley (2007) discussed how feedback influenced students’ learning and achievement depending on its type and delivery. For instance, feedback that facilitated self-regulation processes was so potent that it enhanced engagement, the effort put into the task, self-efficacy, and affective attributions; however, personal-level feedback, usually in the form of praise, was relatively unhelpful in improving learning. On the other hand, Hsu (2025) emphasized the value of teachers’ positive feedback for enhancing students’ positive psychology, neural efficiency, learning outcomes, and performance, in addition to its benefits for personal and professional development. Moreover, Khah and Farahnian (2016) found that corrective feedback reduced grammar errors and enhanced writing performance. After comparing the outcomes of coded and uncoded written corrective feedback, Salimi et al. (2015) suggested that teachers use

alternative feedback types based on students' needs. However, their study revealed that coded corrective feedback proved to be much more efficient in promoting language accuracy in both the short and long term. Moreover, in their comparative study, Jingxin and Razali (2020) examined automated writing evaluation systems from a cognitive and sociocultural perspective through ZPD and scaffolding. Their research indicated that these systems' continuous and detailed formative feedback could improve language learning. In addition to individual feedback, Bonyadi (2018) recommended integrating collaborative feedback into EFL instruction, as it excites and motivates students while helping them become more self-aware and autonomous. Similarly, in their case study, Saeed et al. (2018) explored learners' engagement in peer feedback within a Facebook group and found that social media significantly fostered students' writing development through peer feedback outside their university writing classes. Finally, Gan (2020) highlighted that EFL students' motivation and preferences shaped how feedback was received and experienced, regardless of its type and delivery. They emphasized teachers' demanding yet vital responsibility to cultivate a supportive classroom environment that promotes positive self-concept and confidence, encourages students' active use of feedback, and facilitates conditions for process-oriented feedback with actionable steps that align with students' preferences.

2.2.3. Research on Self-efficacy

Built on strong theoretical frameworks, studies on self-efficacy consistently demonstrate the correlation between performance and self-efficacy levels. Bandura's

seminal paper (1977) introduced and established the concept of self-efficacy regarding its impact on behavioral change. In their key experiments, Bandura and Adam (1977) systematically manipulated participants' self-efficacy levels by providing varied feedback and experiences. These studies showed that those who received treatments to eliminate anxiety and gain gradual mastery experiences increased their self-efficacy, performed better, and became more resilient and willing to perform tasks. Moreover, the research indicated that perceived self-efficacy expectations predicted behavioral success and self-efficacy judgments following mastery experiences accurately predicted performance outcomes. Schunk (1981, 1989) investigated the relationship between self-efficacy and achievement behaviors. His comparative analysis of cognitive modeling versus didactic instruction (Schunk, 1981) demonstrated that both instructional methodologies increased self-efficacy and performance; however, the cognitive modeling group achieved this more accurately. Zimmerman and Bandura (1994) examined the role of self-efficacy in relation to self-regulatory efficacy and goal-setting in writing courses, concluding that students' self-efficacy in writing predicted their academic self-efficacy and standards regarding the quality of their writing tasks. Additionally, students' perceived academic self-efficacy informed their goal-setting strategies to improve their writing, which, in turn, directly and indirectly predicted students' academic success in terms of grades.

Grounded in robust foundations, extensive contemporary research further underscores the significance of self-efficacy in educational contexts. Vieira and Alves (2025) conducted a longitudinal study with undergraduate students, revealing a positive

impact of academic self-efficacy on students' transition to work self-efficacy. Their findings demonstrated the importance of fostering higher self-efficacy levels during university years, as it enhanced academic performance and benefited their career paths. Cong et al.'s study (2024) established a positive correlation between engagement in learning and academic self-efficacy, indicating that students exhibiting low self-efficacy and engagement were more susceptible to burnout. This research also revealed that engagement protected students with low self-efficacy from burnout. Similarly, Hu et al. (2024) advocated for the positive impact of learning engagement on self-efficacy in EFL learning within smart classroom environments. Their study revealed that positive emotions led to greater student engagement, which in turn resulted in higher student self-efficacy. They proposed that smart classrooms might help enhance positive academic emotions and engagement, thereby improving self-efficacy. Zhang et al. (2025) also explored ways to integrate technological elements into classroom practices to foster self-efficacy. They advocated for the advantages of incorporating AI tools into EFL classroom practices as a teaching strategy, as the findings revealed that AI literacy enhanced self-efficacy in AI learning and increased the willingness to communicate by reducing anxiety.

2.2.4. Research on the Effects of Feedback on Self-Efficacy

The literature on feedback establishes a positive correlation between feedback mechanisms and self-efficacy. Schunk (1982) provided foundational evidence demonstrating that effort-attributional feedback, which connects success to the effort invested in one's accomplishments, improved students' self-efficacy levels and skill

mastery significantly more quickly than alternative feedback strategies emphasizing prospective success or no feedback. Furthermore, in his comparative study examining the effects of instructional methodologies on self-efficacy, he found that regardless of the pedagogical approach implemented, students showed improvement in their self-efficacy. However, students who received the cognitive modeling approach, coupled with effort-attributional feedback, displayed the highest improvement in their self-efficacy judgments and performance (Schunk, 1981). Additionally, Chan and Lam (2010) identified the positive effects of self-reference feedback, which compares current performance to previous performances, over norm-referenced feedback, which evaluates students' current performance against a standard, on self-efficacy. Their findings also indicate that summative feedback notably diminished EFL students' self-efficacy compared to formative feedback, underscoring the critical significance of feedback type on students' self-efficacy levels.

Moreover, the source of feedback, whether from a teacher, a peer, self-assessment, or a technological tool, has a significant influence on self-efficacy outcomes. In her comparative research, which revealed the different effects of teacher and peer feedback on EFL students' self-efficacy, Ruegg (2018) found that students receiving teacher feedback demonstrated significant enhancements in their writing self-efficacy compared to those receiving peer feedback. On the other hand, Cui et al. (2021) demonstrated the potential of trained peer feedback in a two-semester experimental study comparing the effects of trained peer feedback and teacher feedback on EFL students' writing self-efficacy. Their

findings revealed that when students received adequate training in providing feedback, peer feedback had the same notable effects on improving writing self-efficacy and writing skills as teacher feedback. Takarroucht (2022) further examined the role of self-assessment feedback on writing self-efficacy among EFL students. The study revealed that students utilizing structured self-assessment in their writing courses exhibited statistically higher self-efficacy in post-tests. Lastly, addressing the recent technological enhancements within feedback tools, Chen and Hsu (2022) investigated the efficacy of positive emoji feedback in CALL environments. They concluded that using emoji feedback in online settings significantly improved learners' self-efficacy, even when delivered subliminally.

2.2.5. Research on the Effects of AI-based Feedback on Writing Self-Efficacy

Despite being scarce and nearly non-existent in the Turkish EFL, emerging research suggests that AI-based feedback can serve as a valuable alternative to support students' writing self-efficacy, particularly in EFL contexts. Sari and Han (2024) presented a hybrid approach that combines teacher feedback with the Automated Writing Evaluation (AWE) system. In their one-semester quasi-experimental study with EFL students at a Turkish university, they compared the effectiveness of combined automated teacher feedback and teacher-only feedback. The findings indicated that using both automated and teacher feedback proved to be more effective in improving students' writing self-efficacy and writing performance than traditional teacher-only feedback. In their mixed-methods study with EFL students, Apriani et al. (2024) demonstrated that AI-based chatbots significantly enhanced writing proficiency and self-efficacy by providing tailored feedback

that supports self-regulated learning. Similarly, Bouzar et al. (2024) highlighted the potential of ChatGPT with its ongoing feedback mechanism and the cultivation of a sense of achievement, as their findings indicated that long-term post-graduate ChatGPT users had higher academic self-efficacy levels compared to non-users. Moreover, El-Garawany (2024) investigated the impact of Quillbot-based interventions on EFL writing self-efficacy, with findings showing significant improvements in EFL learners' writing performance and self-efficacy. Teng's study (2024) focused on integrating ChatGPT feedback into EFL writing processes, and the results indicated the positive impact of AI tools on writing, including higher self-efficacy, motivation, and engagement. Moreover, Shen and Tao (2025) emphasized the significance of AI-based writing self-efficacy for an effective AI-based EFL writing environment, as it reduced writing anxiety by providing planning strategies. Their study cautioned the need for AI instruction before integrating it into EFL writing instruction. Lastly, although they clearly stated that AI tools had notable benefits on writing self-efficacy, some research warned against concerns regarding its integration, including plagiarism and excessive dependence on AI tools, highlighting the significance of balanced integration with conventional approaches (Apriani et al., 2024; Bouzar et al., 2024; Teng, 2024).

2.2.6. Summary

Academic writing is a crucial yet demanding skill for students across disciplines, requiring linguistic proficiency, social and cognitive skills, mastery of strategy use, discourse competence, and genre awareness. Many students begin their HE with limited

writing experience, leading to extensive research on effective ways to support these skills. Regardless of whether it is conventional or innovative, timely and well-designed feedback has proven critical in improving students' learning outcomes and affective states by facilitating engagement and self-regulation while cultivating a supportive learning environment. Furthermore, extensive research demonstrates that feedback, a form of verbal persuasion within Bandura's framework, significantly fosters learners' self-efficacy, which correlates highly with engagement in learning and success. Providing feedback on a student's effort and progress enhances self-efficacy over time by reinforcing growth. Students with higher self-efficacy tend to exhibit lower anxiety, undertake challenging tasks, invest more time and effort, and ultimately perform better. Similarly, studies indicate that writing self-efficacy is strongly associated with writing performance. With the rapid advancements in generative AI tools that can deliver constant, immediate, and precise feedback, some researchers who have investigated the impact of AI-based feedback on students' writing self-efficacy indicated that integrating AI feedback into writing instruction can significantly enhance students' writing self-efficacy and performance. Finally, while acknowledging the significant benefits, some researchers and students have raised concerns about the risk of plagiarism and excessive dependence on AI tools. Thus, current research recommends a balanced integration that leverages the advantages of AI feedback while incorporating conventional approaches. All in all, emerging research is promising regarding the benefits of AI feedback on writing self-efficacy; however, further research is needed, as the literature focusing on the effects of AI feedback on writing self-efficacy is scarce and nearly non-existent in the Turkish EFL context.

3. METHODOLOGY

This section outlines the rationale behind this study. First, an overview of the research design is provided. Next, the participants involved in the study are introduced. Subsequently, the data collection instruments are examined. Finally, a detailed discussion of the employed procedures and the resulting data analysis is presented.

3.1. Research Context

This study explores the impact of AI-based feedback on students' self-efficacy in academic writing classes. Given the importance of understanding how different types of feedback affect participants' academic writing self-efficacy, the research adopts an analytical approach that allows for an in-depth examination of the data and a comprehensive analysis of the results. The study employs a deductive methodology, starting with specific hypotheses derived from established theories and literature, and aims to test these hypotheses using empirical data. One of the objectives is to investigate the effect of AI-based feedback compared to teacher feedback on academic writing self-efficacy in the Turkish EFL context. Therefore, a quasi-experimental research design was employed, allowing for comparisons between predetermined groups in real-world classroom settings and assessing the effects of the interventions (Shadish et al., 2002). Accordingly, academic writing self-efficacy scales, AI-based feedback, and teacher feedback were employed. These tools were specifically selected to evaluate participants' self-efficacy levels, provide tailored feedback on their texts, and enhance their academic

writing skills. While this design offers significant insights, its limitations include the absence of randomization.

3.2. Participants

The participants in this research consisted of 33 EFL students enrolled in the English preparatory program at a state university in İstanbul, Turkey. At the beginning of the academic year, these students were classified at the A1 (elementary) level based on their English proficiency test scores, as determined by the CEFR. At the time of data collection, they had recently begun their second term at the preparatory school. The institution's expected language proficiency level for this group of students was B1 (lower intermediate) during the research period. However, the self-rated proficiency results from the pre-test revealed that 72.7% of participants believed their proficiency to be at A2 or lower; only nine participants (27.3%) perceived themselves as being at the B1 level. Most participants (63.6%) identified as A2 level, while three (9.1%) regarded themselves as A1. The sample consisted of twenty female (60.6%) and thirteen male (39.4%) participants. The ages of the participants ranged from a minimum of 18 to a maximum of 52, with a mean age of 20,03. The participants' departments varied across different faculties. Nine participants (27.3 %) were studying Political Science and Public Administration, eight (24.2%) were enrolled in Management, four (12.1%) studied Economics, four (12.1%) were in Public Finance, and four (12.1%) were studying in Molecular Biology and Genetics, two (6.1%) were in International Relations, one (3%) was in Law, and one (3%) was in History. Except for one participant, all participants'

departments used English as their medium of instruction; thus, they were required to pass the English proficiency exam before progressing in their departments. Participants received 24 hours of English instruction per week, comprising 16 hours of Main Course (general English) lessons and 8 hours of Reading and Writing lessons. Each class was led by one reading and writing instructor and at least two general English instructors. While the Main Course lessons mostly covered general skills such as listening, speaking, reading, grammar, and vocabulary, the Reading and Writing course specifically focused on academic reading and writing skills. In the Reading and Writing lessons, participants followed a reading book selected by the department and a writing pack prepared by the institution's Curriculum Office for instruction on opinion essays. In the demographic section of the pre-test, students were asked about their prior enrollment in an academic writing course. None of the participants had any previous experience before attending the preparatory school. Moreover, it is noteworthy that all participants, except one, had prior experience with AI tools (SD = 0.83). The majority of participants (84.9%) reported that they sometimes (45.5%) or often (39.4%) utilized AI tools, suggesting that the sample essentially had sufficient familiarity to employ the AI feedback tools meaningfully. Among the AI tools used, the majority of students (78.9%) expressed a clear preference for ChatGPT. One student (3%) reported using Gemini, while another (3%) reported using DeepSeek alongside ChatGPT, indicating that the sample likely had considerable familiarity with ChatGPT as a feedback tool. Participants identified various reasons for utilizing AI tools, including assistance with school assignments, support for academic writing, feedback and error correction, translation, grammar and structure correction, idea

generation, writing verification, and general daily usage. The rationale for selecting the groups stemmed from the convenience sampling of two pre-existing classes in real-life conditions that were available for the study, belonged to the same level group, and received the same number of hours of writing instruction.

Additionally, a focus group was established from the experimental and control groups to investigate the potential underlying reasons for the observed results. For this focus group, ten participants were randomly selected from each group, with an equal gender distribution (five females and five males), and their ages ranged from 18 to 21. This session was designed to obtain qualitative insights to complement the quantitative findings.

3.3. Tools

This study employed two data collection tools (see Appendix 1) and conducted a focus group interview with five participants from both groups. Initially, a background questionnaire was administered to collect demographic information, including age, gender, department, and self-assessed English proficiency levels. It also gathered information on participants' prior academic writing experience, the sources of that experience, their engagement with various AI tools, and the specific purposes for utilizing them. Subsequently, the SAWSES, originally developed by Mitchell et al. (2021) and later adapted by Doenyas et al. (2023), was employed in this research to assess participants' self-efficacy in academic writing. This instrument comprised 16

items and three subscales, evaluated on a five-point Likert scale, which enabled learners to express their levels of agreement, ranging from strong disagreement to strong agreement (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). The original SAWSES was validated through exploratory and confirmatory factor analyses on large interdisciplinary samples of undergraduate and graduate students, demonstrating high reliability coefficients (α = .94, and .95). The exploratory factor analysis revealed a three-factor scale explaining 61% of the total variance (Mitchell et al., 2021). The scale consists of 16 items and identifies three primary dimensions of academic writing self-efficacy: 1. Writing-Essentials, which evaluates students' beliefs regarding emotional control, academic language, and synthesizing sources (three items); 2. Relational-reflective investigates students' beliefs about establishing relationships with scholarly sources, teachers, and the self through reflection (eight items); and 3. Creative Identity, which explores students' beliefs about creativity, voice, and disciplinary identity (five items). The scale's first non-Western adaptation, the Turkish version developed by Doenyas et al. (2023), has established itself as a reliable instrument in a sample of Turkish undergraduates, confirming the original three-dimensional structure via confirmatory factor analysis. It has achieved high internal consistency, with a Cronbach's alpha of .90, affirming its cross-cultural applicability in assessing academic writing self-efficacy.

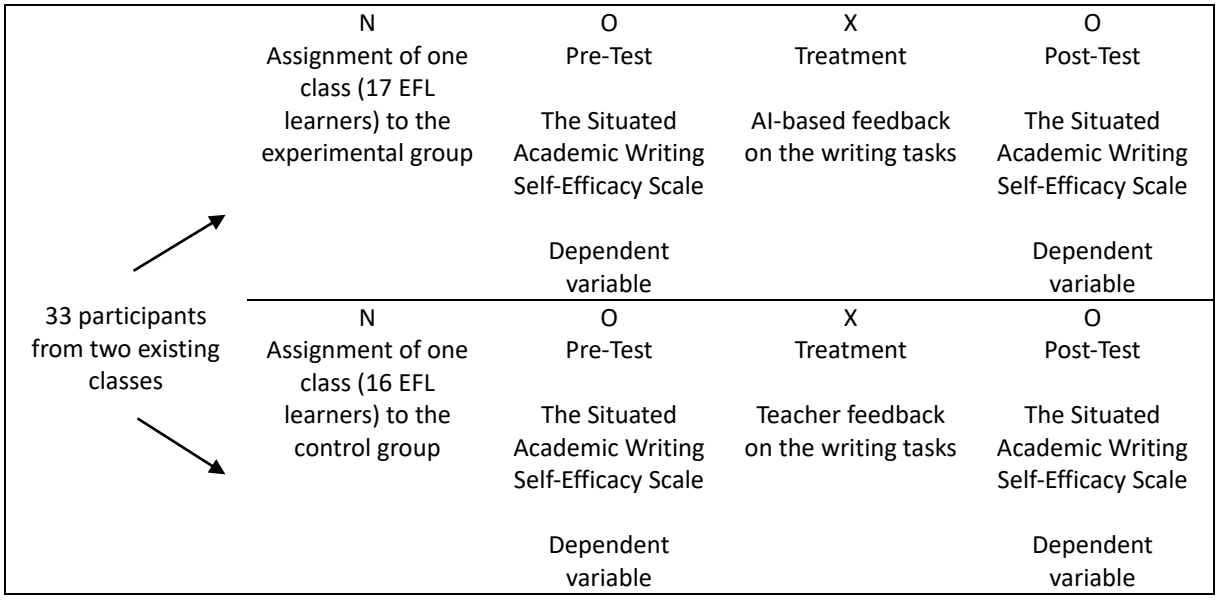
3.4. Procedure

After securing approval from the Faculty of Education Sciences Ethics Committee at Istanbul Medeniyet University (see Appendix 2), the university administration was notified to obtain permission. The study was implemented over seven weeks during the spring semester of the 2024-2025 academic year. Initially, participants underwent two weeks of writing instruction. Pre-existing classes were then randomly assigned to control and experimental groups. Participants were informed about the purpose, significance, and processes of the research, both verbally and in writing. They were assured that their involvement was voluntary and that their personal information and responses would remain confidential. Both groups completed a pre-test before writing various academic texts and editing them based on the feedback they received over a five-week period. Additionally, the experimental group participated in a session on the ethical and practical use of AI tools for academic guidance. They were also instructed to log in with their accounts so that ChatGPT could offer customized feedback tailored to their unique needs. In the control group, participants drafted their first versions, received feedback from their teacher, and subsequently revised their second drafts. The experimental group engaged in the same writing tasks but received feedback from ChatGPT using the provided prompts before completing their second drafts. All writing assignments and feedback sessions were conducted in class. The prompts ensured that participants in the experimental group received responses tailored to their proficiency levels, individual needs, specific task requirements, and institutional standards, similar to those in the control group. During these writing tasks, the control group received traditional feedback from the teacher,

whereas the experimental group received AI-based feedback via ChatGPT. In both groups, the feedback provided was explicit and corrective in nature. Additionally, both groups were taught by the same teacher and followed the same curriculum, covering identical instructional content using the same writing pack and resources. This method ensured they received consistent guidance and educational materials throughout the study. All leading questions and suggestive comments were deliberately omitted to minimize potential biases. After the intervention phase, participants took the post-test. The entire process is illustrated in Figure 6.

Figure 6:

The Flowchart of the Pretest-Posttest Control and Experimental Group Design



Following the post-test, a focus group interview was conducted with ten participants, including five from each group. Their insights were shared for a total of fifty

minutes per group, offering comments and reflections on the findings. The interviews were conducted separately to minimize potential biases that could result from group dynamics.

3.4.1. Pre-test administration

At the beginning of the study, participants completed a questionnaire designed to gather information about their age, gender, department, English proficiency, and prior experience with AI tools and academic writing. Next, the SAWSES, consisting of 16 items to assess students' self-efficacy in academic writing, was administered. Participants were instructed to select the most appropriate answer at their own pace. The questionnaire was conducted in Turkish because the participants' proficiency level prevented them from fully understanding the statements, which could impact the accuracy of their responses.

3.4.2. The practice process

The writing tasks formed an integral part of the curriculum. Participants were required to write sections or entire essays on the topics specified in the writing pack. They had previous experience with paragraph structure from earlier writing classes, where they learned to write simple descriptive and opinion paragraphs. However, since they had not received any prior instruction on essays, the initial two weeks were dedicated to teaching them about essay structure, content, unity, coherence, the use of conjunctions, academic linkers, and punctuation rules. In addition to the writing pack,

some supplementary resources approved by the Curriculum Office were incorporated into the lessons to enhance and support the writing process. In the following weeks, participants continued to receive writing instruction, wrote various types of academic texts, obtained feedback from either the teacher or ChatGPT, and then revised their texts to produce a second draft based on the feedback received. Appendix 3 provides a summary of the weekly steps followed during the seven-week implementation phase, detailing the instructional content, writing tasks, processes, and materials utilized.

Week 1

The experiment had not yet begun in the first two weeks because the participants were unfamiliar with essay structure and lacked experience in writing essays. Consequently, writing instruction was provided to build a foundational understanding of the overall essay structure. In the first week, the opinion essay framework was discussed, covering the elements of an introductory paragraph, body paragraphs, and a concluding paragraph. Sample essays were examined to enhance participants' understanding of essay organization. They compared the essay structure to the paragraph structure with which they were already familiar, helping them identify the essential elements of an essay. Next, students were introduced to transition signals and the relevant punctuation to improve the logical flow of their writing. They practiced identifying and combining the most effective transition signals and punctuation marks to ensure coherence and cohesion in various contexts.

Week 2

In the second week, the instruction specifically focused on crafting academic-level body paragraphs in an essay. Students analyzed sample body paragraphs and identified structural components. Subsequently, they were presented with two essays, each lacking a body paragraph, and assigned to select one and coherently complete its missing body paragraph. Upon completing this task, both groups received teacher feedback, as mandated by institutional requirements. The rationale for giving teacher feedback to both groups during the instructional phase was to ensure every student received at least one instance of teacher feedback before their mandatory writing assignment in week five, a requirement set by the institution. Consequently, the researcher aimed to deliver this feedback before starting the experimental phase.

Week 3

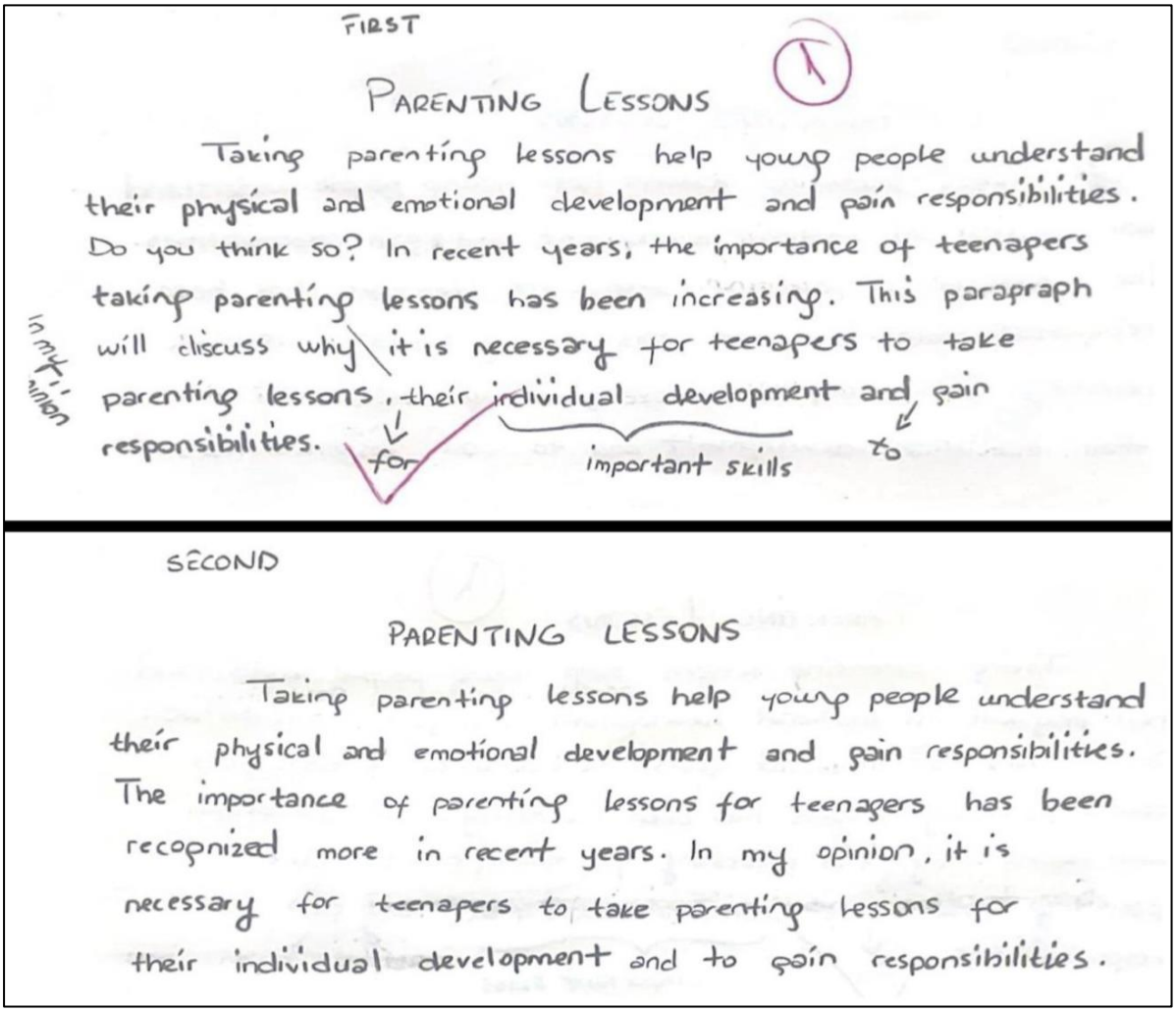
Before the pre-test, participants were thoroughly informed about the study through written and verbal communication. This session clarified the purpose of the research, the methods used, the voluntary nature of participation, and the strict confidentiality of personal data. Following this, students were invited to participate in the study. Those who consented signed an informed consent form. After collecting the consent forms, the pre-test was administered. Once the pre-test was completed, the writing instruction commenced with a discussion on the structure of the introductory paragraph of an essay. Students examined various sample introductions and learned multiple strategies for writing effective openings, including the funnel method, defining

key terms, asking rhetorical questions, the turnabout method, using anecdotes, and incorporating quotations. After identifying and discussing these strategies, they practiced identifying thesis statements and differentiating between strong and weak examples. The instruction concluded with detailed guidance on how to create a clear and persuasive thesis statement. Students then received a complete opinion essay with the introductory paragraph omitted. Using their understanding of essay structure, they were assigned to write an appropriate introductory paragraph that aligned with the provided body and conclusion. After completing their first drafts, the experimental group utilized AI-based feedback for their revisions, while the control group received feedback from their teacher. Before implementing AI feedback, the experimental group was provided with clear guidelines on the ethical and effective use of AI tools. A handout outlining best practices was distributed, emphasizing steps such as self-editing before seeking AI assistance and providing clear prompts such as “Does my thesis statement align with the overall argument and structure of the essay?” or “How can I enhance the grammar and vocabulary in this paragraph?”, specifying the desired proficiency level and any additional preferences, being mindful of potential AI hallucinations, and recognizing the importance of critically evaluating the feedback received. They were encouraged to maintain their academic style and voice, ensuring the ethical use of AI by avoiding direct copy-pasting, rephrasing in their own words, and regarding AI as a guide and teacher who can sometimes make mistakes. Sample AI interactions were analyzed and discussed in a humorous manner to make ethical issues more relatable and comprehensible. The experimental group then received feedback from ChatGPT based on a detailed prompt

designed by the researcher. This prompt specified the criteria for a well-structured opinion essay introduction, emphasizing clarity, strength, alignment of the thesis with the main idea, logical coherence, and smooth transitions between the introduction and body, along with the provision of background information, a clearly defined thesis, and suggestions for improvements in vocabulary, grammar, and punctuation, supported by explanations and examples. Students were encouraged to engage with ChatGPT by asking follow-up questions for assistance and interacting with it not only in writing but also through spoken dialogue. In contrast, the control group received traditional teacher feedback for their introductory paragraphs, adhering to the same standards outlined. After receiving feedback, students in both groups revised their first drafts and submitted their second drafts. In Figure 7, the upper part displays a student's original introductory paragraph (1st Draft) on the topic: "Is taking parenting lessons at school necessary for teenagers?" before the implementation of AI-based feedback. In contrast, the lower part displays the student's revised version of the introductory paragraph (2nd Draft) after receiving AI-based feedback from ChatGPT. The student was selected due to their legible handwriting

Figure 7:

A Student's Introduction Paragraph Before and After Receiving AI-Based Feedback (Week 3)



Week 4

In the fourth week, transition signals were introduced to illustrate cause-and-effect relationships. They examined sample sentences and practiced combining them to convey these relationships accurately. Moreover, recognizing that many students struggle with punctuation in academic writing, a comprehensive lesson on academic punctuation rules

was introduced for both groups. Next, they briefly revised essay structures and the organization of body paragraphs, using elicitation techniques to reinforce their prior knowledge. Once they solidified their understanding of body paragraph structure, each group received two essays, each missing one body paragraph. They were assigned to choose one essay and complete the missing body paragraph. After finishing their body paragraphs, the AI group obtained feedback from ChatGPT using a specific prompt aimed at evaluating various criteria: coherence and unity; clarity, strength, and relevance of the topic sentence; effectiveness and relevance of supporting sentences, including strong examples and explanations; use of transitions and overall flow; grammar and language use; and punctuation. One student displayed a considerably lower proficiency level than their peers and faced challenges. As a result, this student was advised to modify their prompt to request feedback suitable for an A2-level learner, with examples and explanations tailored to their understanding. Meanwhile, the control group received teacher feedback based on the same criteria. Following the feedback, both groups revised their essays and submitted the revised drafts accordingly.

Week 5

In the fifth week, the instruction began with a discussion of functional language for expressing comparison and contrast. Students analyzed sample structures and examples. They were introduced to common conjunctions for comparison and contrast, creating opportunities to practice combining sentences with these structures. Next, sentence fragments were addressed, with examples that were missing a subject, a verb, or

a complete thought. Students worked on distinguishing between complete sentences and fragments. Then, run-on sentences were analyzed, with examples and solutions presented for discussion, allowing students to practice differentiating between complete sentences and run-ons. Additionally, students were assigned a writing assignment according to institutional guidelines, which involved completing the missing body paragraph of an essay that lacked one, contributing 10% to their final grade. After submitting their first drafts, they received indirect feedback via Error Correction Codes, as required by the institution. They had the opportunity to identify and correct their mistakes through research on the supplied codes. They completed their revised second drafts on the designated day, finalizing the assignment.

Week 6

Week six began by focusing on the concluding paragraph, emphasizing the essential elements that comprise it, which include rephrasing the thesis, summarizing key points of the essay, providing a final thought, and, when relevant, encouraging the reader to take action. Activities included revising the main idea for concluding paragraphs and highlighting the connection between the thesis in the introduction and its rephrased version in the conclusion. Common signal words used in both introductory and concluding paragraphs were also reviewed. Subsequently, students worked on an essay with the concluding paragraph missing and were asked to select the most suitable concluding paragraph from a set of options. Finally, the researcher presented both groups with an essay with the concluding paragraph omitted and assigned participants to write

one that aligned with the rest of the essay. For the experimental group, the AI-based feedback prompt included clear criteria for assessing the concluding paragraph. These criteria emphasized the need for coherence and unity with the essay, clarity, and strength in restating the thesis, and the impact of the final sentence in delivering a closing message, such as a suggestion, comment, or insight. Additional factors, such as consistency, grammatical correctness, and proper punctuation, were also considered. Furthermore, the prompt had already included a statement related to motivation; however, since participants commented that ChatGPT's replies lacked the same encouraging tone typically found in teachers, the researcher enhanced the prompt by creating a distinct ‘Strengths and Encouragement’ section. This adjustment aimed to provide balanced feedback by acknowledging students' successes, particularly directing ChatGPT to focus on the well-constructed elements of the written product, thereby creating a similar feedback process to that in the control group. Moreover, the researcher now included instructions for ChatGPT to provide feedback by the expectations of the B1 level. This adjustment was motivated by institutional requirements emphasizing the need for alignment with the curriculum’s target level, especially as the midterm exams approached. Meanwhile, the control group received teacher feedback based on the same established criteria, ensuring consistency between both groups. After obtaining feedback, students from both groups submitted their second drafts. Next, the focus of the instruction shifted to the overall structure of the opinion essay. Participants were asked to arrange the paragraphs of a jumbled essay in the correct order, analyzing each part closely. Furthermore, they learned various sentence structures and expressions typically used in

different sections of an opinion essay. Detailed discussions took place regarding the essay writing process, thoroughly covering the stages of brainstorming, drafting, and editing. A writing schedule was established for the following week to focus on essay writing.

Week 7

At the beginning of the seventh and final week, students' existing knowledge of essay structure was activated using elicitation techniques. Students then thoroughly examined the institutional standards for the essential components of a well-structured essay, including format, content, cohesion and coherence, vocabulary, grammar, and mechanics. Additionally, they were reminded of the word limits and the expected proficiency level, which was emphasized as B1. The topic of plagiarism was also discussed, reminding students of the potential consequences associated with academic dishonesty. Students were then presented with several opinion essay topics that required them to express agreement or disagreement with a given statement. They were instructed to write a complete opinion essay of approximately 300 to 400 words within a 75-minute timeframe. After completing their essays, the experimental group received feedback from ChatGPT based on a structured prompt designed for B1-level learners. This prompt included comprehensive evaluation criteria, focusing on topic relevance, overall coherence, and specific elements such as format, content, cohesion, and coherence. It also assessed lexical and grammatical accuracy, as well as technical aspects, including punctuation and spelling. The feedback aimed to provide an overall evaluation and offer constructive suggestions, concluding with a positive and encouraging comment.

Appendix 4 provides the English translation of the initial prompt for the opinion essay discussed in Week 7. Appendix 5 includes the English translation of the initial AI-based feedback provided by ChatGPT to a student in response to the prompt in Appendix 4. Meanwhile, the control group received teacher feedback using the same criteria to ensure consistency and comparability.

3.4.3. Post-test Administration

In the final phase of the study, the SAWSES was re-administered to measure any changes in students' academic writing self-efficacy levels following the intervention. After the post-test and the conclusion of the experimental procedure, participants were thanked for their contributions to the research. Additionally, teacher feedback was provided to interested students in the experimental group to ensure ethical and fair standards were maintained.

3.5. Data Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS). First, descriptive statistics, including the minimum, maximum, and mean values, were calculated for the participants' ages. Next, frequencies and percentages were calculated for proficiency levels, gender, departmental distribution, and prior experiences with academic writing and the use of AI tools. Subsequently, to assess the internal consistency of the SAWSES, Cronbach's alpha coefficients were determined for each subscale and the overall scale in both pre-test and post-test administrations. The scale

included 16 items and three subscales, with all 33 participants providing valid responses in both datasets. The *Writing essentials* subscale (three items) exhibited a pre-test coefficient of .39, indicating poor internal consistency. However, this value significantly improved to .83 in the post-test, suggesting that the intervention enhanced participants' understanding of essential academic writing skills. The other subscales exhibited high internal consistency across both time points. The results for *Relational reflective writing* (eight items) were .87 in the pre-test and .88 in the post-test, while those for *Creative identity* (five items) were .80 in the pre-test and .84 in the post-test. The overall SAWSES scores for both pre-test and post-test administrations demonstrated high reliability, with coefficients of .86 for the pre-test and .94 for the post-test. Finally, construct validity was assessed through factor analysis for each subscale and the overall scale. The *Writing essentials* subscale showed a significant increase from 45.06% of the total variance in the pre-test to 74.97% in the post-test. The variance of the *Relational reflective writing* subscale decreased from 68.32% in the pre-test to 55.23% in the post-test, while the variance of the *Creative identity* subscale rose from 55.26% in the pre-test to 61.1% in the post-test. The overall factor analysis of the SAWSES revealed that 67.9% of the total variance was present in the pre-test, slightly increasing to 68.65% in the post-test. Based on the findings, the SAWSES demonstrates improved reliability in the post-test results compared to the pre-test, indicating more consistent internal responses among participants and an enhanced factor structure among the items following the intervention. Overall, the instrument scale demonstrated high reliability and acceptable construct validity, providing a solid foundation for further research. *Table 1* presents the reliability

coefficients and the principal component variance values for the pre-test and post-test data.

Table 1

Reliability Coefficients and Percentage of Variance for the SAWSES and Its Subscales

Subscale / Total	Cronbach's Alpha (Pre-test)	Cronbach's Alpha (Post-test)	% of Variance (Pre-test)	% of Variance (Post-test)
Writing essentials	.39	.83	45.06%	74.97%
Relational reflective writing	.87	.88	68.32%	55.23%
Creative identity	.80	.84	55.26%	61.1%
Overall SAWSES	.86	.94	67.9%	68.65%

A comprehensive analytical approach was employed to assess the impact of the intervention. Initially, a descriptive analysis was conducted to reveal the mean scores of the pre-test and post-tests, aiming to determine and compare the levels of academic writing self-efficacy in each group both before and after the implementation process. Second, non-parametric tests were implemented due to the relatively small sample size and the inability to meet the normality assumption. The Wilcoxon Signed-Rank Test was applied to each scale to determine if there were meaningful differences in participants'

academic writing self-efficacy between the pre-test and post-test scores within each group. Subsequently, the Mann-Whitney U Test was utilized to analyze the disparity in self-efficacy levels between the control and experimental groups after the treatment.

Finally, focus group interviews were conducted to support the quantitative findings. The results were shared during the interviews with ten participants, divided equally between the experimental and control groups. Each group was interviewed separately, with sessions lasting a total of fifty minutes per group. The researcher analyzed the participants' responses in depth to gain a deeper understanding of their perspectives and identify any differences between the groups. All participants' personal information remained confidential, and the data collected was presented anonymously.

4. RESULTS

This section demonstrates the research questions and the results derived from the data analyses. It begins by presenting the participants' level of academic writing self-efficacy at both the pre-test and post-test. Next, it examines the impact of teacher feedback on academic writing self-efficacy, followed by an analysis of the impact of AI-based feedback on academic writing self-efficacy. Finally, a comparison of data from both the control and experimental groups is provided.

4.1. What is the level of academic writing self-efficacy among Turkish EFL students?

4.1.1. The Academic Writing Self-Efficacy Level of the Control Group

Table 2 presents the descriptive statistics for the control group's scores in academic writing self-efficacy across all subscales and the overall scale. Pre-test results revealed that participants in the control group had a moderate overall level of academic writing self-efficacy before implementation, with a mean score of 3.30. Specifically, the *Writing essentials* subscale in the pre-test revealed moderate self-efficacy with a mean score of 3.27. In *Relational reflective writing*, participants demonstrated a high level of self-efficacy, with a mean score of 3.44. In the *Creative identity* subscale of the pre-test, participants displayed a moderate mean score of 3.09.

Following the intervention, increases are observed in the overall scale and across all subscales. The mean score for *Writing essentials* increased to 3.65, indicating a transition to a high level of self-efficacy following implementation. *Relational reflective*

writing also notably improved, reaching an even higher level of self-efficacy, with a mean score of 3.81. Additionally, *Creative identity* scores also increased significantly, reaching a high level with a mean of 3.53. Overall, the control group demonstrated high perceived academic writing self-efficacy across all subscales and overall scale post-implementation, achieving an overall mean score of 3.69. The results suggest that teacher feedback had a positive impact on students' self-efficacy across these three dimensions of academic writing self-efficacy.

Table 2:

Descriptives for Academic Writing Self-Efficacy in the Control Group (n=16)

	Subfactors	Mean	Std. Error	Std. deviation
Pre-test	Writing essentials	3.27	0.14	0.57
	Relational reflective writing	3.44	0.12	0.50
	Creative identity	3.09	0.13	0.53
	Overall academic writing self-efficacy	3.30	0.09	0.35
Post-test	Writing essentials	3.65	0.25	0.99
	Relational reflective writing	3.81	0.20	0.79
	Creative identity	3.53	0.21	0.83
	Overall academic writing self-efficacy	3.69	0.20	0.81

Table 3 summarizes the findings from Wilcoxon Signed-Rank Tests conducted to determine whether there was a statistically significant improvement in the academic writing self-efficacy of the control group between the pre-test and post-test across the overall scale and its three subscales. The analysis revealed a statistically significant increase in the overall academic writing self-efficacy of the control group ($p = .04$), suggesting that traditional instruction combined with teacher feedback positively impacted students' perceived self-efficacy in academic writing. Regarding the subscales, no significant differences were found in the *Writing essentials* ($p = .09$) and *Relational reflective writing* ($p = .08$) despite observing slight increases in post-test scores. However, the *Creative identity* subscale demonstrated a statistically significant improvement following traditional instruction ($p = .04$).

Table 3:

Academic Writing Self-Efficacy in the Control Group (Wilcoxon Signed-Rank Test) (n=16)

Subfactors	Ranks	N	Mean Ranks	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	Negative Ranks	2	11.00	22.00	.09
	Positive Ranks	11	6.27	69.00	
	Ties	3			
Relational reflective writing	Negative Ranks	3	9.67	29.00	.08
	Positive Ranks	12	7.58	91.00	
	Ties	1			
Creative identity	Negative Ranks	3	6.33	19.00	.04
	Positive	11	7.82	86.00	

	Ranks				
	Ties	2			
Overall academic writing self-efficacy	Negative Ranks	2	14.00	28.00	.04
	Positive Ranks	14	7.71	108.00	
	Ties	0			

4.1.2. The Academic Writing Self-Efficacy Level of the Experimental Group

Table 4 presents the descriptive statistics for the experimental group's academic writing self-efficacy scores across all subscales and the overall scale. Pre-test results revealed that participants in the experimental group had a moderate level of overall academic writing self-efficacy, with a mean score of 3.38. When examined by subscale, participants reported high self-efficacy in the *Writing essentials* subscale, with a mean score of 3.47, and in the *Relational reflective writing* subscale, with a mean score of 3.61. However, their self-efficacy in the *Creative identity* subscale was lower, with a moderate mean score of 2.95.

Following the intervention, improvements are observed across all subscales and the overall scale. The mean score for the *Writing essentials* increased to 3.67, while the mean score for *Relational reflective writing* increased to 3.93 after the intervention, both remaining within the high range. *Creative identity* scores also notably increased after implementation, with a mean score of 3.27, still indicating a moderate level of self-efficacy. Finally, the post-test scores for the overall scale increased from moderate to

high, with a mean score of 3.68. The results suggest that AI-based feedback has a positive impact on students' self-efficacy across these three dimensions of academic writing.

Table 4:

Descriptives for Academic Writing Self-Efficacy in the Experimental Group (n = 17)

	Subfactors	Mean	Std. Error	Std. Deviation
Pre-test	Writing essentials	3.47	0.09	0.35
	Relational reflective writing	3.61	0.18	0.73
	Creative identity	2.95	0.17	0.68
	Overall academic writing self-efficacy	3.38	0.14	0.57
Post-test	Writing essentials	3.67	0.13	0.55
	Relational reflective writing	3.93	0.11	0.44
	Creative identity	3.27	0.13	0.52
	Overall academic writing self-efficacy	3.68	0.10	0.43

Table 5 presents the findings of the Wilcoxon Signed-Rank Tests conducted to compare the pre-test and post-test academic writing self-efficacy scores of the experimental group across the overall scale and its three subscales. The analysis revealed a statistically significant increase in the overall academic writing self-efficacy of the experimental group (p = .01), indicating that AI-based feedback generated from ChatGPT had a positive impact on students' perceived self-efficacy in academic writing. Regarding the subscales, although there was an increase in the *Writing essentials* subscale scores (p = .18), the difference was not statistically significant. However, the *Relational reflective writing* (p = .01) and *Creative identity* (p = .03) subscales demonstrated statistically significant improvements following the AI-based feedback intervention.

Table 5:

Academic Writing Self-Efficacy in the Experimental Group (Wilcoxon Signed-Rank Test) (n=17)

Subfactors	Ranks	N	Mean Ranks	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	Negative Ranks	4	7.88	31.50	.18
	Positive Ranks	10	7.35	73.50	
	Ties	3			
Relational reflective writing	Negative Ranks	4	5.75	23.00	.01
	Positive Ranks	13	10.00	130.00	
	Ties	0			
Creative identity	Negative Ranks	5	5.40	27.00	.03
	Positive Ranks	11	9.91	109.00	
	Ties	1			

Overall academic writing self-efficacy	Negative Ranks	3	6.67	20.00	.01
	Positive Ranks	13	8.92	116.00	
	Ties	1			

4.2. Does traditional teacher feedback affect self-efficacy in academic writing?

Based on the item-level Wilcoxon Signed Ranks Test, *Table 6* presents the two items that revealed a statistically significant difference between the pre-test and post-test results in the control group. The third item from the *Writing essentials* subscale, “I can combine or synthesize multiple sources I’ve read to create an original product or text.”, yielded a significant increase in the post-test ($p = .04$), suggesting that participants in the control group enhanced their self-efficacy in integrating information into their writing. Additionally, a statistically significant difference was found in the fifteenth item from the *Creative identity* subscale, “Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.”, with a significance level of .03. While teacher feedback did not lead to improvements across all items, it positively impacted two aspects of academic writing self-efficacy: source integration and creative expression (For the complete Item-Level Wilcoxon Test Results Table for the Control Group, refer to Appendix 6)

Table 6:

Items with Statistically Significant Differences in the Control Group (The Wilcoxon Test) (n=16)

Subfactors	Items	Ranks	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	3. I can combine or synthesize multiple sources I've read to create an original product or text.	Negative Ranks	1	5.50	5.50	.04
		Positive Ranks	8	4.94	39.50	
		Ties	7			
Creative identity	15. Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.	Negative Ranks	2	6.25	12.50	.03
		Positive Ranks	10	6.55	65.50	
		Ties	4			

4.3. Does AI-based feedback affect self-efficacy in academic writing?

Table 7 presents the four items that demonstrated statistically significant improvements between the pre-test and post-test results in the experimental group. Notably, three items from *Relational reflective writing* showed significant gains. First,

the seventh item, “When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.”, had a meaningful difference with a significance value of .02, indicating an improvement in participants’ ability to express their ideas when engaging with academic texts. Second, the eighth item, “When I look at the overall picture I’ve presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.”, showed a significant improvement with a significance level of .02, suggesting an increase in their capacity to construct coherent arguments. Third, the tenth item, “With each new writing assignment, I can adapt my writing to meet the needs of that assignment,” demonstrated very high statistical significance with a significance value of .01, indicating an improvement in their ability to adapt to new writing tasks. Similarly, a statistically significant difference was found in the fourteenth item from the *Creative identity* scale, “I feel I can develop my own writing voice (ways of speaking in my writing that are uniquely mine).”, with a significance level of .01. While AI-based feedback from ChatGPT did not improve all items, it positively impacted these four aspects of academic writing self-efficacy (For the complete Item-Level Wilcoxon Test Results Table for the Experimental Group, refer to Appendix 7).

Table 7:

Items with Statistically Significant Differences in the Experimental Group (The Wilcoxon Test) (n = 17)

Subfactors	Items	Ranks	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Relational reflective writing	7. When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.	Negative Ranks	1	4.00	4.00	.02
		Positive Ranks	8	5.13	41.00	
		Ties	8			
	8. When I look at the overall picture I've presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.	Negative Ranks	1	3.50	3.50	.02
		Positive Ranks	8	5.19	41.50	
		Ties	8			
	10. With each new writing assignment, I can adapt my writing to meet the needs of that assignment.	Negative Ranks	0	0.00	0.00	.01
		Positive Ranks	7	4.00	28.00	
		Ties	10			
Creative identity	14. I feel I can develop my own writing voice (ways of speaking in my writing that	Negative Ranks	1	4.50	4.50	.01

are uniquely me).	Positive Ranks	10	6.15	61.50	
	Ties	6			

4.4. Is there a difference between the impact of AI-based feedback and teacher feedback on self-efficacy in academic writing?

Table 8 presents the pre-test findings of the Mann–Whitney U Test across three subscales and the overall scale, which was conducted to determine potential differences in academic writing self-efficacy between the experimental and control groups before the intervention. The results revealed no statistically significant differences in *Writing essentials* (p = .17), *Relational reflective writing* (p = .14), *Creative identity* (p = .61), or overall academic writing self-efficacy (p = .26). Consequently, the findings indicate that the two groups were comparable in terms of their initial academic writing self-efficacy, confirming baseline equivalence before the intervention.

Table 8:

Pre-Test Comparison of Academic Writing Self-Efficacy Between Experimental and Control Groups (Mann–Whitney U Test)

Subfactors	Groups	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	Experimental	17	19.18	326.00	.17
	Control	16	14.69	235.00	

Pre-test	Relational reflective writing	Experimental	17	19.38	329.50	.14
		Control	16	14.47	231.50	
	Creative identity	Experimental	17	16.18	275.00	.61
		Control	16	17.88	286.00	
	Overall academic writing self-efficacy	Experimental	17	18.85	320.50	.26
		Control	16	15.03	240.50	

Moreover, the Mann-Whitney U Test for item-by-item analysis reveals no statistically significant differences between the experimental and control groups in the pre-tests. All item-level p-values were higher than .05. This indicated that both groups had comparable item-level academic writing self-efficacy before the intervention (for the complete item-level Mann-Whitney U Test Results for the Pre-test of the Control and Experimental Groups, refer to Appendix 8).

Table 9 presents the post-test findings of the Mann–Whitney U test across three subscales and the overall scale, which was conducted to identify potential differences in academic writing self-efficacy between the experimental and control groups following the intervention. The results revealed no statistically significant differences in *Writing essentials* ($p = .60$), *Relational reflective writing* ($p = .89$), *Creative identity* ($p = .34$), or overall academic writing self-efficacy ($p = .61$).

Similarly, the item-level Mann-Whitney U Test results of the post-test analysis revealed no statistically significant difference between the experimental and control groups following the intervention. All item-level p-values were higher than .05. (For the item-level Mann-Whitney U Test Results for the Post-test of the Control and Experimental Groups, refer to Appendix 9.) Consequently, the findings revealed that although both feedback types enhanced participants' academic writing self-efficacy, no statistically significant differences were observed between the control group, which received teacher feedback, and the experimental group, which received AI-based feedback, in this study.

Table 9:

Post-Test Comparison of Academic Writing Self-Efficacy Between Experimental and Control Groups (Mann–Whitney U Test)

	Subfactors	Groups	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Post-	Writing essentials	Experimental	17	16.15	274.50	.60
		Control	16	17.91	286.50	
	Relational reflective writing	Experimental	17	16.76	285.00	.89
		Control	16	17.25	276.00	

test	Creative identity	Experimental	17	15.44	262.50	.34
		Control	16	18.66	298.50	
	Overall academic writing self-efficacy	Experimental	17	16.18	275.00	.61
		Control	16	17.88	286.00	

5. CONCLUSIONS AND DISCUSSION

This section summarizes the conclusions and discussions from this study. First, it presents the main conclusions corresponding to each research question, as well as insights from focus group discussions. Then, it discusses the results derived from this study in relation to previous research. Next, it offers practical recommendations and outlines the study's limitations. Ultimately, it provides recommendations for future research.

5.1. Conclusions

This study, which investigated the impact of AI-based feedback on self-efficacy in academic writing, yielded four main conclusions. First, the academic writing self-efficacy level of Turkish EFL students is moderate. Second, traditional teacher feedback significantly improved students' overall academic writing self-efficacy. Third, AI-based feedback significantly improved students' overall academic writing self-efficacy. Lastly, the data comparing the improvements between the groups revealed no statistically significant difference between the impact of teacher feedback and AI-based feedback on academic writing self-efficacy. These findings suggest that both types of feedback had a comparable positive effect on students' self-efficacy in academic writing.

Insights from the focus group discussions with five randomly selected participants from the control group suggest that the conclusions of this study may stem from various factors. The teacher feedback group predominantly indicated that they had made

significant improvements due to the detailed in-person teacher feedback they received at least once a week and were not surprised that their overall academic writing self-efficacy statistically improved. Specifically, students expressed that several factors contributed to their growth in *Creative identity* self-efficacy. One student highlighted that the teacher's one-on-one feedback sessions helped enhance their ideas more effectively during the editing stage. Another participant mentioned that he could create a writer's identity through regular writing practice. Additionally, one participant stated that receiving weekly feedback encouraged them to think about what else they could write next. Another indicated that exploring different topics each week enriched their creativity. They also found that learning different essay structures inspired them to use various writing styles. When the comparable positive effects of both teacher feedback and AI-based feedback on academic writing self-efficacy were presented, the students were surprised, given their strong preference for teacher feedback. While one student indicated that this may have stemmed from the non-stop accessibility of AI tools, the majority still expressed a preference for teacher feedback. One student stated that they considered AI feedback unreliable, which led them to prefer feedback from their teachers. Another student also expressed a preference for teacher feedback, noting that AI feedback did not offer the same level of guidance as a human teacher. Overall, students considered teacher feedback to be an essential part of the academic writing process, valuing its reliability and the sense of human connection it offered.

Insights from focus group discussions with five randomly selected participants from the experimental group suggest that the conclusions of this study may stem from various factors. Participants in the AI feedback group had mixed feelings about the feedback they received from ChatGPT. On one hand, many students appreciated the accessibility, speed, and practicality of AI-based feedback. Two participants highlighted that ChatGPT enabled the entire class to receive instant and simultaneous feedback after writing tasks, a capability that a human teacher cannot achieve. Another added that teachers can only focus on mistakes due to time limitations, but AI tools can cover every aspect of their writing in detail. One student stated that, unlike teachers, ChatGPT offered visual and systematic feedback, such as tables or even PDFs, making the feedback easier to comprehend. When asked to discuss the factors that may have contributed to their improvement in *Relational reflective writing* self-efficacy, some participants noted that ChatGPT emphasized the use of academic writing connectors, which enhanced the cohesion of their writing. One student indicated that ChatGPT was excellent at helping them understand how to develop their thinking processes. When asked to discuss the factors that may have contributed to their improvement in *Creative identity* self-efficacy, several participants mentioned that they utilized ChatGPT not only for error correction but also for idea generation, asking it how to think differently. This gave them the feeling of "thinking with someone," contributing to their creative development. Some students appreciated the guidelines on the ethical and efficient use of AI tools provided before the implementation of AI-based feedback, which encouraged them to use these tools as a guide to develop their ideas and understanding through interaction rather than simply

copying and pasting. Additionally, another student noted that by analyzing sample phrases suggested by ChatGPT, they could develop their writing voice by adapting the phrases they liked into their essays. Many participants also valued the teacher's presence in the classroom while receiving AI-based feedback, as they could consult with the teacher when unsure about ChatGPT's responses. They described this "double support system" as highly effective, stating that AI offered detailed guidance while the teacher remained a trusted authority. On the other hand, some students mentioned that while AI was helpful, they still preferred teacher feedback, considering it more reliable and aligned with institutional standards. Remarkably, this preference was not as strongly stated in the experimental group as it was in the control group. Moreover, a few participants criticized ChatGPT for having excessively high expectations, often requesting changes even in well-written texts. One student expressed that AI provided systematic feedback but lacked human connection and trust in the evaluation process. Overall, students regarded AI-based feedback as a valuable supplement rather than a replacement for teacher feedback.

5.2. Pedagogical Implications

The results of this study suggest several pedagogical implications. First, the data on improvements within groups demonstrated that both teacher and AI-based feedback significantly enhance academic writing self-efficacy. This aligns with existing research that shows a positive correlation between feedback mechanisms and self-efficacy, regardless of their source (Chan & Lam, 2010; Schunk, 1981, 1982; Takarroucht, 2022).

On the other hand, the effectiveness of feedback is influenced by its quality. For instance, even peer feedback can rival teacher feedback in enhancing writing self-efficacy if peers receive proper training in providing high-quality feedback (Cui et al., 2021). In contrast, without adequate training, it lacks quality, thereby affecting its effectiveness (Ruegg, 2018). Secondly, comparisons between groups reveal no significant difference in the impact of teacher feedback and AI-based feedback on academic writing self-efficacy, underscoring the potential of AI-based feedback as a supplementary tool in academic writing instruction. Additionally, the lower p-value for the group receiving AI-based feedback might imply a slightly greater improvement in participants' academic writing self-efficacy. Thus, while AI-based feedback is immediate, convenient, systematic, and precise, its impact on academic writing self-efficacy is comparable to that of teacher feedback in this study's context. As seen in Appendix 4, when properly prompted, AI tools can deliver immediate, personalized feedback tailored to students' individual needs, thereby supporting their overall writing proficiency and self-efficacy (Apriani et al., 2024). As shown in Appendix 5, AI-based tools like ChatGPT not only offer detailed, systematic, and informed feedback but also incorporate features such as emojis, which have been demonstrated to boost self-efficacy, even when delivered subliminally (Chen & Hsu, 2022). This alignment with existing literature suggests that implementing AI-based feedback systems can serve as an effective approach in academic writing instruction to enhance self-efficacy (Bouzar et al., 2024; El-Garawany, 2024; Sari & Han, 2024; Teng, 2024), particularly for students who often receive limited or no feedback due to teachers' time limitations and heavy workloads (Herda et al., 2024; Jacobsen & Weber,

2023). Finally, an intriguing implication of this study is that both groups demonstrated the lowest scores in the *Creative identity* subfactor of academic writing self-efficacy, and both teacher feedback and AI-based feedback significantly improved this subfactor. Despite the valid concerns that traditional instructional methods might suppress originality and that AI tools might hinder creativity (Alharbi, 2023; Aydın & Zeinolabedini, 2024; Khatri & Karki, 2023), in this study context, students who received teacher feedback fostered a stronger sense of uniqueness and originality in their academic writing, while those receiving AI-based feedback from ChatGPT reported cultivating a more personal writing style. However, further prolonged and in-depth studies are needed to draw definitive conclusions. In summary, within the framework of this study, incorporating AI-based feedback into academic writing instruction should be considered a pedagogically valid tool to enhance conventional methods that support academic writing self-efficacy.

5.3. Practical Recommendations

This study yields several practical recommendations, particularly regarding the implementation of AI-based feedback in academic writing instruction. First, educators should recognize and leverage the potential of AI-based feedback. Given the time and workload constraints that often hinder the effectiveness and consistency of teacher feedback, AI-based tools like ChatGPT can provide students with precise, personalized, and immediate feedback, thereby improving their academic writing and self-efficacy. Second, before integrating AI-based feedback into academic writing instruction, it is

crucial to provide students with clear guidelines on the ethical and efficient use of AI tools (Shen & Tao, 2025). Findings in this study context reveal that most students are already utilizing AI-based tools, particularly ChatGPT, for their writing assignments. Therefore, students should be cautioned against plagiarism, AI hallucinations, and overdependence (Jacobsen & Weber, 2023). In addition, they should be encouraged to ask targeted questions to obtain the desired responses, evaluate the responses using critical thinking skills, and effectively utilize various AI features, such as voice interaction and generating visual aids. Third, when designing initial feedback prompts, teachers are recommended to first test their effectiveness and precision before implementing them since the quality of prompts has a direct influence on the efficacy of AI-based feedback (Jacobsen & Weber, 2023). For instance, when asking ChatGPT for feedback on a text, it sometimes lacks the qualities that effective feedback typically contains. However, when given the appropriate prompt, the feedback becomes more detailed, precise, and engaging (see Appendices 4 and 5). Fourth, despite the revolutionary effects of AI tools in EFL instruction, human expertise is still recommended to ensure their effectiveness (Brian et al., 2024; Herb & Lloyd, 2024; Karataş et al., 2024; Y. Liu, 2023; Yeung et al., 2023). Teachers should guide students by providing or designing prompts with clear guidelines that correspond to specific assignment requirements and institutional standards. They should also evaluate the dynamic changes that are unique to each classroom and student and, if necessary, update the prompts to meet their varying levels and specific needs. For instance, in response to students' demands for a more motivational context in the AI-based feedback, the prompts

used in this study were updated to meet their needs, which emerged as one of the most appreciated aspects for students. Lastly, it is recommended that students log in to their AI tools using their accounts for a more personalized AI-based feedback experience. Since this requires memory usage, as is the case with ChatGPT, if free users encounter memory limitations, teachers can advise them to delete unnecessary stored memory from the settings to create more space for the application to be used freely.

5.4. Limitations

This study has certain limitations. First, the sample size was relatively small, with 16 participants in the control group and 17 in the experimental group, totaling 33 participants. Consequently, the findings might not be applicable on a larger scale. Second, the implementation period was relatively short, lasting only 5 weeks, excluding the 2-week orientation process. As self-efficacy typically improves over time, particularly with repeated mastery experiences, the comparable effects of the feedback types may become more observable with prolonged and intensive implementations. In addition, writing is a time-consuming process, and the tight schedule in writing classes may not have provided students with sufficient time to observe more significant improvements in their academic writing self-efficacy. Third, the study was conducted at a state university in Turkey, which may limit the generalizability of the results to other contexts, such as private institutions or educational settings in different countries. Furthermore, since the study involved participants from a specific age group and academic background, the findings may be unreliable when generalized to a more diverse group. Fourth, this study

employed a quasi-experimental design, which has limitations, including the lack of randomization. Fifth, the study utilized only one AI tool, ChatGPT, which restricts the generalizability of the findings to other AI-based feedback tools. Sixth, the findings of this study are limited to writing skills, particularly one aspect of that skill, academic writing. Therefore, they may not be generalizable to other skill sets. Seventh, the role of the teacher can be a limitation, as teachers' attitudes and support may influence how participants perceive the process, and the results may not apply to other teachers with different teaching styles or attitudes. Eighth, teacher feedback and AI-based feedback have different dynamics, so they are not completely equivalent to one another. Ninth, because the feedback provided in the study was explicitly corrective, the findings may not be fully generalized to other feedback types. Tenth, although the experimental group primarily received AI-based feedback on their academic texts, teacher support remained available if they encountered difficulties understanding the feedback or faced significant problems in their second drafts. Finally, although this study did not experience this limitation, the necessity for a stable internet connection and a device may pose a potential limitation in other settings with less technological infrastructure.

5.5. Recommendations for Further Research

This study offers several recommendations for further research. First, future studies should involve larger sample sizes and longer, more intensive implementation durations to allow for a more comprehensive understanding of the long-term effects of AI-based feedback on academic writing self-efficacy. Second, while this study employed

a quasi-experimental design due to institutional limitations, adopting an experimental design with random assignment could improve internal validity. Third, the study could be replicated with participants from various age groups, proficiency levels, or educational settings to establish whether the results are consistent across diverse populations. Fourth, examining the influence of teachers' attitudes, support, and digital literacy in AI-based feedback environments would be valuable, as these factors may significantly affect the study outcomes. Fifth, this research specifically utilized ChatGPT as the AI-based feedback tool; future studies could investigate other AI tools to determine if different tools yield comparable outcomes. Lastly, comparative studies on various AI-based feedback tools may provide insights into their effectiveness and unique benefits in enhancing academic writing self-efficacy.

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APPENDIX 1

Academic Writing Self-Efficacy Levels of Preparatory Students

Dear Participant,

This research is a master's thesis conducted under the supervision of Prof. Dr. Selami Aydın as part of the Master's Program in English Language Education at Istanbul Medeniyet University. The study aims to examine the impact of AI-based feedback on the academic writing self-efficacy of students learning English as a foreign language (EFL) in Turkey.

Completing the survey will take approximately 10 minutes. Participation is entirely voluntary, and your responses will be kept confidential. The collected data will only be used for scientific research purposes.

This survey is not an exam or an assessment of success; it is solely aimed at measuring your feelings and self-efficacy regarding the academic writing process.

Thank you very much for participating in the study.

Researcher: Sinem Aydın

Contact: sinem.aydin@medeniyet.edu.tr

PART 1: Background Questionnaire

What is the last four digits of your ID number? ____
Your age? __
Your gender? 1. Female, 2. Male
Your department? _____

Which option best describes your language proficiency level? 1. A1 (Beginner): I can use simple words and phrases and express myself with minimal sentences 2. A2 (Basic): I can understand daily conversations and write at a basic level, but academic writing is difficult. 3. B1 (Intermediate): I can understand daily and academic texts, and I can complete academic writing tasks, but there are still areas where I struggle.
Do you use an AI-based feedback tool (ChatGPT, Grammarly, etc.) in your academic writing processes? 1. Never, 2. Rarely, 3. Sometimes, 4. Often, 5. Always
If you answered yes, which AI-based tools do you use for which writing purposes and activities? _____
Have you received any academic writing training before, besides the preparatory training? 1. Yes 2. No
If you answered yes, where did you receive academic writing training outside of university preparation? _____

PART 2: The Situated Academic Writing Self-Efficacy Scale (SAWSES)

Please read each statement carefully and mark the option that accurately reflects your situation on a scale of 1 to 5: 1: Strongly Disagree, 2: Disagree, 3: Neither agree nor disagree, 4: I agree, 5: I definitely agree.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)

1. Even when the writing is hard, I can find ways to overcome my writing difficulties.					
1. I can successfully use scholarly academic words and phrases when writing in my courses.					
2. I can combine or synthesize multiple sources I've read to create an original product or text.					
3. When I write, I can think about my audience and write so they clearly understand my meaning.					
4. When I receive feedback on my writing, no matter how it makes me feel, I can use that feedback to improve my writing in the future.					
5. When I reflect on what I am writing I can make my writing better.					
6. When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.					
7. When I look at the overall picture I've presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.					
8. I can recognize when I've wandered away from writing what my audience needs to know and have begun writing about interesting, but unrelated, ideas.					
9. With each new writing assignment, I can adapt my writing to meet the needs of that assignment.					
10. When I seek feedback on my writing, I can decide when that feedback should be ignored or incorporated into a revision in my writing.					

11. I can use creativity when writing an academic paper.					
12. I feel I can give my writing a creative spark and still sound professional.					
13. I feel I can develop my own writing voice (ways of speaking in my writing that are uniquely me).					
14. Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.					
15. I can comfortably express the concepts, language, and values of my major in my writing assignments.					

APPENDIX 2

The Ethics Committee Approval

T.C.
İSTANBUL MEDENİYET ÜNİVERSİTESİ REKTÖRLÜĞÜ
Rektörlük

2025 AİLE YILI

Sayı : E-38510686-050.04-2500015443 03.03.2025
Konu : Sinem Aydın'ın Başvurusu

İlgili Makama,

İMÜ Sosyal ve Beşeri Bilimler Etik Kurulu'nun 25.02.2025 tarihli oturumunda, İMÜ Lisansüstü Eğitim Enstitüsü (İngiliz Dili Eğitimi) yüksek lisans öğrencisi **Sinem Aydın**'ın "Akademik Yazma Derslerinde Yapay Zekâ Tabanlı Geri Bildirimin Öğrencilerin Öz Yeterlilikleri Üzerindeki Etkisi" başlıklı YL tezi kapsamında (dan. Prof. Dr. Selami Aydın) veri toplanmasına yönelik araştırma dosyası görüşülmüş, içerik bakımından etik bir sorun bulunmadığı sonucuna varılarak kurulun 2025/02 sayılı ve 25.02.2025 tarihli kararıyla, araştırmacının izin talebi uygun bulunmuştur.

Prof. Dr. Tuncay BAŞOĞLU
Etik Kurul Başkanı

Bu belge, güvenli elektronik imza ile imzalanmıştır.
Belge Doğrulama Kodu: CCDPPEA Belge Takip Adresi: https://www.turkiye.gov.tr/istanbul-medeniyet-universitesi-ebys

Adres: Ünalan Mah. Göztepe Kavşağı Yanı, D-100 Karayolu 5/4 34700 Üsküdar / İstanbul
Bilgi için : Tuncay Başoğlu
Etik Kurul Başkanı
Telefon No: (0 216) 2803333
Faks No:
Telefon No:
e-Posta:
İnternet Adresi: www.medeniyet.edu.tr
Direkt Hat:
Kep Adresi: istanbulmedeniyetuni@hs01.kep.tr

APPENDIX 3

Weeks	Instructional Content	Writing Task	Writing Process		Materials	
			Control Group	Experimental Group	Control Group	Experimental Group
Weeks 1-2	• Opinion essay structure • Transition signals to show time • Body paragraphs in opinion essays	Body Paragraph	**1. First Draft:** Writing a body paragraph that coherently integrates into the provided essay **2. Teacher Feedback:** Receiving feedback from the teacher on the written product	**1. First Draft:** Writing a body paragraph that coherently integrates into the provided essay **2. Teacher Feedback:** Receiving feedback from the teacher on the written product	Writing Pack Pens and paper	Writing Pack Pens and paper
Week 3	• The introductory paragraph structure • Strategies for writing effective openings • Creating a clear and persuasive thesis statement	Introductory Paragraph	**1. First Draft:** Writing an introductory paragraph that coherently integrates into the provided essay **2. Teacher Feedback:** Receiving feedback from the teacher on the written product **3. Second Draft:** Incorporating teacher feedback to revise, edit, and improve the writing	**1. First Draft:** Writing an introductory paragraph that coherently integrates into the provided essay **2. AI-based Feedback:** Receiving AI-based feedback from ChatGPT on the written product **3. Second Draft:** Incorporating AI-based feedback to revise, edit, and improve the writing	Writing Pack Pens and paper	Internet-enabled mobile phones or tablets Writing Pack Pens and paper
Week 4	• Transition signals to show cause-and-effect relationships • Detailed guidelines on academic punctuation practices	Body Paragraph	**1. First Draft:** Writing a body paragraph that coherently integrates into the provided essay **2. Teacher Feedback:** Receiving feedback from the teacher on	**1. First Draft:** Writing a body paragraph that coherently integrates into the provided essay **2. AI-based Feedback:** Receiving AI-based feedback from ChatGPT on the written product	Writing Pack Pens and paper	Internet-enabled mobile phones or tablets Writing Pack Pens and paper

	• Body paragraph organization		the written product 3. **Second Draft:** Incorporating teacher feedback to revise, edit, and improve the writing	3. **Second Draft:** Incorporating AI-based feedback to revise, edit, and improve the writing		
Week 5	• Expressing comparison and contrast • Common conjunctions for comparison and contrast • The correction of sentence fragments • The correction of run-on sentences	Writing Assignment: Body Paragraph (graded)	1. **First Draft:** Writing a body paragraph that coherently integrates into the provided essay 2. **Error Correction Codes:** Receiving indirect feedback on the written product based on Error Correction Codes 3. **Second Draft:** Revising, editing, and improving the writing based on Error Correction Codes	1. **First Draft:** Writing a body paragraph that coherently integrates into the provided essay 2. **Error Correction Codes:** Receiving indirect feedback on the written product based on Error Correction Codes 3. **Second Draft:** Revising, editing, and improving the writing based on Error Correction Codes	Writing Pack Pens and paper	Writing Pack Pens and paper
Week 6	• Essential elements of concluding paragraphs • Rephrasing the thesis, summarizing key points, and providing a final thought • Opinion essay structure • The essay writing process	Concluding Paragraph	1. **First Draft:** Writing a concluding paragraph that coherently integrates into the provided essay 2. **Teacher Feedback:** Receiving feedback from the teacher on the written product 3. **Second Draft:** Incorporating teacher feedback to revise, edit, and improve the writing	1. **First Draft:** Writing a concluding paragraph that coherently integrates into the provided essay 2. **AI-based Feedback:** Receiving AI-based feedback from ChatGPT on the written product 3. **Second Draft:** Incorporating AI-based feedback to revise, edit, and improve the writing	Writing Pack Pens and paper	Internet-enabled mobile phones or tablets Writing Pack Pens and paper
Week 7	• Institutional		1. **First Draft:**	1. **First Draft:** Writing	Writing	Internet-

	standards for a well-structured essay • Putting it all together	Opinion Essay	Writing an opinion essay 2. **Teacher Feedback:** Receiving feedback from the teacher on the written product 3. **Second Draft:** Incorporating teacher feedback to revise, edit, and improve the writing	an opinion essay 2. **AI-based Feedback:** Receiving AI-based feedback from ChatGPT on the written product 3. **Second Draft:** Incorporating AI-based feedback to revise, edit, and improve the writing	Pack Pens and paper	enabled mobile phones or tablets Writing Pack Pens and paper

APPENDIX 4

English Translation of the Initial Prompt for the Opinion Essay in Week 7

You are an English teacher. For my academic writing course, please provide detailed and constructive feedback on the essay I've attached. The expected level is B1, so your feedback should be clear, understandable, and instructional. You should highlight both the strengths and the areas that need improvement, and offer specific suggestions for development.

1. Topic Relevance and Overall Meaning

- Did I understand the topic correctly?
- Did I go off-topic?
- Are my arguments logical and clearly expressed?

2. Detailed Evaluation

Please evaluate my essay according to the categories below. Provide detailed comments under each heading:

FORMAT (Paragraph Structure and Organization)

- Are the introduction, body paragraphs, and conclusion clearly structured?
- Is the thesis statement clear and relevant to the topic?
- Is the conclusion well-connected and does it complete the essay logically?
- Does the first sentence of the conclusion restate the thesis using different words?

CONTENT (Ideas and Supporting Details)

- Does the essay stay on topic throughout?
- Have I explained my views sufficiently, or are some points underdeveloped?
- Are there examples or supporting arguments, or does the essay remain too general?

COHESION & COHERENCE (Flow and Connection)

- Is there a logical flow between paragraphs and sentences?

(NOTE: A transitional sentence at the end of each paragraph is not required.)

- Are linking words (e.g., however, therefore, in addition) used correctly and sufficiently?

VOCABULARY (Word Choice and Appropriateness)

- Is my vocabulary appropriate for the B1 level?
- Have I repeated the same words or phrases too often?
- Can you suggest stronger word choices suitable for B1 level?

GRAMMAR (Grammar Structures)

- Are my sentence structures appropriate for B1 level?
- Are there any grammar mistakes?
- Can I use more advanced B1-level grammar structures?

MECHANICS (Spelling, Punctuation,

Formatting)

- Are there any spelling mistakes?
- Have I used punctuation marks correctly?
- Is the layout between paragraphs clear and organized?

3. Overall Evaluation and Suggestions

- What are the strongest aspects of my writing?
- Identify one or two areas that need the most improvement, and explain how I can work on them.
- End with a motivational comment that will encourage me to keep improving.

APPENDIX 5

English Translation of the Initial AI-based Feedback Provided to a Student by ChatGPT for an Opinion Essay in Week 7

Feedback: "Smoking Should Be Banned" Essay

First of all, you have clearly stated the main idea of your essay and presented a strong stance in favor of banning smoking. That's a great start! Now let's take a closer look at each category.

1. Topic Relevance & Overall Meaning

✅ **Strengths**:

- The topic is well understood, and your essay is relevant to the thesis that smoking should be banned.
- Your arguments cover different aspects such as health, economy, and effects on children.

🔧 **Areas to Improve**:

- Some expressions are unclear or incorrect. For example:

❌ "People are get the habit of early age."

✅ "People develop this habit at an early age."

- The overall flow of ideas could be stronger. The order is logical, but some points need more explanation.

2. Detailed Evaluation

✍ **FORMAT (Paragraph Structure and Organization)**

✅ **Strengths**:

- Your essay includes an introduction, body paragraphs, and a conclusion.
- The thesis statement is clearly presented.

🔧 **Areas to Improve**:

- The thesis could be expressed more clearly. Right now, it's written in a simple way, such as:

❌ "Smoking is very harmful, so it should be banned."

✅ A stronger version would be: "Smoking should be banned due to its harmful effects on health, economy, and future generations."

- The conclusion could be better connected to the rest of the essay. The first sentence of the conclusion should restate the thesis in different words.

❌ "Smoking should be banned because it is harmful."

✅ "To sum up, banning smoking is necessary to protect public health, reduce economic costs, and ensure a healthier future."

📌 **CONTENT (Ideas and Supporting Details)**

✅ **Strengths**:

- You stayed focused on the topic.
- Your arguments are presented in a logical structure.

🔧 **Areas to Improve**:

- Supporting examples are missing. For example:

❌ "Smoking causes health problems."

✅ "Smoking causes serious diseases such as lung cancer and heart disease, leading to millions of deaths every year."

- The economic impact could be explained better. You can include details such as healthcare expenses or workforce loss.

📎 **COHESION & COHERENCE (Transitions and Flow)**

✅ **Strengths**:

• Each paragraph has a clear theme.

🔧 **Areas to Improve**:

• Transition words are missing or used incorrectly. Add more connectors such as “Moreover,” “In addition,” or “As a result.”

❌ “Smoking harms children. It should be banned.”

✅ “Smoking harms children. Moreover, it sets a bad example for future generations.”

• Sentence flow could be improved. For example, adding “First of all,” at the beginning of the second paragraph helps guide the reader.

📝 **VOCABULARY (Word Choice and Appropriateness)**

✅ **Strengths**:

• You used topic-related vocabulary such as “harmful,” “economy,” and “health.”

🔧 **Areas to Improve**:

• There is too much repetition. The phrase “Smoking is harmful” is repeated many times. Try using synonyms:

✅ “Smoking is detrimental to health.”

✅ “This dangerous habit affects people negatively.”

• Some words are used incorrectly. For example:

❌ “People are have a problem.”

✅ “People have a problem.”

📖 **GRAMMAR (Language Structures)**

✅ **Strengths**:

• Sentence structures are generally understandable.

• You used modal verbs like “should” correctly.

🔧 **Areas to Improve**:

• There are some grammar mistakes. For example:

❌ “Smoking should banned.”

✅ “Smoking should be banned.”

❌ “Smokers often need medicines and hospital visits, which increase their personal healthcare costs.”

✅ “Smokers often require medical treatment, leading to increased healthcare costs.”

• You can use a wider variety of grammar structures. Try using conjunctions to create more complex sentences:

❌ “Smoking is harmful. It should be banned.”

✅ “Since smoking is harmful, it should be banned.”

🔤 **MECHANICS (Spelling, Punctuation, Formatting)**

✅ **Strengths**:

• Punctuation is mostly correct.

• Paragraph organization is generally clear.

🔧 **Areas to Improve**:

• Some spelling mistakes need correction. For example:

❌ “smollra” → ✅ “smoking”

❌ “tey are rise children” → ✅ “they raise children”

• Punctuation marks are sometimes missing or incorrect. Especially work on comma usage.

3. Overall Evaluation and Suggestions

✔ **Your strengths**:

• You clearly addressed the topic.

• Ideas are presented in a logical order.

• The essay follows a basic structure with an introduction, body, and conclusion.

🔧 **Areas to improve most**:

1.**Grammar and vocabulary**: Try to reduce repetition and use stronger expressions.

2.**Transitions and flow**: Use more linking words to create smoother transitions between sentences.

📌 **Suggestions for improvement**:

- Learn and use connectors such as “Moreover,” “In addition,” and “Therefore” to make your writing more fluent.
- Avoid repeating the same words. For example, instead of always using “harmful,” try “dangerous” or “detrimental.”
- Add real-life examples: Giving realistic examples about the harms of smoking can make your writing stronger.

▨ **Motivational Closing**

You understood the topic well and tried to organize your ideas clearly—this is a great start! With stronger connectors, more varied vocabulary, and smoother sentence transitions, your writing can improve significantly.

Writing is a skill that grows with practice, so keep going! I’m confident your next essay will be even better. 🚀

APPENDIX 6

Item-Level Wilcoxon Test Results Table for the Control Group (n = 16)

Subfactors	Items	Ranks	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	1. Even when the writing is hard, I can find ways to overcome my writing difficulties.	Negative Ranks	4	8.63	34.50	.89
		Positive Ranks	7	4.50	31.50	
		Ties	5			
	2. I can successfully use scholarly academic words and phrases when writing in my courses.	Negative Ranks	2	7.00	14.00	.15
		Positive Ranks	8	5.13	41.00	
		Ties	6			
	3. I can combine or synthesize multiple sources I've read to create an original product or text.	Negative Ranks	1	5.50	5.50	.04
		Positive Ranks	8	4.94	39.50	
		Ties	7			
Relational reflective	4. When I write, I can think about my audience and write so	Negative Ranks	5	7.20	36.00	.28

writing	they clearly understand my meaning.	Positive Ranks	9	7.67	69.00	
		Ties	2			
	5. When I receive feedback on my writing, no matter how it makes me feel, I can use that feedback to improve my writing in the future.	Negative Ranks	3	8.17	24.50	.24
		Positive Ranks	9	5.94	53.50	
		Ties	4			
	6. When I reflect on what I am writing I can make my writing better.	Negative Ranks	3	5.33	16.00	.12
		Positive Ranks	8	6.25	50.00	
		Ties	5			
	7. When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.	Negative Ranks	4	5.50	22.00	.29
		Positive Ranks	7	6.29	44.00	
		Ties	5			
	8. When I look at the overall picture I've presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.	Negative Ranks	3	5.00	15.00	.17
		Positive Ranks	7	5.71	40.00	
		Ties	6			
	9. I can recognize when I've wandered away from writing	Negative Ranks	3	7.83	23.50	0.06

	what my audience needs to know and have begun writing about interesting, but unrelated, ideas.	Positive Ranks	11	7.41	81.50	
		Ties	2			
	10. With each new writing assignment, I can adapt my writing to meet the needs of that assignment.	Negative Ranks	4	7.13	28.50	.38
		Positive Ranks	8	6.19	49.50	
		Ties	4			
	11. When I seek feedback on my writing, I can decide when that feedback should be ignored or incorporated into a revision in my writing.	Negative Ranks	3	7.50	22.50	.17
		Positive Ranks	9	6.17	55.50	
		Ties	4			
Creative identity	12. I can use creativity when writing an academic paper.	Negative Ranks	3	6.00	18.00	.58
		Positive Ranks	6	4.50	27.00	
		Ties	7			
	13. I feel I can give my writing a creative spark and still sound professional.	Negative Ranks	4	6.38	25.50	.50
		Positive Ranks	7	5.79	40.50	
		Ties	5			
	14. I feel I can develop my own writing voice (ways of	Negative Ranks	2	8.75	17.50	.07

speaking in my writing that are uniquely me).	Positive Ranks	10	6.05	60.50	
	Ties	4			
15. Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.	Negative Ranks	2	6.25	12.50	.03
	Positive Ranks	10	6.55	65.50	
	Ties	4			
16. I can comfortably express the concepts, language, and values of my discipline or major in my writing assignments.	Negative Ranks	1	6.50	6.50	.10
	Positive Ranks	7	4.21	29.50	
	Ties	8			

APPENDIX 7

Item-Level Wilcoxon Test Results Table for the Experimental Group (n = 17)

Subfactors	Items	Ranks	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	1. Even when the writing is hard, I can find ways to overcome my writing difficulties.	Negative Ranks	4	3.50	14.00	.41
		Positive Ranks	2	3.50	7.00	
		Ties	11			
	2. I can successfully use scholarly academic words and phrases when writing in my courses.	Negative Ranks	3	5.00	15.00	.17
		Positive Ranks	7	5.71	40.00	
		Ties	7			
	3. I can combine or synthesize multiple sources I've read to create an original product or text.	Negative Ranks	2	6.50	13.00	.12
		Positive Ranks	8	5.25	42.00	
		Ties	7			
Relational reflective writing	4. When I write, I can think about my audience and write so they clearly understand my meaning.	Negative Ranks	3	3.33	10.00	.48
		Positive Ranks	2	2.50	5.00	

	Ties	12			
5. When I receive feedback on my writing, no matter how it makes me feel, I can use that feedback to improve my writing in the future.	Negative Ranks	3	3.50	10.50	.53
	Positive Ranks	4	4.38	17.50	
	Ties	10			
6. When I reflect on what I am writing I can make my writing better.	Negative Ranks	2	4.00	8.00	.13
	Positive Ranks	6	4.67	28.00	
	Ties	9			
	Total	17			
7. When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.	Negative Ranks	1	4.00	4.00	.02
	Positive Ranks	8	5.13	41.00	
	Ties	8			
8. When I look at the overall picture I've presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.	Negative Ranks	1	3.50	3.50	.02
	Positive Ranks	8	5.19	41.50	
	Ties	8			
9. I can recognize when I've wandered away from writing	Negative Ranks	1	2.00	2.00	.13

	what my audience needs to know and have begun writing about interesting, but unrelated, ideas.	Positive Ranks	4	3.25	13.00	
		Ties	12			
	10. With each new writing assignment, I can adapt my writing to meet the needs of that assignment.	Negative Ranks	0	0.00	0.00	.01
		Positive Ranks	7	4.00	28.00	
		Ties	10			
	11. When I seek feedback on my writing, I can decide when that feedback should be ignored or incorporated into a revision in my writing.	Negative Ranks	2	4.00	8.00	.26
		Positive Ranks	5	4.00	20.00	
		Ties	10			
Creative identity	12. I can use creativity when writing an academic paper.	Negative Ranks	2	4.25	8.50	.34
		Positive Ranks	5	3.90	19.50	
		Ties	10			
	13. I feel I can give my writing a creative spark and still sound professional.	Negative Ranks	5	5.00	25.00	.78
		Positive Ranks	5	6.00	30.00	
		Ties	7			
	14. I feel I can develop my own writing voice (ways of	Negative Ranks	1	4.50	4.50	.01

speaking in my writing that are uniquely me).	Positive Ranks	10	6.15	61.50	
	Ties	6			
15. Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.	Negative Ranks	5	5.50	27.50	.59
	Positive Ranks	6	6.42	38.50	
	Ties	6			
16. I can comfortably express the concepts, language, and values of my discipline or major in my writing assignments.	Negative Ranks	3	7.33	22.00	.15
	Positive Ranks	9	6.22	56.00	
	Ties	5			

APPENDIX 8

Item-Level Mann-Whitney U Test Results for the Pre-test of the Control and Experimental Groups

Subfactors	Items	Groups	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	1. Even when the writing is hard, I can find ways to overcome my writing difficulties.	Experimental	17	19.21	326.50	.11
		Control	16	14.66	234.50	
	2. I can successfully use scholarly academic words and phrases when writing in my courses.	Experimental	17	17.56	298.50	.70
		Control	16	16.41	262.50	
	3. I can combine or synthesize multiple sources I've read to create an original product or text.	Experimental	17	17.97	305.50	.51
		Control	16	15.97	255.50	
Relational reflective writing	4. When I write, I can think about my audience and write so they clearly understand my meaning.	Experimental	17	18.68	317.50	.25
		Control	16	15.22	243.50	
	5. When I receive feedback on my writing, no matter how it makes me feel, I can use that feedback to improve my writing in the future.	Experimental	17	18.97	322.50	.20
		Control	16	14.91	238.50	
	6. When I reflect on what I am writing I can make my writing better.	Experimental	17	17.94	305.00	.52
		Control	16	16.00	256.00	
	7. When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.	Experimental	17	18.15	308.50	.45
		Control	16	15.78	252.50	

	8. When I look at the overall picture I've presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.	Experimental	17	16.71	284.00	.84
		Control	16	17.31	277.00	
	9. I can recognize when I've wandered away from writing what my audience needs to know and have begun writing about interesting, but unrelated, ideas.	Experimental	17	19.26	327.50	.12
		Control	16	14.59	233.50	
	10. With each new writing assignment, I can adapt my writing to meet the needs of that assignment.	Experimental	17	16.35	278.00	.65
		Control	16	17.69	283.00	
	11. When I seek feedback on my writing, I can decide when that feedback should be ignored or incorporated into a revision in my writing.	Experimental	17	18.53	315.00	.31
		Control	16	15.38	246.00	
Creative identity	12. I can use creativity when writing an academic paper.	Experimental	17	15.29	260.00	.26
		Control	16	18.81	301.00	
	13. I feel I can give my writing a creative spark and still sound professional.	Experimental	17	16.76	285.00	.88
		Control	16	17.25	276.00	
	14. I feel I can develop my own writing voice (ways of speaking in my writing that are uniquely me).	Experimental	17	15.62	265.50	.36
		Control	16	18.47	295.50	
	15. Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.	Experimental	17	17.24	293.00	.88
		Control	16	16.75	268.00	
	16. I can comfortably express the concepts, language, and values of my	Experimental	17	16.79	285.50	.89

discipline or major in my writing assignments.	Control	16	17.22	275.50	

APPENDIX 9

Mann-Whitney U Test Results for the Post-test of the Control and Experimental Groups

Subfactors	Items	Groups	N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Writing essentials	1. Even when the writing is hard, I can find ways to overcome my writing difficulties.	Experimental	17	17.76	302.00	.59
		Control	16	16.19	259.00	
	2. I can successfully use scholarly academic words and phrases when writing in my courses.	Experimental	17	16.44	279.50	.72
		Control	16	17.59	281.50	
	3. I can combine or synthesize multiple sources I've read to create an original product or text.	Experimental	17	15.56	264.50	.32
		Control	16	18.53	296.50	
Relational reflective writing	4. When I write, I can think about my audience and write so they clearly understand my meaning.	Experimental	17	16.94	288.00	.97
		Control	16	17.06	273.00	
	5. When I receive feedback on my writing, no matter how it makes me feel, I can use that feedback to improve my writing in the future.	Experimental	17	16.26	276.50	.62
		Control	16	17.78	284.50	
	6. When I reflect on what I am writing I can make my writing better.	Experimental	17	16.88	287.00	.94
		Control	16	17.13	274.00	
	7. When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.	Experimental	17	19.79	336.50	.07
		Control	16	14.03	224.50	

	8. When I look at the overall picture I've presented in my writing, I can assess how all the pieces tell the complete story of my topic or argument.	Experimental	17	17.79	302.50	.59
		Control	16	16.16	258.50	
	9. I can recognize when I've wandered away from writing what my audience needs to know and have begun writing about interesting, but unrelated, ideas.	Experimental	17	17.12	291.00	.94
		Control	16	16.88	270.00	
	10. With each new writing assignment, I can adapt my writing to meet the needs of that assignment.	Experimental	17	16.74	284.50	.86
		Control	16	17.28	276.50	
	11. When I seek feedback on my writing, I can decide when that feedback should be ignored or incorporated into a revision in my writing.	Experimental	17	17.21	292.50	.89
		Control	16	16.78	268.50	
Creative identity	12. I can use creativity when writing an academic paper.	Experimental	17	15.94	271.00	.49
		Control	16	18.13	290.00	
	13. I feel I can give my writing a creative spark and still sound professional.	Experimental	17	15.79	268.50	.43
		Control	16	18.28	292.50	
	14. I feel I can develop my own writing voice (ways of speaking in my writing that are uniquely me).	Experimental	17	17.15	291.50	.92
		Control	16	16.84	269.50	
	15. Even with very specific assignment guidelines, I can find ways of writing my assignment to make it original or unique.	Experimental	17	14.09	239.50	.06
		Control	16	20.09	321.50	
	16. I can comfortably express the concepts, language, and values of my	Experimental	17	16.29	277.00	.65

discipline or major in my writing assignments.	Control	16	17.75	284.00	

Özgeçmiş

KİŞİSEL BİLGİLER

Adı Soyadı: Sinem AYDIN

Uyruğu: T.C.

EĞİTİM

Derece	**Kurum**	**Mezuniyet Yılı**
Lisans	Orta Doğu Teknik Üniversitesi Eğitim Fakültesi İngilizce Öğretmenliği Bölümü	2010
Yüksek Lisans	İstanbul Medeniyet Üniversitesi Lisansüstü Eğitim Enstitüsü İngiliz Dili Eğitimi	Devam ediyor

İŞ TECRÜBESİ

Tarih	**Kurum**	**Görev**
2011-2012	İngiliz Kültür Derneği	İngilizce Öğretmeni
2012-2013	İzmir Ekonomi Üniversitesi Yabancı Diller Yüksekokulu	Okutman
2013-2014	Acarkent Doğa Anadolu Lisesi- IB Programme	Amerikan Edebiyatı Öğretmeni
2014- 2015	Bilfen İlköğretim Okulları	İngilizce Öğretmeni
2017-Halen	İstanbul Medeniyet Üniversitesi Yabancı Diller Yüksekokulu	Öğretim Görevlisi

YABANCI DİLLER

İngilizce (ileri düzey), İspanyolca (başlangıç-orta düzey)