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AN INVESTIGATION INTO DETECTING AND CORRECTING LOGICAL FALLACIES IN ACADEMIC WRITINGS OF STUDENT TEACHERS IN AN ELT PROGRAMME

Özlem Demir

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YAZARIN

Adı : Özlem
Soyadı : Demir
Bölümü : İngiliz Dili Eğitimi Anabilim Dalı
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Tez yazma sürecinde bilimsel ve etik ilkelere uyduğumu, yararlandığım tüm kaynakları kaynak gösterme ilkelerine uygun olarak kaynakçada belirttiğimi ve bu bölümler dışındaki tüm ifadelerin şahsıma ait olduğunu beyan ederim.

Yazar Adı Soyadı: Özlem Demir

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Danışman: Prof. Dr. Kemal Sinan Özmen ...……

İngiliz Dili Eğitimi Anabilim Dalı, Gazi Üniversitesi

Başkan: Prof. Dr. Paşa Tevfik Cephe ……

İngiliz Dili Eğitimi Anabilim Dalı, Gazi Üniversitesi

Üye: Prof. Dr. Yusuf Demir ……

İngiliz Dili Eğitimi Anabilim Dalı, Selçuk Üniversitesi

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ÖZ

Akademik yazma, öğrencilerin yalnızca dilsel değil aynı zamanda bilişsel becerilerini geliştirmelerine olanak tanırken; tartışmacı metin üretiminde yapılan mantık hataları, metnin akıl yürütme kalitesini zayıflatmakta ve öğrencilerin eleştirel düşünme becerilerinin gelişimini olumsuz etkileyebilmektedir. Bu nedenle, öğretmen adaylarının yazılı argümanlarında daha sağlam, geçerli ve ikna edici savlar üretebilmeleri için, mantık hatalarının tanınması ve düzeltilmesine yönelik sistemli öğretim yaklaşımlarına ihtiyaç duyulmaktadır. Bu araştırma, İngiliz Dili Eğitimi programında öğrenim gören birinci sınıf öğretmen adaylarının akademik tartışma yazılarında karşılaşılan mantık hatalarının tür ve sıklıklarını belirlemeyi; bu hataların tespit edilmesi ve düzeltilmesinde açık mantık hatası eğitimi ile yapılandırılmış akran geribildirim süreçlerinin etkilerini incelemeyi amaçlamaktadır. Çalışma, Türkiye'de bir devlet üniversitesinde öğrenim gören 20 öğretmen adayıyla yürütülmüş ve karma yöntem deseni doğrultusunda hem nicel hem nitel veriler toplanmıştır. Yedi hafta süren müdahale sürecinde öğrencilere Engel'in (1982) informal mantık sınıflandırmasına dayalı olarak hazırlanan materyaller aracılığıyla doğrudan eğitim verilmiş ve her hafta yazılan tartışmacı kompozisyonlara yönelik akran geribildirim oturumları düzenlenmiştir. Nicel veriler, öğrencilerin ilk ve revize taslaklarındaki mantık hatalarının sıklığını ve türlerini karşılaştırmalı olarak analiz etmeyi içermiştir. Nitel veriler

ise uygulama sonunda yapılan odak grup görüşmeleri yoluyla elde edilmiştir. Bulgular, öğrencilerin müdahale öncesinde özellikle "genelleme", "yanlış neden-sonuç" ve "duygulara başvurma" gibi safsataları sıkça kullandıklarını; müdahale sonrasında ise bu hatalarda belirgin bir azalma olduğunu ortaya koymuştur. Öğrenciler, akran değerlendirmesi ve açık öğretim yoluyla yazılarını daha mantıklı, tutarlı ve akademik bir üsluba uygun şekilde yeniden yapılandırabilmişlerdir. Odak grup görüşmeleri ise katılımcıların sürece dair olumlu tutum geliştirdiğini, mantık yürütme becerilerinde farkındalık kazandıklarını ve akademik yazma özgüvenlerinin arttığını göstermiştir. Elde edilen veriler, öğretmen adaylarının eleştirel düşünme ve akademik yazma becerilerinin gelişiminde mantık odaklı öğretim ve yapılandırılmış akran geribildirimi uygulamalarının etkili bir yöntem olduğunu ortaya koymaktadır.

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Özlem Demir

GAZİ UNIVERSITY

GRADUATE SCHOOL OF EDUCATIONAL SCIENCES

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ABSTRACT

Academic writing not only enhances students' linguistic competencies but also fosters their cognitive development. However, the presence of logical fallacies in argumentative texts can undermine the quality of reasoning and limit the development of critical thinking. Therefore, there is a pedagogical need to systematically address fallacies in instructional contexts to help pre-service teachers construct sound, valid, and persuasive arguments. This study aims to identify the types and frequencies of logical fallacies found in the argumentative essays of first-year student teachers enrolled in an English Language Teaching (ELT) programme, and to examine the impact of explicit fallacy instruction combined with structured peer feedback on the recognition and reduction of these fallacies. Conducted with 20 pre-service teachers at a state university in Turkey, this mixed-methods study involved a seven-week intervention. During the process, students received direct instruction based on Engel's (1982) taxonomy of informal fallacies and participated in peer review sessions for their weekly drafts. Quantitative data were collected through comparative analysis of students' first and revised drafts, while qualitative insights were obtained via a post-intervention focus group interview.

The findings revealed that students frequently committed fallacies such as hasty generalization, false cause, and appeal to emotion prior to the intervention.

Following the instructional treatment, there was a notable decline in the frequency of such fallacies, and students demonstrated increased ability to construct logically coherent and

academically appropriate arguments. Focus group data further indicated that participants developed greater awareness of logical reasoning and expressed positive attitudes toward both the instructional content and the peer review process. Overall, the study highlights the effectiveness of integrating fallacy-focused instruction with peer interaction to improve critical thinking and argumentative writing skills in pre-service English teachers.

Keywords : Logical Fallacies, Peer Review, Argumentative Writing, Pre-Service Teachers, Writing Instruction

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LIST OF ABBREVIATIONS

EFF	English as a Foreign Language
ELT	English Language Teaching
L1	First Language
L2	Second Language
S	Student
W	Writing
WT	Writing Task
ZPD	Zone of Proximal Developent

CHAPTER I

INTRODUCTION

1.1 Background to the Study

Writing is widely recognized as one of the most complex and cognitively demanding skills in language learning, particularly within academic contexts. Unlike speaking or listening, academic writing requires not only linguistic proficiency but also the ability to organize ideas logically, develop well-supported arguments, and adhere to formal discourse conventions (Hyland, 2019). In higher education, students are expected to engage in advanced levels of critical thinking and express their thoughts through logically structured arguments. However, many undergraduate students struggle to meet these expectations because they have had limited prior exposure to academic writing, especially during their pre-university education (Grabe & Zhang, 2013). Writing is indeed a cognitively intensive process that demands simultaneous control over multiple components such as content, grammar, vocabulary, and coherence. As noted by Nunan (2008), writing is one of the most complex and difficult skills to master for second language learners since it involves high-level cognitive processing.

From a pedagogical perspective, writing has often received less attention than other skills such as reading, even though it plays a crucial role in fostering language competence, critical thinking, and effective communication (Kress, 1990; Badley, 2009). This disparity becomes more problematic in contexts where writing is neglected in earlier stages of education because learners in such settings often enter tertiary institutions without sufficient foundational skills, which makes academic writing particularly challenging.

Academic writing is closely linked to argumentative discourse because it requires students not only to present their ideas but also to defend them through valid reasoning and critical engagement. One of the central objectives of academic writing instruction in English Language Teaching (ELT) programs is to support students in articulating their ideas persuasively. This objective is typically realized through argumentative essay tasks in which students are expected to advance and justify a thesis using logical reasoning and evidence (Nussbaum, 2005). In contemporary higher education, fostering critical and innovative thinking has become a curricular priority, and argumentative writing tasks serve as key platforms through which such skills are assessed (Indah & Kusuma, 2015). Nevertheless, English as a Foreign Language (EFL) learners often struggle to formulate strong arguments, particularly when they lack background knowledge about the assigned topic. Indah (2015) demonstrated that topic familiarity significantly affects the quality of reasoning, as unfamiliar topics often lead to more fallacious claims.

Logical fallacies, which are reasoning errors that undermine the soundness of arguments, represent one of the most critical obstacles in academic writing (Engel, 1982). These fallacies may render an argument invalid or misleading and thereby compromise the persuasiveness of the text. Dowden (2010) emphasizes the importance of evaluating claims for logical soundness and asserts that the presence of a fallacy makes an argument unsound and unconvincing. Therefore, the ability to detect and avoid logical fallacies constitutes an essential component of critical thinking (Stapleton, 2001). However, instruction in writing courses has traditionally prioritized surface-level features such as grammar and structure, which means that deeper issues related to logical consistency have often been neglected. As a result, many students produce grammatically accurate yet rhetorically weak texts (Wingate, 2012).

Standard writing rubrics rarely devote explicit attention to logical fallacies. Although most rubrics include general criteria related to content development and the support of ideas, they do not typically specify expectations for fallacy-free reasoning (Indah & Kusuma, 2015). Consequently, students may assume that arguments which are well-developed in terms of structure but flawed in logic are still acceptable. Ferris (2006) similarly observed that feedback in L2 writing classes tends to emphasize linguistic accuracy, and content-related reasoning errors are often overlooked or deliberately avoided, particularly when students are already struggling with language use. This situation reveals a clear pedagogical gap.

While students may receive guidance on how to organize their essays, they are seldom taught how to ensure that their arguments are logically sound.

The Process Writing Approach, which was developed in the 1970s and 1980s (Murray, 1972; Seow, 2002), reconceptualized writing as a recursive, multi-stage process that involves prewriting, drafting, revising, editing, and publishing. This model encourages reflective thinking and iterative improvement, which are both essential for the development of critical reasoning. Schön's (1983) Reflective Practitioner Model complements this approach by emphasizing the importance of reflection-in-action and reflection-on-action as mechanisms that facilitate learning. Students engaged in writing are expected to reflect not only during the act of composing but also afterward when revising, and this reflective engagement enhances their awareness of fallacious reasoning and rhetorical effectiveness.

Vygotsky's (1978) Sociocultural Theory also contributes to the theoretical foundation of writing instruction by highlighting the inherently social nature of learning. The concept of the Zone of Proximal Development (ZPD) illustrates the importance of scaffolded interaction with more capable peers or instructors in promoting cognitive development. When peer feedback is properly structured, it provides students with valuable opportunities to learn from one another by identifying flaws in reasoning and offering constructive criticism. Hughes (2015) and Topping (2010) both underscore the pedagogical value of peer feedback, particularly in enhancing metacognitive awareness and logical precision in academic writing.

The literature on critical thinking further reinforces the necessity of explicit instruction in argument evaluation and fallacy identification (Stapleton, 2001; Indah & Kusuma, 2015). Academic writing tasks that require students to construct and critique arguments offer a valuable context for the development of higher-order thinking skills. Nevertheless, the ability to recognize and revise logical fallacies does not typically emerge from traditional writing instruction and instead must be explicitly taught and supported through guided practice.

In EFL contexts, students face additional cognitive burdens during writing tasks. They must manage linguistic accuracy while simultaneously constructing arguments that are logically coherent and rhetorically persuasive. The cognitive load of writing in a second language, combined with limited prior exposure to academic discourse, frequently results in fallacies

such as hasty generalizations, false dilemmas, and appeals to emotion (Alagozlu, 2007). Moreover, several studies have shown that EFL learners often have limited awareness of logical fallacies and rarely receive targeted feedback on such issues (Khoiri & Widiati, 2017; Davarpanah et al., 2021).

In response to this challenge, integrating explicit instruction on logical fallacies with structured peer review emerges as a promising pedagogical solution. By combining declarative knowledge, which involves understanding what fallacies are, with procedural knowledge, which refers to the ability to detect and revise them, students can incrementally improve the quality of their arguments. Peer review sessions that are guided by checklists and supported by fallacy taxonomies such as Engel's (1982) provide a collaborative environment where learners can critically examine one another's texts and internalize the principles of logical reasoning.

In conclusion, this study is grounded in a multidimensional theoretical framework that draws on the Process Writing Approach, Sociocultural Theory, Reflective Pedagogy, and Critical Thinking literature to explore how explicit instruction and peer feedback can enhance the quality of argumentative writing. While previous research has addressed these instructional components separately, few studies have attempted to integrate them within a unified instructional design. By addressing this gap, the present study aims to investigate how a combined pedagogical model can simultaneously improve both the logical soundness and the rhetorical quality of EFL students' academic writing.

1.2 Statement of the Problem

Academic writing in higher education demands not only language proficiency but also advanced critical thinking and argumentation skills. Constructing a well-reasoned argument is a core expectation in most academic essays, yet many students enter university with only a partial or incorrect understanding of what constitutes a strong argument. Research indicates that new undergraduates often struggle to take a clear position and support it convincingly, largely because argumentation has not been explicitly taught in their prior education. In other words, argumentation is a key requirement that is often poorly understood by instructors and therefore not adequately taught to students (Wingate, 2012).

This gap between the skills students need and those they have developed leads to significant difficulties in academic writing, especially for those writing in a second language.

In the Turkish higher education context, these challenges are even more pronounced due to the limited emphasis on academic writing before university. Undergraduate students in Türkiye are observed to experience difficulties with academic writing as they try to accommodate their existing writing knowledge to the new discipline-specific demands of tertiary education (Altınmakas & Bayyurt, 2018). One exploratory study found that a major factor influencing Turkish students' weak writing performance was the lack of sufficient L1 and L2 writing instruction and practice at the secondary school level (Altınmakas & Bayyurt, 2018).

One consequence of insufficient prior training in argumentation is that students' essays often exhibit unsupported claims, flawed reasoning, and generally weak argumentation. Studies across various contexts have noted that novice academic writers frequently have trouble formulating a clear thesis, organizing ideas logically, and backing up their claims with appropriate evidence (Davies, 2008; Bacha, 2010). In some cases, students present claims without adequate evidence or use evidence ineffectively, even including information that contradicts their own claims (Direkci et al., 2022). These issues indicate not just language problems but deeper reasoning deficiencies. Students may list facts or opinions but fail to connect them in a convincing and logical manner. Crucially, the feedback students receive during writing courses has tended to reinforce this surface-level focus. In both L1 and L2 writing classrooms, teachers' written comments and corrections often focus on low-level linguistic issues such as grammar, spelling, and word choice rather than the substance of the argument (Ferris, 2006; Bitchener & Storch, 2016). For example, Ferris (2006) found that instructors predominantly marked language errors, including verbs, articles, and syntax, and paid comparatively little attention to whether a student's claims were well-founded or logically organized. As a result, students might improve the grammatical accuracy of their texts while logical fallacies and weak reasoning remain unaddressed. This imbalance in feedback and instruction means that even grammatically polished essays can lack persuasive power and coherence. Wingate (2012) observed that many student texts are structurally acceptable but rhetorically flawed because students have mastered formulaic aspects of essay writing but not the art of argumentation.

Such findings underscore that the core of persuasive writing including a sound, supported argument, is often missing or mishandled in student work.

Educators and researchers increasingly agree that these problems point to a critical need for more explicit instruction in argumentation skills within academic writing curricula. There is substantial evidence that argumentation ability is not an innate talent but a teachable skill, and that explicit training in reasoning and critical thinking can significantly improve students' writing (Crowell & Kuhn, 2012). For instance, Crowell and Kuhn (2012) argue that helping students learn how to formulate claims, provide evidence, and consider counterarguments should be a fundamental educational goal. In practice, interventions that integrate argumentation into writing instruction have shown promising results. A recent study in Türkiye implemented an argumentation-based writing program for first-year undergraduates and found notable improvements in the content and organization of students' essays, as well as in their critical thinking skills (Direkci et al., 2022). This suggests that when students are actively taught how to argue, how to reason through a stance, and how to support it with logic and evidence, they become better writers and thinkers overall. Yet, despite these positive examples, such pedagogical approaches are not yet widespread. Many writing courses still devote minimal time to developing students' argumentative reasoning, and specific aspects like recognizing logical fallacies or faulty reasoning patterns are rarely addressed in a systematic way. In fact, even when students are encouraged to think critically, they may not be equipped to identify fallacious reasoning in their own or others' arguments, which means they can inadvertently perpetuate errors in logic that weaken their essays. This represents an important gap in both instruction and research. While it is known that students struggle with logical argumentation, there is limited insight into how best to help them overcome these weaknesses.

In summary, there is a clear need for instructional strategies that explicitly target students' ability to construct logically sound arguments and to recognize fallacious reasoning in writing. The persistent prevalence of unsubstantiated claims and poor reasoning in student essays, despite improvements in language accuracy, indicates that traditional writing instruction has not sufficiently addressed the development of critical argumentation skills. By drawing on insights from the literature, the present study is motivated to explore how focused pedagogical interventions can strengthen learners' argumentative writing.

Addressing this problem entails examining how often and why students commit reasoning errors in their compositions, and whether teaching approaches such as explicit critical-thinking instruction and guided peer feedback can mitigate these issues. Ultimately, by investigating methods to help students craft more coherent and persuasive arguments, this research seeks to bridge the gap between surface-level writing proficiency and the deeper logical competence that true academic writing excellence requires.

1.3 Aims and Research Questions

This study aims to explore the nature and frequency of logical fallacies in the academic essays of pre-service English language teachers and to evaluate the effects of explicit instruction and peer review on reducing such fallacies over time. By identifying the types of reasoning errors commonly found in students' argumentative writing, the study seeks to shed light on the cognitive and rhetorical challenges that novice academic writers face. Additionally, it seeks to examine the participants' attitudes toward the integration of fallacy training and peer feedback in the academic writing process, with a particular focus on how these instructional components influence their awareness of argument quality, their revision practices, and their overall writing development.

To achieve these aims, the study addresses the following research questions:

1. To what degree do Turkish pre-service English language teachers display logical fallacies in their essays prior to receiving fallacy instruction, based on Engel's (1982) classification?
2. What is the impact of explicit instruction on the recognition and reduction of logical fallacies in their academic writing?
3. What is the impact of peer review on the detection and correction of logical fallacies in their essays?
4. What are the perceptions of pre-service English language teachers toward fallacy-focused instruction and peer review practices in the academic writing course?

1.4 Significance of the Study

Logical fallacies are common errors in reasoning that can severely undermine the logic and credibility of an argument. In academic writing, especially in a second language, the presence of such fallacies often signals illegitimate arguments or irrelevant points that lack sufficient supporting evidence. This topic is important because students' ability to argue convincingly in writing is a key indicator of critical thinking and academic proficiency. Researchers emphasize that knowledge of common fallacies is essential for learners to avoid flawed reasoning in their own writing and thereby enhance the overall quality of their arguments. Indeed, when students understand logical fallacies, they can prevent these mistakes and become more alert to reasoning flaws in others' arguments, a skill closely tied to critical thinking development. However, despite its significant role in determining argument quality, the topic of logical fallacies has been underrepresented in the literature on second language writing. For instance, one study notes that logical fallacy instruction has "not been widely explored in the context of EFL," likely because writing pedagogy has traditionally prioritized issues like grammar, organization, or mechanics over argument logic. Only a few research efforts have directly examined logical fallacies in L2 writers' texts like Alagözlü's (2007) quantitative analysis of Turkish EFL students' essays is noted as one of the few attempts in this area. This gap in the literature is problematic because EFL learners do commonly commit logical fallacies, which can undermine the strength of their claims. Studies have found that even after completing academic writing courses, students still produce numerous fallacies in their essays, some so basic that they could be avoided with simple, explicit instruction. Addressing this underexplored aspect of writing is therefore crucial to improve students' argumentative rigor and critical thinking in a second language.

Focusing on pre-service English language teachers in Türkiye adds a vital pedagogical and contextual dimension to the study's significance. As future English teachers, these individuals will be responsible for developing their own students' language and thinking skills, so it is imperative that they themselves acquire strong argumentation and critical thinking abilities. In fact, teacher education research suggests that to help students develop critical thinking, teachers should first be educated to have those skills (Taşti & Yildirim, 2022). In the Turkish context, however, recent evidence as Taşti and Yildirim (2022)'s study indicates that pre-service teachers' critical thinking skills are generally weak.

A systematic review of studies on Turkish teacher candidates found that, despite growing attention to critical thinking in education, pre-service teachers in Turkey have mainly low- or medium-level critical thinking skills and dispositions. This reveals a clear need for enhanced training in analytical reasoning and academic writing within teacher preparation programs. By targeting logical fallacies in the academic writing of these trainees, the present study directly addresses that need. It hones the participants' ability to construct and evaluate arguments in English and thus aligns with Türkiye's broader educational goals of cultivating critically minded, articulate graduates. Notably, the issue of logical fallacies in student writing has scarcely been studied in the Turkish EFL context; Alagözlü's analysis of Turkish ELT students' essays documented prevalent fallacies (with Oversimplification being the most frequent, followed by Straw Man and other errors), but such research remains rare. By focusing on Turkish pre-service teachers, this study fills a local research gap and provides insight into how explicit fallacy instruction can benefit a population that will in turn influence countless learners. In sum, examining this specific group is significant because it not only improves the participants' own academic writing competence, but also prepares them as future educators who can model critical thinking and logical argumentation in their classrooms.

Beyond its immediate context, the study makes important contributions to several scholarly fields such as English Language Teaching (ELT), second language writing, and critical thinking instruction. In the field of ELT, the research demonstrates a practical method for integrating critical-thinking focused instruction into language teaching. By incorporating explicit lessons on logical fallacies into an EFL writing course, it responds to calls for enriching language curricula with higher-order reasoning skills (Babazade, 2023). This approach exemplifies how language instruction can go beyond linguistic form to also cultivate reflective and analytical skills in learners, thereby preparing students for the demands of real-world communication and academic success. From the perspective of second language writing, the study shifts attention to an often-neglected aspect of writing quality: the logical soundness of arguments. L2 writing research and instruction have traditionally emphasized grammar, vocabulary, and text organization; by contrast, this work highlights the importance of reasoning clarity and provides evidence that addressing logical fallacies can significantly strengthen students' argumentative writing.

It thus expands the scope of L2 writing pedagogy to include the evaluation of argument logic, a component that has been overlooked in many EFL contexts. Moreover, the innovative combination of explicit fallacy instruction with structured peer review offers a new pedagogical model for writing teachers. Training students to identify fallacies and critique each other's arguments in a structured manner encourages deeper engagement with content and fosters self-reflection. This aligns with prior research showing that when learners receive guidance in peer evaluation, they become more critical of their own work and produce more substantive revisions, leading to higher-quality argumentative essays (Tsai & Chuang, 2013). Finally, the study contributes to the broader domain of critical thinking instruction by illustrating that direct teaching of reasoning principles within a disciplinary context can effectively enhance learners' critical thinking skills. Recent findings have shown that training students to recognize and avoid reasoning fallacies has a significant positive effect on their critical thinking ability (Khartite & Nadia, 2021). The present study reinforces this idea, supporting the notion that focusing on logical fallacies is a promising framework for boosting students' critical thinking skills in education. In an interdisciplinary sense, the research bridges the gap between language education and critical thinking pedagogy, demonstrating how strengthening logical reasoning in a second language can simultaneously advance students' communication skills and their capacity for independent, analytical thought.

Practically, the findings of this study carry valuable implications for curriculum designers, teacher educators, and academic writing instructors. For curriculum designers in ELT and teacher education programs, the results underscore the value of embedding explicit logical reasoning components into the writing curriculum. Incorporating modules on identifying common fallacies and constructing sound arguments can ensure that future English teachers graduate with sharpened critical thinking skills alongside language proficiency. Such curriculum enhancements would directly address the current deficiencies in higher-order thinking training noted in Turkey's teacher education system, helping to produce educators who are better equipped to teach and model critical thinking (Taşti & Yildirim, 2022). Teacher educators can likewise utilize the study's approach in their courses: by including direct instruction on logical fallacies and structured peer-review sessions in academic writing or methodology classes, they can significantly improve pre-service teachers' ability to analyze and craft arguments. This is not only likely to improve the trainees' own academic

writing, but also to prepare them to integrate critical thinking and argumentation exercises into their future teaching practice. Additionally, for academic writing instructors (in both tertiary ESL/EFL settings and teacher training contexts), the study provides strategies to enhance students' writing and reasoning. Implementing guided peer review as part of the writing process, for example, can lead to more extensive revisions and better-quality final drafts and ultimately producing higher-quality argumentative writing (Tsai & Chuang, 2013). Likewise, incorporating explicit lessons on logical fallacies can directly reduce the occurrence of these errors in student papers; researchers have observed that many basic fallacies disappear when instructors provide simple, explicit instruction on how to recognize and avoid them. By adopting these strategies, academic writing instructors can cultivate a more critical, self-reflective approach to writing in their classrooms, thereby improving not only the coherence and correctness of student essays but also the strength and validity of the arguments presented. In summary, the study's practical value lies in offering concrete, validated techniques for developing critical thinking through second language writing. Curriculum developers, teacher trainers, and instructors can all draw on these insights to enrich their programs and ultimately contributing to an educational environment in Türkiye that produces more logically skilled writers, critical thinkers, and effective users of English in academic contexts.

1.5 Assumptions of the Study

This study assumes that students participating in the writing course have a B1–B1+ level of English proficiency and basic knowledge of academic writing structures based on their previous coursework. It also assumes that participants will complete the writing tasks and peer feedback activities with sincerity and effort, and that they will attend classes regularly during the 7-week intervention period.

1.6 Limitations of the Study

Like many empirical research, this study has certain limitations. First, the sample is limited to a group of first-year pre-service English language teachers at a single state university, which restricts the generalizability of the findings.

Second, not all students were able to complete the 7-week intervention process due to reasons such as absenteeism, personal issues, or academic workload. Third, the peer review process depends heavily on the learners' understanding of the fallacy concept, which may vary despite instructional efforts.

CHAPTER II

LITERATURE REVIEW

This chapter presents a comprehensive review of the theoretical and empirical literature that informs the present study. It begins by establishing the foundational role of writing in English Language Teaching (ELT) and the development of critical thinking through process-based writing approaches. Special attention is given to the challenges ELT learners face in constructing sound arguments, particularly in relation to logical consistency. The chapter then explores the nature and types of logical fallacies, highlighting their prevalence in EFL student writing across various contexts. Drawing on interdisciplinary sources from applied linguistics, rhetoric, and educational psychology, it examines the pedagogical implications of reasoning errors and the need for explicit instruction in argumentation. Additionally, the chapter reviews research on peer feedback as a collaborative and metacognitive strategy, demonstrating how structured peer review can aid in recognizing and correcting logical fallacies. Finally, the chapter identifies a critical gap in the literature: while both logical fallacy instruction and peer feedback are individually researched, their integration within ELT writing pedagogy remains underexplored. The present study aims to address this gap by investigating the combined impact of explicit fallacy training and structured peer review on EFL student teachers' argumentative writing.

1. Theoretical Foundations of Academic Writing in ELT

1.1. The Role of Writing in Language Learning

Writing is a fundamental component of language acquisition and academic success, particularly in ELT (English Language Teaching) contexts. As Kress (1990) observed, writing has historically been underemphasized in education compared to reading.

However, writing plays a crucial role in developing language competence, critical thinking, and communication skills (Badley, 2009).

Modern educational standards underscore the importance of writing as a tool for learning and assessment. For example, the National Commission on Writing (2003) argued that writing is central to academic success, famously stating that "writing is learning" and calling for a "writing revolution" in schools. Writing is not only a means for students to demonstrate what they know, but also a process through which they figure out and internalize knowledge. Content-area teachers recognize the value of writing in assessing student understanding (Applebee & Langer, 2011), yet many feel underprepared to teach writing effectively. In one survey, over half of teachers reported having little to no training in how to teach writing (Graham, 2008). This lack of preparation can lead to suboptimal writing instruction and missed opportunities to develop learners' higher-order thinking. In higher education, the necessity of writing is further reinforced by institutional requirements; for instance, many university programs mandate a thesis or substantial research paper for graduation, implicitly emphasizing that strong writing skills are essential for academic and professional success (Leki & Carson, 1994).

1.2. The Process Writing Approach

In the 1970s and 1980s, the shift from product-oriented to process-oriented writing pedagogy emphasized planning, drafting, revising, and editing as iterative steps (Murray, 1972; Seow, 2002). This approach promotes reflection and fosters critical thinking by encouraging students to revise their thoughts and arguments (Horowitz & Stein, 1990).

Earlier approaches to teaching writing had focused on the final product of writing and the mastery of language forms. Prior to the 1970s, writing instruction often equated learning to write with learning grammar structures and correct usage, with students expected to imitate model texts provided by the teacher. Such product-based approaches gave little attention to

the purpose or audience of writing and involved exercises like controlled compositions aimed at eliminating errors (Zamel, 1976, as cited in Barut, 2012). In contrast, the emergence of process-based approaches placed greater emphasis on what writers do (planning, drafting, revising) rather than solely on the texts they produce. Research by cognitive composition scholars (e.g., Flower & Hayes, 1981) paved the way for viewing writing as a problem-solving and decision-making process. Students under a process approach are encouraged to choose their own topics, develop their personal voice, and collaborate with peers and teachers through feedback during writing. The process approach thereby "gave birth to a new pedagogy in which the writing process was valued, and the student was at the center". Key stages of the process approach include pre-writing (generating ideas and planning with an audience and purpose in mind), composing drafts, revising content, and editing for form (Tribble, 1996). Importantly, these stages are recursive and not strictly linear as writers may revisit and reshape ideas even after initial revisions. Compared to product-focused teaching, the process approach involves less direct emphasis on linguistic accuracy in early drafts and more on developing ideas and organization. Teachers adopt the role of facilitators or coaches rather than mere evaluators, providing guidance and questions that help students refine their arguments (Badger & White, 2000). By engaging in this iterative cycle of writing and reflection, EFL learners not only practice language skills but also exercise critical thinking, as they must reconsider their choices and reasoning at each stage of revision.

1.3. Academic Writing Challenges for EFL/ELT Learners

Student teachers in ELT programs often face challenges related to organizing ideas, supporting claims with evidence, and adhering to genre expectations. Argumentative writing poses a particular difficulty due to the requirement for logical consistency and clarity, which many learners struggle to meet due to linguistic and cognitive limitations.

Novice EFL writers frequently struggle to produce well-organized, well-supported arguments in a second language. One reason is that writing in English as an L2 imposes a heavy cognitive load. For example, learners must attend to grammar and vocabulary at the same time as higher-order concerns like argument structure and critical reasoning. Traditional EFL instruction has sometimes prioritized surface-level accuracy (grammar, spelling) and formulaic essay structures over the development of reasoning skills. As a result, students may not have ample practice in evaluating evidence or constructing logical

arguments in their writing. Moreover, critical thinking skills are not always explicitly taught in some education systems; for instance, researchers have noted that a lack of emphasis on critical thinking in certain curricula (e.g., the Turkish educational context) can leave learners ill-prepared to detect flaws in arguments (Alagözlü, 2007; Çokluk-Bökeoğlu, 2004). Cultural and educational factors such as deference to authority and reliance on rote learning might also contribute to learners' reluctance to challenge ideas or include counterarguments in writing (Atkinson, 1997). Consequently, EFL student teachers may find it difficult to engage critically with sources or anticipate alternative viewpoints, leading to essays that simply summarize content or echo source texts rather than present a nuanced argument (Alagözlü, 2007). These challenges highlight the need for instructional approaches that specifically target argumentation skills and logical reasoning in writing, in addition to language proficiency.

2. Logical Reasoning and Argumentation in Academic Writing

In the context of English as a Foreign Language (EFL) writing, logical fallacies are broadly defined as errors in reasoning that weaken the validity of an argument. These fallacies can manifest as illegitimate arguments or irrelevant points that undermine a writer's claim. Argumentative writing is often challenging for EFL students, and research has shown that many learners struggle to construct logically sound arguments, frequently slipping into fallacious reasoning.

Despite their impact on the persuasiveness of writing, logical fallacies have historically received less attention in language teaching than surface features like grammar and mechanics. However, with growing emphasis on critical thinking in language education, a body of scholarly literature has begun to examine the prevalence and types of logical fallacies in EFL student essays. This review summarizes key theoretical discussions and empirical studies on this topic, highlighting common fallacies (e.g. hasty generalization, false dilemma, slippery slope) identified in EFL learners' writing and their implications for English Language Teaching (ELT).

Academic argumentation is a complex skill that involves more than language proficiency, it requires the ability to present claims, support them with reasons and evidence, and anticipate or rebut counterclaims. Even in first-language contexts, studies have found that students often make claims with some supporting reasons yet fail to provide sufficient evidence or

consider alternative viewpoints and rebuttals. Nussbaum and Kardash (2005), for example, observed that undergraduate writers could generate thesis statements and reasons but struggled to integrate counterarguments or credible evidence. Persky, Daane, and Jin (2003) reported similar findings in a large-scale assessment of writing: while students could formulate basic arguments, they seldom backed them with adequate factual support or addressed opposing perspectives. Song and Sparks (2017) further add that typical school writing tasks (e.g., a single-perspective response to a prompt) provide little incentive for students to engage with multiple viewpoints, leaving teachers with limited insight into students' argumentation weaknesses. These findings underscore that developing strong argumentative writing skills is not automatic; it must be explicitly fostered. In an EFL setting, the challenge is amplified as learners must do all of this critical thinking in a language in which they may have limited expressive resources. Therefore, instruction in ELT needs to encompass not just linguistic accuracy and genre conventions, but also the principles of sound reasoning and argument quality.

2.1. The Nature of Argumentation in Writing

Logical fallacies are considered a subset of critical thinking problems in writing. They are essentially "defective conclusions" or reasoning errors that can be either unintentional (due to lack of skill) or intentional (used to mislead). In argumentation theory, the presence of fallacies indicates a failure to meet the criteria of a sound argument. Kurland (2000) suggests that a strong argument must satisfy standards of acceptability, relevance, and adequacy; using fallacious statements means these criteria are not met. For example, a claim supported by unfounded generalizations or irrelevant attacks would violate such standards. In EFL writing pedagogy, scholars have increasingly tied logical fallacies to critical thinking skill development. Stapleton (2022), for instance, proposed that evaluating L2 writing should include checking for logical fallacies as one criterion of critical thinking, alongside elements like supporting evidence and consideration of opposing views.

At its core, *argumentation* refers to both the product and the process of making an argument that is, a piece of discourse (written or spoken) that offers claims backed by reasons, and the interactive process of justifying or debating those claims. The traditional purpose of argumentation is often seen as persuasion, but contemporary perspectives note that

argumentative discourse can serve multiple purposes, such as inquiry, decision-making, negotiation, and learning (Walton & Krabbe, 1995; Rapanta & Macagno, 2016). Argumentation is inherently a social, dialogic activity: even in writing, an effective argument anticipates dialogue by considering alternative positions and responding to potential counterarguments (van Eemeren, Grootendorst, & Henkemans, 1996). Hillocks (2002) criticized rigid, formulaic writing instruction for emphasizing structure (e.g., the five-paragraph essay) at the expense of these social and critical dimensions of argumentation (as cited in Kuhn & Crowell, 2011, pp. 84–85). In other words, focusing only on thesis statements and topic sentences without teaching students *why* and *how* to engage with opposing views can lead to superficially organized but logically weak essays. From a critical thinking standpoint, learning to argue well includes learning to avoid *fallacious reasoning*. Johnson and Blair (2006) point out that a high-quality argument must meet standards of relevance, sufficiency, and acceptability (often referred to as the RSA criteria); accordingly, they define a logical fallacy as "a pattern of argumentation that violates one of the criteria a good argument must satisfy and that occurs with some marked degree of frequency" (p. 54). *Fallacies*, therefore, represent systematic failures in reasoning that violate the norms of sound argument and diminish an argument's persuasive force. Some researchers even suggest that the ability to spot and avoid logical fallacies is a key measure of a student's critical thinking ability in writing (Hansen, 2020, as cited in Lismay, 2020). In sum, an understanding of argumentation theory provides a backdrop for why fallacies matter: they are the "symptoms" of poor critical thinking in writing. Teaching students about argument structure, the need for relevant evidence, and common reasoning errors can help them become more critical and self-aware writers who meet the standards of good argumentation rather than flouting them.

2.2. Definition and Types of Logical Fallacies

Many theorists categorize fallacies to help students recognize them. Copi et al. (2016) define fallacies as arguments that appear valid but are logically flawed. Aristotle's classical taxonomy included 13 fallacies, while Engel (1982) expanded the classification into broader categories. One useful classification is provided by Mayfield (2007), who groups common fallacies into four broad categories.

- Manipulation through Language: Fallacies that exploit language, such as prejudicial language (using biased or emotive terms) or word ambiguity (using vague or double-meaning words). These can mislead readers by phrasing rather than substance.
- Manipulation through Emotions: Fallacies that sway an audience's feelings instead of reasoning. Examples include appeal to fear or appeal to pity (arousing fear or sympathy to persuade), bandwagon appeal (arguing something is true or good because "everyone" thinks so), or false appeals to authority.
- Manipulation through Distraction: Fallacies that divert from the issue. Classic examples are the red herring (introducing an irrelevant topic to distract) and straw man (misrepresenting an opponent's stance to easily refute it).
- Inductive Fallacies: Errors in drawing conclusions from evidence. This category includes hasty generalization (generalizing from insufficient data), false dilemma (presenting only two extreme options when more exist), false cause (incorrectly linking cause and effect), slippery slope (claiming without warranty that one action will trigger a chain of events), and others.

These categories illustrate the variety of pitfalls student writers may encounter. Theoretical discussions in applied linguistics emphasize that EFL students often lack awareness of such fallacies, partly because traditional writing instruction prioritizes form over reasoning content. Additionally, identifying fallacies is inherently challenging: there are "limitless" varieties and overlapping definitions, which can complicate both teaching and research. Nonetheless, understanding logical fallacies is deemed crucial for developing critical thinking. Hansen (2020, as cited in Lismay 2020) even argues that the ability to evaluate and avoid fallacious arguments is a key measure of argumentative skill. In sum, theoretical literature calls for integrating logic and critical reasoning into EFL writing instruction so that students learn to spot reasoning pitfalls and strengthen the clarity and credibility of their arguments. Engel (1982) offers a useful classification into three categories: ambiguity, presumption, and relevance. Examples include Ad Hominem (irrelevant personal attack), Straw Man (misrepresentation of an argument), Slippery Slope (unjustified chain reaction), False Analogy (invalid comparisons). These fallacies are prevalent in student writing due to cognitive overload and lack of formal training in logic.

Classifying logical fallacies for pedagogical purposes can be challenging. In fact, Sinnott-Armstrong and Fogelin (2010) caution that it is neither possible nor practical to enumerate

every fallacy, given the "limitless" variety of ways an argument can go wrong. Likewise, Khoiri and Widiati (2017) note that researchers trying to categorize fallacies encounter overlapping taxonomies and numerous borderline cases. Because of this, many textbooks and instructors choose to focus on a subset of the most common and "tempting" fallacies that students are likely to commit. For instance, Lau (2011) provides a streamlined classification that groups informal fallacies by the fundamental flaw in reasoning: inconsistency (self-contradictory claims), inappropriate assumption (unwarranted premises or false dilemmas), irrelevance (irrelevant or distracting evidence), and insufficiency (lack of adequate support). Under this scheme, a fallacy like *hasty generalization* is categorized as a problem of insufficiency (jumping to a conclusion from weak evidence), while a *red herring* is a problem of irrelevance. Similarly, Mayfield (2007) offers four broad categories (parallel in many ways to Lau's), which the earlier section listed: fallacies that manipulate through language, emotions, distraction, and inductive logic. These educational classifications are not the only way to think about fallacies. Ramage, Bean, and Johnson (2010), for example, frame fallacies according to Aristotle's appeals (logos, ethos, pathos), classifying errors based on whether they stem from a misuse of logic, credibility, or emotion but they serve as convenient tools for teaching. The key point for EFL writing instruction is that despite the complex scholarly debates on fallacies, students can be taught to recognize a manageable list of common fallacy types that frequently appear in writing.

Engel (1982), for instance, distilled fallacies into three overarching categories (ambiguity, presumption, and relevance), with examples like:

- Ad Hominem (irrelevant personal attack)
- Straw Man (misrepresentation of an argument)
- Slippery Slope (unjustified chain reaction)
- False Analogy (invalid comparison)

Engel's approach emphasizes that many student mistakes in argumentation fall into a few conceptual families of errors. Notably, studies have found that such fallacies are prevalent in student writing partly due to cognitive overload and a lack of formal training in logic. An EFL student concentrating on writing in a foreign language might oversimplify reasoning or rely on intuitive but illogical connections, simply because constructing the argument in English is already demanding. This underlines the pedagogical imperative: by integrating

critical thinking and informal logic into writing instruction, educators can help students spot these reasoning pitfalls and *strengthen the clarity and credibility of their arguments*.

2.3. Argument Evaluation Framework: Engel's Model

In addition to understanding the types and classifications of informal fallacies, evaluating the quality of arguments requires a systematic framework. Engel (1982) proposes a foundational model for analyzing arguments based on three interrelated criteria: truth, validity, and soundness. This model provides a useful lens for determining whether an argument is both logically structured and factually credible, making it particularly relevant for assessing EFL students' argumentative writing in educational contexts.

Truth concerns whether the premises or conclusions of an argument are factually accurate, grounded in real-world evidence or verified knowledge. Engel explains that identifying whether the components of an argument "accord with the facts" is essential in determining its reliability (p. 35), since a false premise can undermine the entire argument regardless of how well it is structured. However, even when statements are factually correct, an argument can still be logically flawed if the reasoning does not support the conclusion, highlighting the importance of analyzing the internal logic. Validity, therefore, focuses on the logical relationship between premises and conclusion, assessing whether the conclusion necessarily follows from the given premises. Engel emphasizes that this property is a matter of form rather than content: "if the premises are true, then the conclusion must be true also" (p. 36), which underscores the structural integrity of the argument. An argument can be valid without being true, and vice versa, but soundness is achieved only when both conditions are met. That is, an argument must not only be logically valid but also based on premises that are true, thus producing a conclusion that is both logically and factually justified. Sound arguments are thus the most persuasive and reliable, serving as the foundation for critical thinking and informed decision-making. Understanding the distinction between truth, validity, and soundness is crucial for evaluating the strength of an argument. While truth pertains to the content and whether it reflects reality, validity ensures that the argument's form allows the conclusion to follow logically from the premises. Without validity, even true premises can lead to an unsupported or misleading conclusion. Conversely, a valid argument built on false premises can still be logically consistent, though not factually reliable.

Therefore, only when both truth and validity are present can an argument be considered sound, offering the highest degree of credibility and persuasiveness.

Engel outlines four possible combinations of truth and validity in logical arguments, each with its own implications for the persuasiveness and reliability of the conclusion. Here's a summary table based on this framework:

Table 1

The Four Types of Argument

Premises	**Validity**	**Soundness**	**Result**
True	Valid	Sound	Conclusion must be true.
True	Invalid	Unsound	Conclusion may or may not be true.
False	Valid	Unsound	Conclusion could be accidentally true.
False	Invalid	Unsound	Argument is completely unreliable.

(*Adapted from Engel, 1982, pp. 35–37*)

This tripartite framework not only clarifies how arguments function logically but also provides a diagnostic tool for identifying the precise nature of flaws in student reasoning. For instance, an argument that commits a hasty generalization may still appear valid in form but would lack soundness due to weak or untrue premises. Similarly, emotionally persuasive yet logically incoherent arguments (e.g., ad hominem or straw man) would be invalid regardless of how truthful the premises may seem. Given that much of the EFL writing literature focuses on fallacy classification without deeper consideration of logical form, Engel's model fills a crucial theoretical gap. It allows instructors and researchers to move beyond labeling fallacies and toward a more comprehensive assessment of argument quality. This approach is particularly applicable to the current study, which not only identifies the types of informal fallacies present in students' writing but also evaluates how well those arguments meet the criteria of truth, validity, and soundness. The model thus serves as both a theoretical foundation and an analytic tool in the subsequent analysis chapters.

2.4. Logical Fallacies in ELT Students' Writing

A few empirical studies across different EFL contexts have investigated how frequently and what types of logical fallacies appear in student writing. Early work in this area was done by Alagozlu (2007) in Turkey, who analyzed 76 Turkish EFL university students' argumentative essays for critical thinking elements. Alagozlu found that a substantial portion of the arguments contained informal logical fallacies. The most prevalent issues were oversimplification (observed 41 times), straw man arguments (36 instances), and irrelevant conclusions (24 instances); hasty generalizations also appeared, though less frequently (8 instances), along with a few cases of begging the question and ad hominem attacks. This study highlighted that even after reading and writing instruction, many learners' arguments were undermined by flawed reasoning. It also underscored the difficulty students have in "filtering by judgment and reasoning" rather than merely echoing source texts.

In the Iranian EFL context, Atai and Nasseri (2010) conducted a detailed study of informal fallacies in advanced EFL learners' writing. They examined whether factors like the writer's gender, age, or academic discipline affected the frequency of fallacies. Their analysis of Iranian university student essays revealed that logical fallacies were common in writing, but there was no significant difference in fallacy frequency based on those demographic variables. In other words, both male and female students, across different ages and majors, were equally prone to reasoning errors in their English essays. Atai and Nasseri documented a range of fallacy types in these texts, and they concluded with a pedagogical implication that EFL writing teachers need to "raise the awareness of the students concerning reasoning pitfalls, including informal fallacies". This suggests a consensus that explicit attention to logical reasoning in the classroom is necessary. A more recent study in Iran by Davarpanah, Izadpanah, and Fasih (2021) took a quantitative approach, exploring the relationship between learners' critical thinking skills and their use of fallacies. Working with 130 high school EFL students, they found a significant negative correlation between a student's critical thinking ability and the frequency of logical fallacies in her argumentative writing.

Other research has examined the impact of instruction on students' ability to recognize or avoid fallacies. For example, Bardakçı (2010) exposed 52 Turkish pre-service ELT teachers to training on common logical fallacies as part of an Advanced Reading and Writing Skills course. The study found that students who received explicit instruction in identifying

fallacies showed improvement in their critical reading skills and they became better at spotting reasoning errors in texts. Although this study focused on reading, it implies that raising learners' awareness of fallacies can positively influence their analytical abilities, which likely transfers to writing as well. Such findings lend support to integrating fallacy instruction into EFL curricula as a way to bolster overall critical thinking.

In other words, students who scored higher on critical thinking tended to commit fewer fallacies, reinforcing the idea that improving critical thinking can lead to more logically sound writing. Several studies in Southeast Asian EFL settings have similarly catalogued the logical fallacies in student writing. In Indonesia, research on this topic has grown in the last decade. Indah and Kusuma (2015) conducted a qualitative analysis of fallacious reasoning in Indonesian undergraduates' argumentative essays. Uniquely, their study classified fallacies according to the type of claim being made (claims of fact, value, or policy) and mapped each fallacy to Aristotle's rhetorical appeals (logos, pathos, ethos). They found that for claims of fact (assertions about truth/falsity of information), students' reasoning frequently suffered from logical fallacies such as hasty generalization, irrelevancy (irrelevant conclusion), slippery slope, oversimplification, and begging the question. Many of these are inductive logical errors, suggesting students often jumped to conclusions or oversimplified complex issues. Indah and Kusuma (2015) also noted pathos-based fallacies in factual claims: some students relied on ad populum appeals (bandwagon), emotive appeals, or introduced red herrings to distract from the main issue. An interesting finding was that an ethos related fallacy, which is the straw man fallacy, appeared even in factual claims, indicating that some writers misrepresented opposing arguments to make their own position seem stronger.

For claims of value (arguments about the worth or morality of something), Indah and Kusuma (2015) observed an even greater density of fallacious reasoning. In fact, every type of logos fallacy in their taxonomy was found in value-claim essays. Students making value judgments commit errors like faulty cause-effect links, unwarranted generalizations, and false dichotomies, among others. These essays also contained emotional diversions (appeals to emotion, red herrings) and ethos fallacies such as appeals to (false) authority and ad hominem attacks on opposing viewpoints. For claims of policy (arguments for or against actions or policies), the Indonesian students similarly showed misuse of authority appeals and emotional persuasion, though the pattern of fallacies largely mirrored those in value

claims. Overall, this study painted a comprehensive picture: EFL students' argumentative writing can display a wide spectrum of logical fallacies cutting across different argument types and persuasive strategies. The authors called these reasoning lapses a "reflection of critical thinking in writing", and they stressed the need for training students to analyze and repair faulty logic in their arguments.

Another Indonesian study by Khoiri and Widiati (2017) looked at logical fallacies from the students' own perspective. They analyzed 40 argumentative essays by EFL undergraduates and then conducted focus group discussions with those writers about the fallacies identified. Consistent with earlier findings, Khoiri and Widiati (2017) found that students produced numerous logical fallacies in their work, including some very basic reasoning mistakes. Even students who had completed standard writing courses still exhibited basic fallacies underscores how ingrained these issues are. Interestingly, when discussing the results with students, the authors noted that many of these fallacies could be avoided through "simple, explicit instruction" on common reasoning errors. This supports the pedagogical implication that raising awareness is beneficial, as students, once introduced to the concept of fallacies, were able to identify them as issues that could have been avoided. Khoiri and Widiati's research also referenced previous Indonesian studies: for instance, Lismay (2020) who analyzed 28 student essays from another university. Lismay reported that inductive fallacies were by far the most pervasive problem, as 76% of the student writers committed an inductive reasoning fallacy in their argumentation. In practical terms, this often-meant hasty generalizations or unwarranted cause-effect claims were marring the arguments.

Beyond written essays, some research has even extended to spoken argumentation in EFL classes, which provides a relevant comparison. For example, Hasibuan et al. (2020) analyzed discussions among Indonesian EFL undergraduates and identified similar logical fallacy patterns in oral arguments. They found that hasty generalization was the most common fallacy in students' spoken arguments as well, followed by appeals to pity, appeals to fear, and other errors like questionable statistics, slippery slope, bandwagon appeals, circular reasoning, pointing to another wrong (tu quoque), and the occasional personal attack.

Notably, the students in that study who fell into fallacies often cited lack of ideas, limited vocabulary, or anxiety as reasons for their reasoning mistakes. This suggests that cognitive overload or linguistic deficiencies might push learners to resort to simplistic or illogical argument tactics, whether in speech or writing.

In the Thai EFL context, a recent study by Termjai (2025) provides insight into fallacies among Thai university students. These researchers analyzed 37 third-year English majors' argumentative essays (written under exam conditions) for logical fallacies, using a taxonomy like Mayfield's. The results were striking in the sheer number of fallacious arguments identified: a total of 779 fallacy instances were counted across the essays. The distribution of fallacy types in the Thai data closely mirrors trends observed elsewhere. The most frequent fallacy was hasty generalization, which accounted for roughly 19% of all fallacy occurrences. This confirms that overgeneralizing from scant evidence is a persistent issue for EFL writers. The second most common was the false cause fallacy (about 15% of cases), where students mistakenly attributed causation without sufficient proof. Following those, a significant proportion of errors involved prejudicial language, such as loaded or biased wording that influenced the tone of the argument (accounting for nearly 14% of the fallacies), as well as issues related to word ambiguity, which constituted 9%. These latter two indicate problems at the language level: students may use emotional or vague language that undermines the logical clarity of their claims. Other fallacies appeared with lower but notable frequency: red herring distractions (around 8%), appeals to fear and pity (each about 7%), straw man misrepresentations (~6%), and circular reasoning (~4%). More rarely observed were false analogies, false dilemmas (either–or fallacies), questionable statistics, and direct ad hominem attacks, each of which composed only a small fraction (well under 2%) of the total. Overall, the Thai study concluded that a core set of fallacy types, including hasty generalization, false cause, prejudicial language, and word ambiguity, were the primary forms consistently weakening student arguments. This aligns with the patterns reported in Indonesia, Iran, and elsewhere, reinforcing that certain logical fallacies are common across diverse EFL learner populations.

In summary, empirical research across Türkiye, Iran, Indonesia, Thailand, and other contexts demonstrates that EFL student writers frequently commit a variety of logical fallacies in their essays. Argumentative writing assignments at the tertiary level commonly reveal overgeneralizations, unwarranted cause-effect claims, misrepresentations of opposing views, and emotionally charged or irrelevant sidetracks. These studies collectively underscore a gap in learners' critical thinking skills when writing in English.

In summary, empirical research across Türkiye, Iran, Indonesia, Thailand, and other contexts demonstrates that EFL student writers frequently commit a variety of logical fallacies in

their essays. Argumentative writing assignments at the tertiary level commonly reveal overgeneralizations, unwarranted cause-effect claims, misrepresentations of opposing views, and emotionally charged or irrelevant sidetracks. While each local context has its nuances, there is a striking convergence in the most frequent fallacy types observed. Inductive reasoning errors especially hasty generalizations are ubiquitous, indicating that many students draw conclusions from insufficient evidence. False cause fallacies also rank high in multiple studies, as learners often mistake correlation for causation or oversimplify complex relationships. In contrast, more subtle fallacies like false analogy or post hoc reasoning tend to appear only occasionally. There are also context-specific quirks; for example, Turkish students in Alagozlu's (2007) study showed a relatively high incidence of straw man fallacies (attacking distorted versions of opponents' arguments), whereas this error was less prominent in the Thai and Indonesian data sets. Nevertheless, the overall takeaway is that a core set of reasoning problems plagues student writing across cultures. These studies collectively underscore a gap in learners' critical thinking skills when writing in English. They also provide evidence that the issue is not isolated to one cultural or educational context but is prevalent in the EFL/ESL writing domain broadly.

2.5. Prevalence and Patterns in EFL/ELT Contexts

Drawing on the above studies, several specific logical fallacies emerge as frequently observed in EFL student essays.

Hasty Generalization: This is one of the most pervasive fallacies in EFL writing. Learners often draw broad conclusions from limited evidence. For example, an Indonesian student argued that "young learners prefer English to their mother language... [and] prefer western culture to their own", a claim that the researchers identified as a hasty generalization unsupported by adequate datafiles. Hasty generalizations were the most frequent fallacy in multiple studies, including Indonesian and Thai contexts. The prevalence of this fallacy suggests students may not realize the need for sufficient and representative evidence when making general claims.

False Dilemma (Either–Or Fallacy): EFL writers sometimes present a complex issue as having only two extreme options, ignoring other possibilities. This false dichotomy can oversimplify their argument. While not as rampant as some other fallacies, false dilemmas

do appear. In one taxonomy-based analysis, a few instances of either–or fallacies were noted in Thai student essays (e.g. only ~0.4% of all fallacies in that corpus). An example might be a student asserting "We either remove English from the curriculum or else students will never learn moral values," implying a black-and-white choice. Such oversimplification was also observed by Indah & Kusuma (2015), who found either–or reasoning present in the Indonesian students' logos fallacies.

Even if less frequent, the false dilemma is important to address because it indicates a lack of nuanced thinking. Students need to learn that issues can have multiple solutions or perspectives beyond two extremes.

Slippery Slope: This fallacy occurs when a writer asserts that a relatively small first step will inevitably lead to a chain of related (and usually negative) events without sufficient proof. Slippery slope arguments have been found in EFL essays, often in the context of policy debates or predictions about the future. For instance, one student wrote, "If English is totally erased from the curriculum, what will we do in the future?", suggesting catastrophic consequences for learners' knowledge.

Indah & Kusuma (2015) reported slippery slope fallacies in some students' factual claims, and the Thai study noted several slippery slope cases as well (though comprising under 2% of the total fallacies). This indicates that while not the most common error, some EFL learners do leap to extreme projections in their arguments (e.g., "If we allow X, soon Y and Z will surely happen") without logical basis.

False Cause: Also known as post hoc fallacy, this is the mistaken belief that because one event follows another, the first event must have caused the second. EFL students frequently make unsupported cause-effect claims. In Thai students' essays, false cause was the second most frequent fallacy type (nearly 15% of all fallacies identified). As an example, highlighted in that study, a student argued, "When they study online, they cannot see anyone, so that is a cause of stress in students," which was labeled a false cause – the student assumed lack of face-to-face contact directly causes stress, without evidence of a causal link. False cause fallacies are closely related to hasty generalizations, as both stem from drawing conclusions that outrun the evidence. These errors show that learners may confuse correlation with causation or overlook other contributing factors when arguing.

Straw Man: This fallacy involves misrepresenting an opponent's argument to make it easier to attack. Studies have found straw man tactics in EFL writing, albeit with varying frequency. Alagozlu (2007) noted that straw man fallacies were quite common in Turkish students' essays (36 instances).

By contrast, Indah & Kusuma (2015) found straw man only in a specific context (as an ethos fallacy in factual claims), and it was less common in the Thai data (~6% of fallacies). An example might be a student oversimplifying an opposing view: "Some people say we should cut English classes; apparently they don't care if our future generations are ignorant," which distorts the actual opposition argument. The straw man fallacy reflects a lack of skill in fair argumentation and has been observed as a noticeable issue in some EFL learners' persuasive writing.

Ad Hominem: Ad hominem fallacies occur when a writer attacks the person making an argument rather than the argument itself. This might appear as name-calling, questioning the opponent's character, or otherwise undermining credibility unrelated to the issue at hand.

In EFL student essays, personal attacks are reported but relatively infrequent. For example, Alagozlu (2007) recorded only one instance of an ad hominem attack among dozens of other fallacies in the Turkish corpus. Indah & Kusuma (2015) likewise found ad hominem present mainly in value-based claims (where students, instead of refuting an idea, criticized the people who hold that idea). While not as widespread as logical missteps like generalizations, any occurrence of ad hominem reasoning is significant as it shifts writing away from logical persuasion to personal antagonism. Its presence in student writing underscores the need to teach respectful, issue-focused argumentation.

Appeals to Emotion (Pathos-Based Fallacies): Many EFL students lean on emotional appeals as a persuasive strategy, which can become fallacious if used in place of valid reasoning. Appeal to pity and appeal to fear are two examples found repeatedly in the literature. In one Indonesian case, a student opposed removing English from the curriculum by pleading, "Supposed English is erased… what is our knowledge for? What do we have to do in the future?", invoking fear about future consequences. The writer's argument hinged on stirring anxiety (and pity for students' plight) rather than providing rational grounds, making it an emotional fallacy. Hasibuan et al. (2020) identified appeals to pity and fear as among the most common fallacies after hasty generalizations in students 'debates.

Similarly, Thai EFL writers in Termjai (2025) study frequently used emotional pleas; appeals to fear and pity together made up about 15% of all fallacies in their essays. While emotional language can be a rhetorical device, these studies show that EFL learners often rely on it excessively or inappropriately, substituting emotion for evidence.

Red Herring: A red herring is a diversionary tactic that involves introducing an irrelevant point to distract from the main argument. This fallacy has been documented in EFL writing as students sometimes shift topics when they cannot refute an opponent's point. For instance, one student, arguing against eliminating English classes, wrote, "It is so unfair for the children... Why English? Why not other subjects?", thereby steering the discussion from the value of English to a different issue (what about other subjects). The original issue (whether removing English is wise) gets sidetracked by a comparative complaint that doesn't directly justify keeping English.

Khoiri & Widiati (2017) and Indah & Kusuma (2015) both observed red herring fallacies in student texts. In the Thai sample, red herrings constituted roughly 8% of identified fallacies. This indicates a moderate incidence: not as high as some inductive fallacies, but certainly a recurring pattern. It suggests that when students lack solid rebuttals, they may unintentionally shift the subject, which is a tendency instructors can address by teaching them to recognize when they have deviated from the focus of the argument.

Oversimplification: Oversimplification (closely related to hasty generalization and false dilemma) involves simplifying a complex issue or explanation to the point of error. This was notably common in Alagozlu's Turkish study, where oversimplification was the single most frequent flaw (41 cases) in student arguments. An oversimplified argument might ignore important nuances or conditions for the sake of making a point straightforward. For example, a student might claim "The government is reluctant to solve the English teaching problem and prefers to just remove it", which one study flagged as an oversimplification/assumption about the government's motives. By painting issues with a broad brush, students risk making claims that are too simplistic to be accurate. This fallacy often overlaps with others (a sweeping generalization or a false binary can both be forms of oversimplification).

Multiple studies have mentioned simplistic reasoning as a pitfall, implying that EFL learners need guidance in dealing with complexity rather than reducing arguments to overly simple terms.

Other fallacies documented include “questionable statistics” (using unsupported or fake statistics), “loaded questions” (asking questions that presuppose unjustified assumptions), “appeal to false authority” (citing non-experts or irrelevant authorities), and “poisoning the well” (preemptively discrediting an opponent). These appear less frequently in student essays but are part of the broad spectrum of informal fallacies noted by researchers. For instance, the Thai analysis found only a handful of instances of false authority or loaded questions, and Alagozlu saw just one case of begging the question (a form of circular reasoning) in the Turkish data. Nonetheless, their presence, even if rare, highlights that some EFL students attempt to use evidence or rhetorical questions in ways that undermine logical persuasion.

The existing literature makes clear that logical fallacies are a common feature of EFL student writing, cutting across cultural and educational contexts. Theoretical discussions emphasize that the ability to craft and evaluate arguments is a critical-thinking skill that should be cultivated in language learning. Empirical studies, however, show that many EFL learners continue to commit reasoning errors such as hasty generalizations, false dichotomies, unwarranted cause-effect claims, and emotional diversions when writing essays in English. These patterns suggest that traditional EFL writing instruction, which typically emphasizes grammar, vocabulary, and essay structure, may be insufficient for fostering strong argumentation skills. As a result, researchers increasingly advocate for integrating critical thinking and informal logic training into EFL curricula. For example, after surveying fallacies in Iranian student writing, Atai and Nasseri (2010) explicitly called for raising students’ awareness of “reasoning pitfalls” in the EFL classroom. Likewise, Indonesian scholars Khoiri and Widiati (2017) argued that even basic explicit instruction on common logical fallacies could help students avoid many of the frequent errors observed in their essays.

One practical implication is to design materials and activities that focus on argument quality, not just language accuracy. Some recent pedagogical interventions have even used innovative tools: for instance, Zhang, Zou, & Cheng (2023) developed a chatbot-based training program to help EFL students practice identifying logical fallacies in arguments.

Their approach reflects a broader trend of using technology to enhance critical thinking in L2 writing. Whether through traditional lessons or AI-driven tools, the goal is to make learners more conscious of fallacies like slippery slopes or false dilemmas as they plan and

revise their essays. Instructors can introduce checklists of common fallacies for peer review, analyze examples of flawed arguments in class, and encourage students to question the support and reasoning behind each claim they make.

In conclusion, the literature on logical fallacies in EFL writing reveals a consistent finding: EFL students often have difficulty constructing fallacy-free arguments, and this issue is documented in various educational contexts from Asia to the Middle East. Common logical fallacies such as hasty generalizations, false dilemmas, and slippery slope arguments recur in student essays, indicating underlying gaps in critical thinking and argumentation skills. Both theoretical and empirical works stress the importance of addressing these gaps within the ELT framework. By highlighting typical fallacies and their examples, researchers provide valuable insights for instructors to develop students' logical reasoning. Ultimately, incorporating critical thinking instruction, specifically by training students to recognize and avoid logical fallacies, can lead to more coherent, persuasive, and credible writing in EFL contexts. The challenge for educators is to balance language instruction with reasoning instruction, ensuring that learners not only express themselves in grammatically correct English but also in logically sound arguments. With continued scholarly attention to this aspect of second language writing, teaching practices can evolve to better equip EFL students with the skills to "make meaning without fallacies" and become more critical, effective writers in English.

3. Peer Review as a Pedagogical Tool

3.1. Collaborative Writing and Feedback

Peer review supports collaborative learning and critical engagement with content. Storch (2011) argues that collaborative writing nurtures dialogue and enhances cognitive processing. Vygotsky's (1978) sociocultural theory underscores the role of interaction in knowledge construction.

When students work together on writing tasks or give feedback on each other's drafts, they enter into a dialogue about their ideas. This collaborative dialogue can prompt learners to clarify their thoughts, ask questions, and justify their choices, all of which contribute to deeper processing of the material (Storch, 2011). The act of explaining one's argument to a

peer, or conversely, critically reading a peer's argument, engages metacognitive skills that solitary writing may not. From a Vygotskian perspective, peer interaction provides scaffolding within the learners' Zone of Proximal Development – peers can often stimulate each other's thinking by pointing out issues or offering alternative viewpoints that the writer might not have considered alone. In essence, writing with others turns writing into a social activity where negotiation of meaning occurs. This collaborative dimension is especially valuable for student teachers in ELT, as it mirrors the kind of dialogic thinking they need to foster in their own classrooms.

3.2. Peer Review in Academic Writing Instruction

Structured peer feedback has been shown to improve students' ability to revise and refine their writing (Patchan et al., 2016). Using rubrics or checklists, such as Engel's taxonomy, can help students identify and avoid fallacies more effectively.

In practice, peer review usually involves students exchanging drafts and providing comments or suggestions for improvement. When properly guided, this practice benefits both the reviewer and the author. Reviewers practice critical reading and learn to apply assessment criteria, which can translate into a better understanding of those criteria in their own writing. Authors, on the other hand, receive an additional audience perspective on their work. Research indicates that peer reviews can be as effective as teacher feedback in prompting substantive revisions, provided the feedback is adequately focused and understood by students (Nelson & Schunn, 2009; Lundstrom & Baker, 2009). A key to success is giving students clear guidance on what to look for. Checklists or rubrics that highlight content-level features (argument clarity, evidence sufficiency, logical consistency) can steer peer reviewers beyond surface-level corrections. For instance, if students use a fallacy checklist derived from Engel's or Mayfield's taxonomy, they are more likely to catch instances of faulty reasoning in each other's essays. This structured approach transforms peer review from a general exchange of opinions to a targeted exercise in quality control for argumentation. In doing so, it not only improves the current draft but also builds the reviewers' own awareness of common mistakes.

3.3. Peer Feedback and Error Correction in Logic

Peer review not only improves surface-level issues but can also enhance reasoning if students are trained to identify fallacies. Hughes (2015) emphasizes the value of peer-led interventions in recognizing flawed reasoning, provided students receive adequate scaffolding.

However, merely asking students to give each other feedback without preparation may yield limited benefits in terms of logical improvement. Studies have found that untrained peer feedback tends to focus on superficial aspects like grammar and spelling rather than content and reasoning (Song & Lavigne, 2006). This is unsurprising, as grammar mistakes are more visible and easier for peers to comment on, whereas pointing out a logical fallacy requires more analytical skill. Therefore, to leverage peer review for logic development, instructors must scaffold the process. This can include training sessions on common fallacies, providing guiding questions (e.g., "Does the claim follow logically from the evidence?", "Can you identify any unsupported assumptions?"), or modeling how to critique an argument's reasoning. Even a simple intervention, such as a peer review worksheet that explicitly lists logical criteria (clarity of claim, relevance of evidence, presence of counterargument, any fallacious reasoning observed), can orient students to attend to the quality of arguments in addition to language. Research by Hughes (2015) supports that peer-led identification of fallacies is feasible when students know what to look for, they can often spot flawed reasoning in their classmates' writing and help correct it. Moreover, discussing each other's logical missteps in a supportive environment can demystify critical thinking; students realize that everyone is prone to errors, and they learn collectively how to avoid them. This reflective dialogue around reasoning, facilitated by peer interaction, aligns with Schön's (1983) reflective practitioner model. Students cycle through noticing a problem (a fallacy), reflecting on why it's a problem, and then revising to fix it, ideally internalizing that knowledge for future tasks. In sum, structured peer feedback is a promising pedagogical tool not just for catching grammar mistakes or improving style, but also for honing the logical rigor of student writing.

4. Instructional Approaches to Teaching Logical Fallacies

4.1. Explicit Instruction vs. Discovery Learning

Explicit instruction on logical fallacies equips students with tools to critically assess arguments. While discovery learning fosters autonomy, it may not be sufficient for teaching abstract concepts like fallacies without guided support.

In educational theory, there has long been a debate about whether to teach critical thinking skills (like logical reasoning) through explicit, direct instruction or to let students "discover" principles through experience and reflection. When it comes to logical fallacies, most evidence leans toward the benefit of explicit instruction. Logical fallacies are often counter-intuitive – a student might not realize, for example, that an emotionally compelling anecdote is logically irrelevant, unless this has been pointed out and explained. Thus, a direct approach, where the teacher clearly defines common fallacies, shows examples, and names them, can give students a concrete vocabulary for discussing argument flaws. This doesn't preclude inductive learning; students can still examine examples and notice patterns (a form of guided discovery), but the teacher eventually labels and clarifies those patterns. In fact, critical thinking curriculum research identifies four approaches to teaching such skills: a general approach (teaching reasoning in isolation from content), an infusion approach (teaching reasoning explicitly within subject-matter lessons), an immersion approach (embedding critical thinking tasks in subject matter without explicit highlighting of them), and a mixed approach combining elements of both. Teaching logical fallacies could be seen as an infusion approach by integrating critical thinking instruction into the language curriculum in an explicit way or as part of a mixed approach (some standalone logic exercises plus embedded practice in writing tasks). Research suggests that purely expecting students to infer logical principles on their own (immersion) may leave many blind spots. For example, Diana et al. (2017) found that while some learners can inductively grasp certain fallacies through practice, others benefit more when deductive explanations are provided upfront. In their study using an online fallacy tutor, participants who received clear, rule-based instruction on each fallacy outperformed those who had to learn by trial and error, especially for more complex reasoning errors. The implication is that guided discovery works best: students actively engage with examples and exercises (maintaining involvement and curiosity), but also receive direct feedback and clarification on the underlying concepts.

The “explicit vs. discovery” dichotomy thus becomes a continuum of guidance. For novice reasoners in an EFL context, leaning toward the explicit end provides a necessary foundation. Once students know what a straw man or false cause is, they are better equipped to notice it in readings or peer discussions on their own.

4.2. Reflective Pedagogy and Fallacy Awareness

Schön’s (1991) Reflective Practitioner Model suggests that learning occurs through cycles of action and reflection. Teaching fallacies through reflective writing and peer dialogue enhances both awareness and application of critical thinking.

A reflective pedagogical approach encourages students to think about their own thinking (metacognition) and their own writing processes. In the context of logical fallacies, reflection can be a powerful tool for internalizing lessons. For instance, after learning about fallacies, students might keep a reflective journal where they identify any fallacies they notice in their initial drafts or even in their everyday life (e.g., in advertising or social media arguments). By articulating these observations, they engage in reflection-on-action (Schön, 1983) that is looking back on a completed action (their writing or someone else’s argument) to draw lessons. They might write something like, “In my first draft, I see now that I made a hasty generalization in paragraph 2 because I based my claim on a single example. Next time, I will try to gather more evidence or soften the claim.” Such reflective entries help solidify understanding and create a habit of self-monitoring for reasoning errors. Additionally, reflective in-class activities, like guided peer discussions about fallacies, allow students to reflect in action; for example, stopping mid-draft to exchange papers and discuss “Is there anything unconvincing or logically problematic so far?” Not only do students catch issues earlier, but they also practice the habit of questioning and checking the logic of what they write. This approach aligns with the idea of the teacher not just as an instructor but as a facilitator of learning experiences where students discover their own weaknesses and strengths. Over time, cultivating this reflective attitude means that students become more independent in editing their work for clarity of reasoning. They essentially learn to become their own critics, which is the ultimate goal in developing critical thinkers.

4.3. Technology-Enhanced Learning Tools

Zhang et al. (2023) demonstrated the effectiveness of chatbot-based learning environments for improving fallacy detection and motivation in EFL learners. Digital tools can provide immediate feedback and facilitate self-paced learning.

In recent years, technology has opened new avenues for teaching argumentative writing and logical reasoning. One innovative example is the use of chatbots and intelligent tutoring systems to provide fallacy-focused training outside the classroom. Zhang, Zou, and Cheng (2023) developed a chatbot that interacts with students in a simulated conversation about arguments and fallacies. The chatbot could pose questions, offer scenarios containing potential fallacies, and give tailored hints or explanations based on the student's responses. In their study, a group of Chinese EFL university students engaged with this chatbot over several weeks. The results indicated that such chatbot-based training can improve students' understanding of logical fallacies and even their overall argumentative writing performance. Students reported that the interactive, instant-feedback nature of the chatbot made learning about fallacies more engaging, and it forced them to actively apply their knowledge by identifying errors in various examples. From a motivational standpoint, incorporating game-like elements (the chatbot in Zhang et al.'s study had scenario-based tasks and immediate praise or prompts) helped sustain students' interest in what might otherwise be a dry topic. Similarly, researchers have explored cognitive tutor systems: Diana et al. (2017) proposed an intelligent tutoring system that would adapt to learners' needs by presenting exercises on identifying informal fallacies and adjusting the difficulty or type of feedback based on performance. An initial implementation (Diana et al., 2017) found that mixing instructional strategies within the tutor was more effective than purely one or the other, echoing the earlier point about explicit vs. discovery learning. Beyond specialized fallacy tutors, even general tools like argument mapping software or discussion forums can be leveraged to enhance logical skills. For instance, an instructor might use an online forum where students must post an argument and then critique at least two peers' arguments for potential fallacies; the asynchronous format gives time to think and craft thoughtful analyses. The advantage of technology is that it allows individualization so that students can practice at their own pace, repeat exercises on fallacies they find difficult, and get automated feedback at any time. It also provides a safe space to make mistakes: an AI tutor's feedback is impersonal and can be less intimidating than a teacher's red pen or a peer's comments, which might encourage

students to experiment and learn from errors without fear. Of course, technology is not a panacea; it works best in conjunction with teacher guidance. But as the studies by Zhang et al. (2023) and others show, tech-based approaches are a promising supplement to traditional instruction, particularly for something like logical fallacies where pattern recognition and practice are key.

5. Gaps in Literature

Despite recognition of the importance of logic in academic writing, few studies have integrated fallacy instruction with peer review in ELT programs. Most research focuses either on general writing quality or peer feedback without specifically targeting reasoning quality. In other words, there is a paucity of studies that examine how teaching informal logic might be combined with collaborative learning techniques to improve student writing. On one hand, numerous investigations have catalogued the prevalence of logical fallacies in student writing and called for better instruction in critical thinking. On the other hand, a separate line of research has extolled the benefits of peer feedback and collaborative writing processes. Yet these two recommendations have rarely been implemented together in the same instructional design. No identified study to date has measured the impact of a pedagogical intervention that explicitly trains students in fallacy recognition and employs structured peer review as a means to reinforce that training. This represents a critical gap because one might expect a symbiotic effect: peer review could become more effective if students are trained to critique reasoning, and fallacy training could sink in deeper if students immediately apply it by evaluating real peer texts. Without empirical research on combined approaches, educators lack guidance on questions such as: How should peer review activities be structured to reinforce logical fallacy awareness? What kind of improvement in argumentation can be achieved through a dual intervention versus a single-method intervention? The present study addresses this gap by implementing a blended approach and examining its impact on the argumentative writing of EFL student teachers. In doing so, it aims to contribute new insights to the literature on developing critical thinking in L2 writing, and offer practical strategies for ELT practitioners seeking to cultivate more logically skilled writers.

CHAPTER III

METHODOLOGY

This chapter outlines the research methodology adopted in the current study, which investigated how pre-service English language teachers identify and address logical fallacies in their argumentative writing. A mixed-methods approach was adopted, integrating both qualitative and quantitative strands to obtain a comprehensive understanding of students' reasoning development, writing behavior, and the impact of explicit instruction and teacher feedback. The methodology is presented under the following headings: research design, context and participants, instructional process and data collection procedures, and ethical considerations.

3.1. Research Design

This study employed a mixed-methods research design embedded within a case study framework. The rationale for this design stemmed from the nature of the research questions and the instructional context. The study was conducted over a seven-week period with an intact group of 50 first-year undergraduate students enrolled in an English Language Teaching (ELT) program at a state university in Türkiye. The design enabled the researcher to examine both observable patterns of development and contextualized student experiences.

The quantitative component of the research involved systematic weekly comparisons of students' argumentative essays over a four-week intervention period. These essays were analyzed to track the development and reduction of logical fallacies, aiming to assess the impact of both explicit instruction and peer feedback on students’ reasoning skills.

To establish a robust analytical foundation for the study, students' pre-instruction argumentative essays, collected as part of a diagnostic writing task in Week 1, were meticulously examined using Engel's (1982) classification system. This well-established taxonomy categorizes informal logical fallacies into three primary groups: Fallacies of Relevance, Fallacies of Presumption, and Fallacies of Ambiguity. The initial diagnostic analysis not only identified the most frequently occurring fallacy types but also illuminated specific reasoning patterns and conceptual weaknesses prevalent in students' baseline academic writing. This pre-intervention data served as a benchmark against which subsequent instructional effects could be meaningfully assessed. To evaluate the impact of explicit instruction, a longitudinal comparison was conducted between these diagnostic essays and the essays written after the intervention.This comparison enabled the identification of both immediate gains and sustained improvements in students' ability to construct logically sound arguments. Quantitative reductions in fallacy frequency, along with qualitative improvements in argument structure, were interpreted as indicators of successful conceptual transfer and cognitive development resulting from the targeted instructional input. In parallel, to assess the contribution of peer feedback to fallacy recognition and revision behavior, each student's first and second drafts for Weeks 4, 5, and 6 were compared using a within-essay analysis. This approach allowed the researcher to isolate the effect of peer input by observing how students incorporated peer-identified issues into their revisions. The comparison focused on (a) whether fallacies identified in the first drafts were addressed or corrected in the second drafts, and (b) whether any new fallacies were introduced during revision. These changes were taken as evidence of growing metacognitive awareness, improved critical reasoning, and heightened sensitivity to logical structure in writing. Importantly, this process also underscored the socially constructed nature of learning, as peer interaction created opportunities for reflective dialogue and collaborative meaning-making. In line with the multi-layered data strategy, the following table offers a comprehensive overview of the data collection timeline, types of data gathered at each phase, and analytical methods employed to answer the research questions. The table highlights the study's methodological coherence by mapping each component of the research design onto the corresponding research objectives, thus clarifying how data sources and procedures were systematically aligned to produce valid and triangulated findings within a mixed-methods framework.

Table 2

A Summary of the Research Process

Research Question	Data Source	Essay Time Frame	Data Analysis
RQ1: To what degree do Turkish pre-service English language teachers display logical fallacies in their essays prior to receiving fallacy instruction, based on Engel's (1982) classification?	Diagnostic task essays (one argumentative essay per student before fallacy instruction)	Pre-instruction	Content analysis; Descriptive frequency counts
RQ2: What is the impact of explicit instruction on the recognition and reduction of logical fallacies in their academic writing?	Essays written before and after the fallacy instruction (diagnostic task and final task)	Pre-instruction task and Final task	Paired comparisons
RQ3: What is the impact of peer review on the detection and correction of logical fallacies in their essays?	First drafts with peer feedback and corresponding final drafts (Weeks 4–6)	Weeks 4-7 (after instruction & peer feedback)	Comparative analysis of peer-identified vs. corrected fallacies
RQ4: What are the perceptions of pre-service English language teachers toward fallacy-focused instruction and peer review practices in the academic writing course?	Post-intervention focus group interview (narratives, responses)	Post-intervention	Thematic analysis Coding of recurring categories (e.g., perceived benefits, difficulties, engagement) Use of direct quotations to support findings

The qualitative component consisted of a focus group interview conducted at the end of the intervention. This aimed to capture students' reflections on their engagement with fallacy detection, writing improvement, and the usefulness of peer collaboration and instructional

scaffolding. The integration of these two strands allowed for triangulation of data (Patton, 1990) and offered a nuanced understanding of how instructional input influenced both measurable writing improvement and student perception.

Three main theoretical underpinnings guided the design and interpretation of this study. First, the Process Writing Approach conceptualizes writing as a recursive process involving drafting, feedback, and revision (Seow, 2002; Murray, 1972). The intervention followed this model, providing multiple opportunities for reflection and reworking. Second, Vygotsky's (1978) Sociocultural Theory suggests that learning occurs in the Zone of Proximal Development through scaffolded support from peers and instructors. Peer feedback sessions were structured to align with this principle. As a guiding theoretical framework to understand how pre-service English teachers develop argumentation competence through cycles of writing, feedback, and revision, Schön's (1991) Reflective Model emphasizes the importance of reflection as a part of professional development. Students were encouraged to reflect on their own and others' writing to develop both declarative (what fallacies are) and procedural (how to revise them) knowledge.

Schön's model challenges the conventional view of professional learning as the application of static knowledge to defined problems and instead emphasizes "reflection-in-action" and "reflection-on-action" as central to developing professional artistry. These concepts resonate with the writing process, especially in tasks requiring complex reasoning and revision. Writing argumentative essays is inherently reflective and iterative; students must navigate uncertainty, revise flawed arguments, and integrate feedback that all of which mirror Schön's model of reflective learning. By framing the writing and peer review process as reflective practices, this study positions participants not merely as learners applying rules, but as emerging professionals refining their judgment and reasoning through situated practice.

The case study framework (Stake, 1995; Merriam, 1997) provided a context-sensitive approach, allowing for a deeper exploration of the instructional process within the natural setting of the course.

By focusing on a single, intact group, the study maintained the integrity of the course and avoided potential inequities that could arise from dividing the participants. This approach

aligns with Nunan and Bailey's (2008) argument that maintaining group cohesion is crucial for ethical research in educational settings.

All participants were enrolled on the same intact course and dividing them into separate groups would have posed significant challenges. Such a division could have disrupted the integrity of the instructional process and possibly led to inequities in learning opportunities. Some students might have been deprived of the instructional benefits available to their peers, which could have compromised the fairness of the research design. This concern aligns with Nunan and Bailey's (2008) argument that maintaining group cohesion is a fundamental ethical consideration in educational research. Disrupting the group dynamics could have interfered with the natural flow of instruction and the collaborative learning environment, which was central to the study's goals.

The mixed-methods design combined both quantitative and qualitative data, offering a comprehensive analysis of the students' progress and experiences. To fully capture the multifaceted nature of students' learning and reasoning development, the study was grounded in a mixed-methods approach that integrated both numerical trends and contextual insights. This allowed for an in-depth exploration of how explicit instruction, peer feedback, and reflective practices influenced the students' argumentative writing and logical reasoning skills. Overall, the methodology was intended to provide a holistic understanding of the impact of these instructional strategies on students' development. To support this comprehensive inquiry, the study was guided by several theoretical frameworks that informed the structure of the intervention, the tools used, and the interpretation of the findings. These frameworks provided both a conceptual lens and a pedagogical rationale for the study's design. The following table provides a summary of the frameworks and theories that underpin this study.

Table 3

Theoretical Framework

Theoretical Framework	Key Ideas	Application in This Study
Process Writing Approach *(Seow, 2002; Murray, 1972)*	Writing is a recursive process of planning, drafting, receiving feedback, revising, and editing, rather than a one-time product. This approach emphasizes that focusing only on final products doesn't improve skills; improvement comes through iterative refinement of drafts.	*Writing instruction was delivered as a cycle of draft → feedback → revision.* Each student wrote multiple essay drafts on which they received feedback, then revised. This mirrored the authentic writing process, giving students repeated practice in developing and refining arguments. The approach ensured that learning to write was seen as continuous development (with multiple reflections and edits), in line with process-oriented pedagogy.
Vygotsky's Sociocultural Theory *(Zone of Proximal Development and Scaffolding)*	.Learning occurs through social interaction; cognitive development is supported by collaboration with more knowledgeable others. The Zone of Proximal Development (ZPD) is the gap between what a learner can do alone and with assistance. With appropriate scaffolding (hints, guidance, feedback), learners can accomplish tasks in their ZPD and gradually internalize new skills.	*Peer review and guided feedback were structured to provide scaffolding within students' ZPD.* During peer feedback sessions, students helped each other identify logical fallacies and weak arguments that they could not easily spot on their own. The instructor also guided discussions when needed. This created a collaborative learning environment where each student could perform at a higher level (e.g. recognizing and fixing complex reasoning errors) with peer support than they could independently. Over time, these scaffolded interactions helped students internalize critical thinking and editing skills.
Schön's Reflective Practice Model	Professional knowledge is developed through reflection on experience, not just application of theory. Reflection-in-action: reflecting *during* the act (i.e., "thinking on your feet") to adjust to the situation at hand. Reflection-on-action: reflecting *after* the act, looking back on what happened to learn for the future. This model challenges purely technical approaches, emphasizing that dealing with uncertain, complex tasks requires constant inquiry and "framing and reframing" problems as they arise.	*The writing and revision process was treated as a reflective practice for students.* They were encouraged to be actively self-reflective: for instance, while writing or revising (in-action), a student might notice flawed reasoning and immediately rethink that part of the argument. After receiving peer/instructor feedback, students engaged in reflection-on-action by reviewing what issues were pointed out and why. Journal prompts or discussion followed each essay draft, asking students to contemplate how to improve their arguments and avoid similar fallacies in the future. By framing students as reflective practitioners, the study helped them develop the habit of critically evaluating their own writing decisions, thereby improving both their immediate drafts and their long-term argumentative skill.

3.2. Context and Participants

This study was conducted at a public university located in Türkiye, within the Department of English Language Teaching (ELT), which operates under the Faculty of Education. As a state-funded institution, the university serves a wide demographic of students from different socio-economic and regional backgrounds. The ELT department offers a nationally accredited four-year Bachelor of Arts program that prepares pre-service teachers to work in primary and secondary education. The curriculum is designed in alignment with the standards and regulations of the Council of Higher Education (YÖK) in Türkiye and places equal emphasis on language proficiency, pedagogical knowledge, and practical teaching skills.

The undergraduate curriculum in the ELT program offers an integrated blend of theoretical, methodological, and practical coursework. During the first and second years, students take introductory field-specific and language-skills-based courses such as Contextual Grammar, Introduction to Linguistics, Listening and Pronunciation, Oral Communication, Reading Skills, Academic Writing, and Writing Skills. In addition to these, students are introduced to basic concepts in educational sciences through courses like Educational Psychology and Introduction to Education. In the later years of the program, the curriculum shifts toward professional development and pedagogical application. Students complete advanced coursework in Approaches to ELT, Language Acquisition, Teaching English to Young Learners, Material Development and Evaluation, and Language Testing and Assessment. These courses are followed by practical field experience in School Experience and a full-semester Teaching Practice course in their final year, where they teach in real classroom settings under the supervision of university advisors and mentor teachers. The medium of instruction for all departmental courses is English, except for a few general education electives that are conducted in Turkish.

The current study took place during the spring semester of the participants' first academic year, as part of the compulsory Writing Skills course, which constitutes a core component of the ELT undergraduate curriculum. This course directly follows the Academic Writing course offered in the fall semester. While Academic Writing introduces students to basic paragraph development, topic sentences, and fundamental writing models (both product- and process-based), Writing Skills advances their academic literacy by focusing on the structure

and content of multi-paragraph essays. It emphasizes the use of cohesive devices, the development of coherence between ideas, and the application of rhetorical modes such as cause-effect and comparison-contrast. Of particular relevance to this study, the course includes focused instruction in argumentative writing, with an emphasis on thesis formulation, supporting evidence, counterarguments, and logical progression of ideas.

The Writing Skills course is delivered in English and is scheduled for four contact hours per week, consisting of two hours of theoretical instruction and two hours of in-class writing practice (2+2). The course is taught by the regular instructor of record, who also served as the researcher in this study. All instructional sessions are face-to-face and follow a process-writing approach, which includes pre-writing activities, drafting, peer review, revision, and reflection. Course materials include both locally developed content and international academic writing textbooks aligned with CEFR standards.

Fifty first year pre-service English language teachers were initially recruited for the study. All of them were enrolled in the Writing Skills course as part of their required curriculum and had previously completed the Academic Writing course in the previous semester. As a result, they entered the study with basic knowledge of academic writing conventions and were expected to apply this knowledge to more complex argumentative writing tasks. According to institutional requirements, all participants demonstrated a minimum B1–B1+ level of English proficiency, as determined by an internal placement or exemption exam administered upon admission to the program.

A purposive sampling method was employed, as the research was implemented within the natural classroom setting and included the intact cohort of enrolled students. Prior to data collection, informed consent was obtained from all participants. Participation in the research component had no influence on course grades or formal assessment procedures, and student writing samples were collected and analyzed solely for research purposes.

Although the study began with 50 participants, only 20 students were included in the final analysis. This reduction was due to several factors including irregular attendance, incomplete draft submissions, or lack of participation in peer review sessions. To ensure internal validity and consistency in longitudinal data tracking, only those students who completed all required writing tasks, submitted both first and second drafts each week, and participated fully in peer review activities across the seven-week instructional period were retained in the final dataset.

The specificity of this context offers a valuable opportunity to investigate the effectiveness of targeted interventions focused on logical reasoning and fallacy identification. Since these students are not only developing their own academic literacy but are also preparing to become future language educators, enhancing their capacity to construct logically sound and persuasive arguments holds pedagogical significance that extends beyond the scope of their personal development and into the broader domain of teacher education and classroom instruction.

3.3. Instruments

3.3.1. Peer-review Form

Engel's (1982) classification was employed to develop a peer-review form (see APPENDIX 2) that served as the basis for evaluating logical fallacies in students' essays. Engel categorizes fallacies into three main types.

The first category, *fallacies of ambiguity*, includes errors that arise when an argument can be interpreted in more than one way, such as *equivocation* or *fallacies of accent*. The second category, *fallacies of presumption*, involves arguments based on unproven or unwarranted assumptions. Common examples include *false analogy*, *irrelevant thesis*, *begging the question*, *question-begging epithets*, *complex question*, *special pleading*, and the *straw man fallacy*. The third category, *fallacies of relevance*, refers to arguments that are logically unrelated to the issue at hand. This group includes fallacies such as *ad hominem*, *appeal to ignorance*, and *appeal to authority*. This taxonomy provides a valuable reference point for students, enabling them to systematically monitor their reasoning and development in academic writing. Furthermore, the peer-review process not only supports their ability to identify fallacious arguments in their own writing but also enhances their critical thinking by evaluating their peers' reasoning. In this way, students are given the opportunity to practice both argumentative analysis and effective writing strategies in an integrative manner.

3.3.2. Validity and Reliability of the Observation Form

To ensure the content validity of the peer-review observation form used during the intervention, expert consensus was sought from two field specialists. The first was the course

instructor, who is also a specialist in academic writing and critical thinking instruction and who led the intervention process. The second was an assistant professor from the same department who holds a PhD in writing instruction and has extensive research experience in academic writing pedagogy. Both experts reviewed the initial draft of the instrument for clarity, scope, and alignment with Engel's (1982) classification of logical fallacies. Their feedback informed several targeted revisions, including refining the wording of fallacy definitions, adding representative examples to reduce interpretive ambiguity, and ensuring comprehensive coverage of relevant categories. Additional attention was given to the logical flow and visual layout of the form so that it could be used efficiently during peer review sessions without disrupting the writing process. These revisions enhanced the precision and representativeness of the instrument, thereby strengthening its content validity.

In terms of reliability, particular attention was paid to ensuring consistency in the interpretation and application of the fallacy categories. To reduce potential subjectivity, the form contained explicit operational definitions and authentic examples for each fallacy type, adapted from Engel (1982). Prior to its use, students participated in structured training sessions where they practiced identifying fallacies in sample texts, discussed ambiguous cases, and received feedback to calibrate their judgments. Practice activities were embedded into early peer review sessions to reinforce shared understanding and to ensure that all reviewers applied the criteria in a uniform manner. Furthermore, all peer review activities were monitored by the researcher, who provided real-time clarification when necessary to maintain inter-rater reliability. Observational notes taken during these sessions were also used to identify recurring points of confusion and address them promptly in class discussions. The combination of expert-informed instrument design, explicit definitions, structured training, ongoing monitoring, and iterative clarification ensured procedural fidelity and minimized variability in the application of the observation form.

3.4. Instructional Process and Data Collection Procedures

The instructional process consisted of a seven-week intervention integrated into the Writing Skills course after the midterm exam. It combined explicit instruction with writing practice, aiming to enhance students' argumentative writing.

The first three weeks focused on developing declarative knowledge about argumentation and logical fallacies, while the remaining four weeks emphasized procedural knowledge through drafting, revising, and peer evaluation. Sessions were held weekly on Thursdays in a face-to-face format with the course instructor, who also acted as the researcher. The intervention was embedded into the regular course structure, ensuring both ecological and pedagogical validity.

3.4.1. Week 1: Instructional Procedures

Prior to the instructional session, the researcher introduced herself, explained the purpose of the study along with its ethical considerations, and distributed informed consent forms to the participants. Upon receiving consent, students completed a diagnostic argumentative writing task under timed conditions, without any prior instruction. The prompt was adapted from *Q Skills for Success 3* (Unit 10: Communication, p. 220), which focused on the unit question: *"Do people communicate better now than in the past?"* Students were asked to write a five-paragraph essay presenting their opinion on whether communication in the 21st century has improved or deteriorated. These initial essays served as baseline data to identify the types and frequencies of logical fallacies present in students' untrained academic writing. Furthermore, the same writing prompt was planned to be reused as the final task at the end of the intervention to assess students' progress and evaluate the instructional impact more reliably. Afterwards, students were introduced to the process writing approach and the fundamental structure of argumentative essays to establish a conceptual foundation for the writing tasks to be completed in the following weeks. Instructional content included an overview of the five key stages of the writing process: prewriting, drafting, revising, editing, and publishing (Seow, 2002). In particular, students studied how to develop a paragraph, focusing on topic sentences, supporting sentences, and concluding sentences, as well as how to plan before writing, revise, edit, and rewrite a draft. Additionally, students were introduced to the structural components of argumentative essays, including thesis statements, topic sentences, supporting evidence, counterarguments, and conclusions. The structure and language of academic writing were modeled through sample essays, and APA 7 citation guidelines were also reviewed using supplementary content from Q: Skills for Success Reading and Writing 5 (Oxford University Press).

3.4.2. Week 2: Instructional Procedures

In the second week of the intervention, instruction focused on developing students' awareness and skills in providing effective peer feedback which is a key component of collaborative writing development. The session began with a classroom discussion on what constitutes meaningful and constructive peer feedback. Students explored the core characteristics of high-quality feedback, including clarity, specificity, constructiveness, and respectful tone. To scaffold students' feedback practices, the researcher introduced a structured peer review checklist, adapted from Engel's (1982) classification of logical fallacies. Students were explicitly taught how to use the checklist to identify different types of flawed reasoning and provide targeted, content-based comments to help improve argumentative logic. To practice this strategy, the class collaboratively reviewed a sample argumentative essay, identifying both strengths and logical weaknesses using the checklist. Instructional support was further enriched through selected materials from Q: Skills for Success Reading and Writing 3, Unit 2: Food and Taste (Oxford University Press). In particular, the writing activity on page 42, which focused on developing and organizing ideas, and the peer review activity on page 44, were used to give students guided practice in both writing and reviewing. These resources helped contextualize the concept of feedback and reinforced the application of peer review skills in a meaningful topic area. After the guided practice, students wrote a short argumentative essay in response to a new IELTS-based prompt. Upon completion of their first drafts, they exchanged papers with their peers and engaged in a peer review activity using the checklist. Students were then asked to revise their essays based on the feedback they received. This session marked the beginning of the procedural knowledge phase of the intervention, where students began actively integrating peer feedback strategies into their writing and revision processes.

3.4.3. Week 3: Instructional Procedures

In the third week, students were introduced to the concept of logical fallacies in academic writing. The session began with direct instruction on various types of common fallacies such as Strawman, Hasty Generalization, and Slippery Slope, supported with illustrative examples. These concepts were then applied through the analysis of case examples taken from sample argumentative essays.

Drawing on content from *Q: Skills for Success Reading and Writing 4* (Oxford University Press), students participated in a brainstorming activity to activate prior knowledge and introduce the topic of fallacies. For example, using Unit 6 ("Should science influence what we eat?"), students examined biased or exaggerated claims, such as the use of terms like "in reality," and discussed how such language might reflect flawed or persuasive reasoning. Next, students worked in groups to identify fallacies in media such as advertisements, social media posts, debates, and opinion essays. This was followed by an interactive "Spot the Fallacy" Kahoot quiz that reinforced recognition of specific fallacy types through gamified learning. A second group activity involved a gallery walk using poster excerpts from Units 6 and 10 of the same coursebook. Students analyzed the statements, identified the fallacy, and discussed possible revisions. To further support comprehension, the instructor facilitated a brief discussion after each activity, helping students articulate why a particular statement was fallacious and how it could mislead readers. The session also incorporated moments of peer teaching, as students explained fallacies to one another during group discussions, enhancing their collaborative learning experience. By the end of the session, students demonstrated increased confidence in identifying fallacies and showed greater awareness of how to avoid them in their own academic writing. To conclude, the class engaged in a Fallacy Correction Challenge. Each group received two short paragraphs from coursebook readings containing fallacious reasoning related to health and nutrition trends. Their task was to (1) identify the fallacy and (2) reconstruct the argument using sound reasoning and appropriate academic support. This week contributed students' conceptual knowledge of logical fallacies in authentic texts and prepared them for application in their own writing.

3.4.4. Week 4: Instructional Procedures

In the fourth week, the focus shifted to applying process writing techniques to strengthening arguments. This marked the beginning of deeper procedural engagement. Students were tasked with composing full argumentative essays, identifying and eliminating logical fallacies, and revising their work using structured feedback tools. In the first session of the week, students reviewed the components of effective essay structure and were reminded of common logical fallacies. The instructor reintroduced the Peer Review Checklist with a focus on clarity, coherence, and fallacy detection.

To reinforce understanding, the instructor modeled the evaluation of a sample paragraph using the checklist and guided a brief discussion on what makes feedback constructive and specific. Students were also encouraged to set personal writing goals for this assignment, such as avoiding overgeneralization or improving the thesis clarity. Before beginning their drafts, a short brainstorming session was held where students organized their ideas using graphic organizers. These preparatory activities aimed to promote intentional writing and heighten awareness of fallacy-free argumentation.

For the first full argumentative essay, students worked on a prompt adapted from *Q: Skills for Success 5* (Unit 5: Global Citizenship, p. 133), which addressed the question: "Why is global cooperation important?" Students were asked to consider either the importance or the lack of importance of international cooperation and to write an argumentative essay of at least 300 words within a 40-minute time limit. Upon completion of their first drafts, students exchanged papers and conducted peer reviews using a structured checklist. This peer review activity specifically targeted unclear reasoning and the identification of logical fallacies, with students expected to provide constructive written comments. In the following session, students were given another 40 minutes to revise their essays based on the feedback received. These revised versions constituted the second drafts and were intended to reflect improvements in logical coherence, argument structure, and the correction of fallacious reasoning.

3.4.5. Week 5: Instructional Procedures

In the fifth week, students continued developing their argumentative writing by focusing on strengthening the logical soundness of their arguments. The instructor presented examples of weak versus strong arguments and emphasized how to improve thesis statements, support claims with credible sources, and revise fallacious reasoning into logically valid arguments.

For this writing task, students engaged with a prompt adapted from *Q Skills for Success 5* (Unit 3: Work and Leisure, p. 78), which centered on the unit question: *"What is the difference between work and fun?"* Students were instructed to choose a leisure activity and write a persuasive essay arguing why it should or should not be considered work. The assignment required a minimum of 300 words to be written within a 40-minute time frame during the first session. Following the drafting stage, students participated in a peer review

session, utilizing a structured checklist to evaluate each other's essays in terms of logical consistency and the presence or absence of fallacies.

In the second session, students collectively reviewed the most frequently identified fallacies from peer feedback. The instructional focus was placed on correcting these fallacies and reinforcing arguments with more credible evidence and clearer reasoning. Afterwards, students were allotted 40 minutes to revise their essays based on the instruction and peer feedback.

3.4.6. Week 6: Instructional Procedures

In the sixth week, students further developed their ability to revise and refine argumentative essays based on feedback and previous writing experiences. For this writing task, students engaged with a prompt adapted from *Q: Skills for Success 3* (Unit 3: Success, p. 62), which explored the unit question: *"What does it take to be successful?"*. Students were asked to choose one of two topics and write an opinion paragraph that addressed either (1) whether athletes or sports teams should accept money from corporate sponsors to achieve success, or (2) whether child athletes should be pushed hard to succeed. They were encouraged to focus on one or more specific sports in their responses. Although the original task was designed as a paragraph, students were instructed to expand it into a full argumentative essay of at least 300 words to align with the instructional goals of the course.

In the first session, students composed their essays individually within a 40-minute time frame. Upon completion, they exchanged their drafts with a peer and conducted a structured review using a checklist designed to identify unclear reasoning, unsupported claims, and logical fallacies. The peer review encouraged collaborative reflection and analytical thinking.

In the second session, students participated in a whole-class review, during which common issues identified in peer feedback such as weak argumentation or prevalent fallacies which were discussed. Following this review, students revised their essays within a 40-minute session, aiming to improve logical coherence, strengthen evidence, and enhance overall persuasive impact.

3.4.7. Week 7: Instructional Procedures

For this writing task, students worked on a prompt adapted from *Q Skills for Success 5* (Unit 2: Language, p. 52), which explored the unit question: *"What happens when a language disappears?"* Students were instructed to write an argumentative essay discussing the consequences of language loss, particularly in terms of its impact on culture, identity, and society.

In the first session, students composed their essays individually within a 40-minute time limit. After completing the first draft, they exchanged papers with a partner and conducted peer reviews using a structured checklist. This review focused on identifying unsupported claims, unclear reasoning, and the presence of logical fallacies, while encouraging constructive written feedback.

In the second session, students revisited the feedback provided by their peers, with particular attention to common fallacies and weaknesses identified during the review process. Based on this feedback, they revised their essays during a 40-minute session. These second drafts aimed to demonstrate improved logical consistency, clearer argumentation, and enhanced awareness of fallacy avoidance.

3.4.8. Final Task: Instructional Procedures

For the final writing task, students revisited a prompt previously used for the diagnostic task, adapted from *Q Skills for Success 3* (Unit 10: Communication, p. 220), which addressed the unit question: *"Do people communicate better now than in the past?"* Students were instructed to write a five-paragraph argumentative essay expressing their opinion on whether communication in the 21st century has changed for the better or for the worse.

In the final week of the intervention, students completed this writing task independently, without receiving any peer feedback or engaging in a revision process. Unlike the previous weeks, this session was designed to assess students' autonomous ability to compose a coherent and logically sound argumentative essay. This task served as a summative writing performance and was analyzed to evaluate the extent to which students could apply the logical reasoning skills and argumentative writing strategies developed throughout the seven-week instructional period. Because the same prompt had been used in the initial

diagnostic task, comparing the two texts allowed for a meaningful analysis of individual progress and instructional impact. At the end of the intervention, the researcher conducted a focus group interview with a group of participating student teachers (see APPENDIX 2). The purpose of this interview was to gain in-depth qualitative insights into the participants' experiences with the instructional process, their reflections on writing development, and their perceptions of the value and challenges of peer review and logical fallacy identification. The interview followed a semi-structured format to allow participants to elaborate on their learning processes and to provide feedback on how the intervention influenced their academic writing practices.

This qualitative data complemented the quantitative analysis by offering a richer understanding of students' engagement, challenges, and development throughout the seven-week instructional period. This qualitative data complemented the quantitative analysis by offering a richer understanding of students' engagement, challenges, and development throughout the seven-week instructional period.

Table 4

Treatment Procedure

Pre-Instruction: Diagnostic Task
Declarative Cycle
1st Week : Introduction to process writing
2nd Week : Presenting peer feedback and giving peer feedback strategies
3rd Week : Introducing types of logical fallacies and explaining peer-review form
Procedural Cycle
4th Week / Essay 1: Draft 1 → Peer Review → Draft 2
5th Week / Essay 2: Draft 1 → Peer Review → Draft 2
6th Week / Essay 3: Draft 1 → Peer Review → Draft 2
7th Week / Essay 4 Final Essay

3.5. Data Analysis

To address the research questions, a mixed-methods data analysis strategy was employed to provide a comprehensive and triangulated understanding of how explicit instruction and peer

feedback influenced students' logical reasoning in academic writing. Both quantitative and qualitative data sources were utilized to examine the development of fallacy recognition, correction, and perception throughout the instructional process.

In the quantitative strand, descriptive statistics were used to establish the baseline frequency and distribution of logical fallacies in students' diagnostic essays, thus addressing RQ1, which examined the degree to which Turkish pre-service English language teachers display logical fallacies prior to instruction. Each essay was coded using Engel's (1982) classification of informal fallacies, which are fallacies of relevance, presumption, and ambiguity, to identify common reasoning errors and establish initial fallacy profiles.

To examine RQ2, which investigated the impact of explicit instruction on fallacy reduction, only the diagnostic task and the final task essays were compared. The comparison focused on the total number and types of logical fallacies committed before and after the seven-week instructional process.

RQ3 explored the influence of peer feedback on students' ability to detect and correct logical fallacies. For this purpose, paired comparisons were made between each student's first and second drafts across the weekly writing tasks from Week 4 to Week 7.

In the qualitative strand, content analysis was conducted on all student essays to identify and categorize logical fallacies based on Engel's (1982) taxonomy. This analysis offered detailed insights into the types of fallacies students struggled with most and how these changed over time. To address RQ4, which examined students' perceptions of fallacy instruction and peer review practices, data from post-intervention focus group interviews were analyzed inductively. Emerging themes were identified to capture students' views on instructional effectiveness, challenges encountered, and perceived benefits in developing their academic writing and reasoning.

3.5.1. Data Analysis Procedure

RQ1: To address the first research question of the study, which is **"***To what degree do students commit logical fallacies in their essays prior to instruction?"*, a detailed content analysis was conducted on the diagnostic argumentative essays written by the first 20 participants. These essays, produced before the explicit fallacy-focused instruction began,

served as the baseline data for understanding students' initial reasoning skills and the nature of logical errors in their academic writing. Each essay was analyzed individually by the researcher to identify and categorize instances of informal logical fallacies.

The identification process was grounded in Engel's (1982) taxonomy of informal fallacies, which classifies such errors into three overarching categories: fallacies of relevance, fallacies of presumption, and fallacies of ambiguity. Each essay was read line by line, and any statement that exhibited flawed or unsupported reasoning was flagged. These statements were then coded by fallacy type (e.g., *false cause*, *oversimplification*, *appeal to fear*) and matched with their corresponding Engel category. For each identified fallacy, the researcher recorded the specific type of fallacy, the exact sentence from the essay where it appeared, and the student ID associated with the error. Importantly, multiple instances of the same fallacy type within a single essay were coded separately.

For instance, if a student committed *hasty generalization* three times, each occurrence was logged independently. This approach allowed for a more accurate depiction of both the variety and frequency of fallacious reasoning in each text.

Following the coding process, the data was compiled into a frequency matrix with students listed in rows and fallacy types in columns. This matrix allowed for comparative analysis across students and fallacy categories. To support interpretation, the researcher generated bar charts showing the most frequently occurring fallacy types, as well as their distribution across Engel's three main categories. In sum, the analysis of the diagnostic essays provided empirical insights into the types and frequencies of logical fallacies committed by students before receiving instruction. These findings establish a foundation for measuring instructional impact in subsequent phases of the study.

RQ2: To address the second research question of the study that is *"What is the impact of explicit instruction on the recognition and reduction of logical fallacies in their academic writing?"* a comparative pre-post analysis was conducted using students' diagnostic essays and final task essays. These two writing tasks were selected to capture changes attributable specifically to the explicit instruction phase. Each essay was coded for logical fallacies using a theory-driven coding scheme informed by Engel's (1982) tripartite taxonomy, which classifies informal fallacies into three categories: fallacies of relevance, fallacies of

presumption, and fallacies of ambiguity. This coding process enabled the identification of both the total number and specific types of reasoning errors committed by each participant.

RQ3: To address the third research question which is *"What is the impact of peer review on the detection and correction of logical fallacies in their essays?"* a series of within-task comparative analyses were conducted using the first and second drafts of students' argumentative essays written during Weeks 4 to 7. These weeks corresponded to the procedural phase of the intervention, during which students applied their declarative knowledge of logical fallacies in practice and engaged in structured peer feedback activities.

For each weekly writing task, students composed an initial draft (D1), received peer feedback using a structured checklist informed by Engel's (1982) taxonomy, and subsequently revised their essays to produce a second draft (D2). Each pair of drafts (D1 and D2) were coded for logical fallacies using the same theory-driven coding scheme based on Engel's tripartite classification of fallacies (relevance, presumption, and ambiguity).

The number and types of fallacies in each draft were recorded and compared to determine whether peer review contributed to a measurable reduction in reasoning errors.

RQ4: To address the fourth research question which is *"What are the perceptions of pre-service English language teachers toward fallacy-focused instruction and peer review practices in the academic writing course?"* a qualitative analysis was conducted based on data collected through a post-intervention focus group interview.

The qualitative data were analyzed in line with Braun and Clarke's (2006) framework, which involves six recursive stages: (1) data familiarization, (2) generation of initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report. Emergent themes included increased awareness of fallacious reasoning, enhanced self-regulation in writing, peer feedback as a double-edged process, and recommendations for improving instruction. These themes offered nuanced insight into how students cognitively and effectively engaged with the intervention. Selected direct quotations were integrated into the findings to illustrate each theme and enrich interpretation.

This qualitative strand served as a triangulation source that contextualized and deepened the quantitative results, revealing how students perceived the pedagogical value and practical impact of fallacy instruction and peer review within the academic writing course.

3.6. Ethical Considerations

Ethical approval for the study was obtained from the relevant institutional review boards at Gazi University Institute of Educational Sciences and Balıkesir University Necatibey Faculty of Education prior to data collection. The study involved the collection of student essays and a focus group interview with pre-service English teachers, and all procedures were designed in accordance with the ethical guidelines of these institutions. The approval ensured that the research plan met the required standards for research with human participants and that appropriate safeguards were in place before the study commenced.

All participants were fully informed about the purpose and procedures of the research, including what their participation would entail and how the data would be used. Participation was entirely voluntary, and it was made clear that there were no academic or other penalties for non-participation or withdrawal. Each participant provided written informed consent prior to taking part in the study, with consent forms collected in hard copy. Participants understood that they could withdraw from the study at any time without any consequences, and no incentives or course credits were tied to participation, ensuring that consent was given freely without coercion.

Anonymity and confidentiality of the participants were rigorously protected throughout the project. To ensure privacy, each student was assigned a unique code (e.g., S1, S2) that was used on all essay samples, transcripts, and research records in place of personal names. No identifying information (such as names or personal details) was included in any notes, transcripts, or reports. In the focus group interview, participants were similarly referred to only by their assigned codes, and they were encouraged to respect the confidentiality of the discussion. All data (including written essays and the audio recording/transcript of the focus group) were stored securely and accessible only to the researcher, thus maintaining confidentiality. In any thesis documentation or publications arising from this research, results are reported in aggregate or with pseudonyms, so that individual participants cannot be identified.

Throughout data collection, analysis, and reporting, the researcher adhered to established ethical research standards and professional conduct. This involved treating participants with respect and honesty, ensuring no harm came to them as a result of their involvement, and remaining impartial and diligent in analyzing the data. The study was conducted in line with

the principles outlined by the approving institutions' ethics committees, as well as general research ethics norms in education. All findings have been reported truthfully and without misrepresentation. In sum, the research process was carried out with a strong commitment to ethical integrity, ensuring the rights, dignity, and privacy of the pre-service teacher participants were safeguarded at every stage.

CHAPTER IV

FINDINGS AND DISCUSSIONS

This chapter presents the findings of the study conducted to investigate how explicit instruction and peer review influence the recognition and reduction of logical fallacies in the academic writing of pre-service English language teachers. The results are structured in alignment with the four research questions that guided the study. Drawing on both quantitative and qualitative data sources, this chapter outlines the nature and frequency of logical fallacies in students' initial argumentative essays, traces longitudinal changes across successive drafts following fallacy-focused instruction, and examines the immediate effects of peer feedback on logical reasoning. Furthermore, students' perceptions of the instructional process are explored through qualitative reflections. Quantitative analyses include descriptive statistics, fallacy frequency counts to compare first and second drafts throughout the seven-week intervention. Complementing this, qualitative data from post-intervention focus group interviews were thematically analyzed to gain insight into students' experiences, perceptions, and reasoning development. By integrating both data strands, the chapter offers a comprehensive understanding of how the combined instructional model affected students' argumentative writing quality, logical clarity, and engagement with critical revision processes.

4.1. Quantitative Findings

4.1.1. Prevalence and Nature of Logical Fallacies Prior to Instruction

To address the first research question "*To what degree do Turkish pre-service English language teachers display logical fallacies in their essays prior to receiving fallacy instruction, based on Engel's (1982) classification?"* this section presents a detailed content analysis of the initial written task. Utilizing Engel's (1982) tripartite classification system of fallacies (*Presumption*, *Relevance*, and *Ambiguity*) each essay was carefully examined to identify logically flawed arguments that appear persuasive yet violate the principles of sound reasoning. Through this diagnostic analysis, both the prevalence and nature of fallacious reasoning in students' academic writing were systematically categorized. The findings not only illuminate the types of reasoning errors students tend to make prior to instruction but also provide a benchmark for evaluating future development. Frequency counts by fallacy type are provided alongside illustrative excerpts to capture both quantitative trends and qualitative characteristics of faulty argumentation.

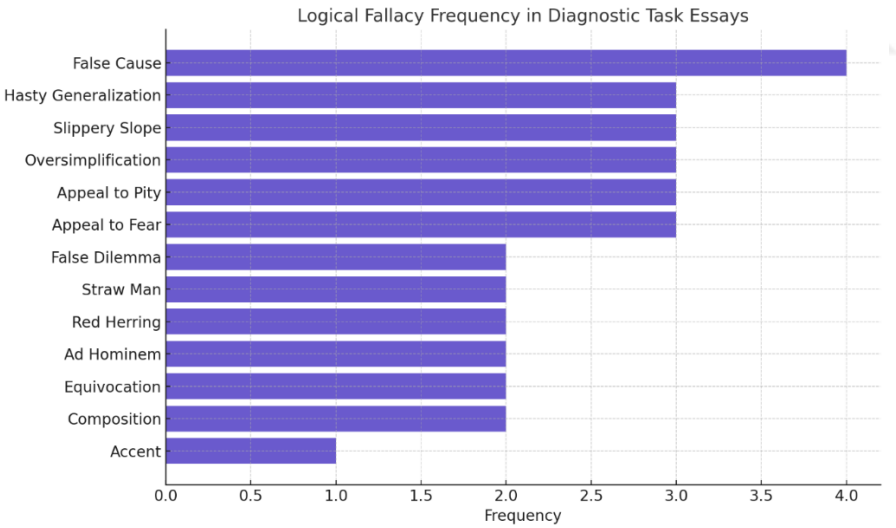


Figure 1. A Figure of Logical Fallacy Frequency in Diagnostic Task Essays

This figure presents the frequency distribution of informal logical fallacies identified in the 20 diagnostic essays written by pre-service English language teachers before the instructional intervention.

Each essay was analyzed individually using Engel's (1982) taxonomy of fallacies, and multiple instances of the same fallacy type within a single essay were counted separately to ensure accurate representation of frequency.

In total, 32 fallacious reasoning instances were found across 13 distinct fallacy types, spanning Engel's three categories. Figure 1 above summarizes the frequency of each fallacy type and category, and Figure 2 below illustrates the distribution by major category. This baseline profile of fallacies provides insight into the participants' untrained reasoning patterns and highlights common flaws in argumentation prior to any instruction.

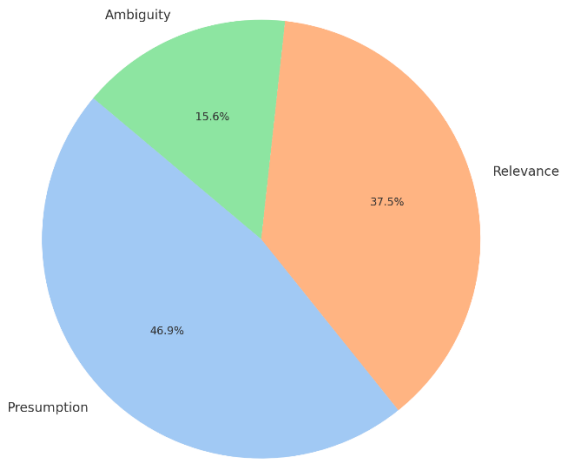


Figure 2. A Distribution of Fallacy Categories

Fallacies of *presumption* arise when an argument is built on a faulty or unwarranted assumption. This was the most dominant category, accounting for nearly half of all fallacies identified (15 of 32 instances). Such fallacies indicate that students often "jump to conclusions" or oversimplify complex issues without sufficient evidence. The most common specific types of presumption fallacies were as follows:

- False Cause (n=4): *Engel (1982) defines a false cause fallacy as if because one event follows another, the first event must be the cause of the second*. In our data, false cause errors were the single most frequent presumption fallacy. For example, one student wrote, *"Because we can send messages in seconds, some people become upset if they do not get a quick answer."* (S13). This claim implies a causal relationship between fast messaging and impatience, falsely attributing emotional reactions *solely to technological speed* without evidence of a direct cause (ignoring personal, cultural, or situational factors).

- Hasty Generalization (n=3): *Engel (1982) describes hasty generalization as drawing a broad conclusion from an inadequate sample of evidence*. In other words, a general rule is derived from too few or unrepresentative cases. Several students committed this fallacy by extrapolating personal anecdotes to universal claims. For instance, Student 3 noted, *"I often see family members sitting in the same room but looking at their phones,"* and then generalized this observed behavior to a societal norm. Here the writer jumped from a single anecdotal observation to a sweeping claim about "people today," illustrating a hasty generalization. The conclusion outpaces the evidence that the student's limited personal experience is not sufficient to prove a widespread trend.
- Slippery Slope (n=3): *A slippery slope argument asserts that a relatively small first step will inevitably lead to a chain of related (usually negative) events without sufficient proof*. Students occasionally made alarmist predictions of this form. For example, Student 14 warned that once something is shared online, *"it can spread to everyone, and it is hard to take back."* This statement implies a dire domino effect that one act of online sharing irreversibly leads to information reaching *"everyone"* without considering any mitigating factors (such as privacy settings, user intent, or context). The argument assumes an inevitable chain reaction (from one share to universal spread) with no evidence, which exemplifies the slippery slope fallacy.
- Oversimplification (n=3): *Oversimplification occurs when a complex issue is reduced to an overly simple explanation or single factor, ignoring relevant complexities*. Several students offered simplistic one-sided statements about technology's impact, failing to acknowledge nuance. For instance, Student 15 wrote, *"These technologies give more people a voice and a way to connect."* While possibly true in part, this claim overgeneralizes the benefits of digital tools and ignores *sociocultural disparities* (e.g. differences in access, digital literacy, or how "voice" is used).

  By painting technology's effect in broad, uniformly positive strokes, the student overlooked the complex mix of positive and negative outcomes which is a fallacy of oversimplifying the issue.

- False Dilemma (n=2): *A false dilemma (either–or fallacy) is an argument that erroneously limits the options to two extremes, ignoring other possibilities*. This fallacy was less common but still present. For example, Student 19 argued, *"We might connect more often, but we have lost some important qualities of respectful conversation."* This statement sets up a binary trade-off – either we gain frequent connection, or we maintain respectful conversation, implying one must be sacrificed for the other. The writer presents the situation as an either/or choice, overlooking the possibility that both frequent online connection and respectful conversation can co-exist (or that there are other nuanced outcomes). By reducing a complex issue to only two opposing outcomes, the student committed a false dilemma fallacy.

Overall, the prevalence of presumption fallacies suggests that students tend to default to personal assumptions and simplified reasoning when addressing complex topics. Many based their arguments on what *"seemed"* true from limited experience, rather than on sufficient evidence or consideration of alternatives. These patterns align with the idea that novice academic writers often make unwarranted leaps in logic or rely on intuitive, unchecked assumptions in their arguments. Without prior training in logical reasoning, the students in this baseline task frequently presumed relationships or general truths that were not justified, highlighting a need for explicit instruction to ground their claims in evidence.

Fallacies of Relevance (n=12). The next largest group of errors fell under *fallacies of relevance*, which occur when an arguer introduces information or appeals that are not logically relevant to the conclusion. There were 12 instances of relevance-based fallacies in the diagnostic essays, accounting for about 38% of all fallacies. These often-involved emotional appeals or distractions that, while persuasive in tone, did not directly support the argument's point. The specific relevance fallacies identified include:

- Appeal to Pity (n=3): *Engel (1982) defines the appeal to pity (argumentum ad misericordiam) as exploiting the audience's sympathy "to win people over" by playing on their emotions.* In our data, some students based their arguments on eliciting sympathy rather than facts. For example, Student 12 wrote, *"I was worried I would lose touch with my old friends,"* using a personal emotional anecdote as support.

This statement attempts to invoke pity or concern (fear of losing friends) to justify a position on technology use. However, as a form of evidence it is purely emotional and irrelevant to the logical merits of the argument. The student is appealing to the reader's compassion instead of providing analytical support or objective reasons, which is characteristic of the appeal to pity fallacy.

- Appeal to Fear (n=3): *The appeal to fear (ad baculum) is a fallacy in which an argument attempts to persuade by invoking fear or threat of negative consequences rather than evidence.* Some students wrote statements colored by anxiety that do not logically advance the argument. For instance, Student 13 observed, *"Teachers can send messages anytime, even at night,"* implying a worrisome scenario.

  This remark suggests a fear of being constantly reachable or monitored, but it lacks a reasonable link to the essay's argumentative claim (it mainly serves to scare or alarm the reader). The student is using the audience's potential fear of 24/7 teacher access as a substitute for relevant evidence like a clear appeal to fear. Such tactics distract from the issue by heightening concern rather than addressing the actual question with logical support.

- Straw Man (n=2): *A straw man fallacy involves misrepresenting an opponent's argument to make it easier to attack.* In the diagnostic essays, a few students distorted an opposing viewpoint and then argued against that distortion. For example, Student 18 claimed, *"People just send emojis instead of visiting."* This oversimplified statement sets up a flimsy version of the opposing side – as if proponents of digital communication advocate replacing all in-person visits with emoji. The opposing argument might simply be that digital tools enhance communication, not that they *eliminate* face-to-face contact.

  By refuting an exaggerated position that no one truly proposed, the student engaged in a straw man tactic. The result is a rebuttal of a point that is easier to knock down but irrelevant to what a real opponent might say.

- Red Herring (n=2): *A red herring is a fallacy where irrelevant information is introduced to divert attention from the main issue.* Instances of this fallacy appeared when students included tangential points that did not address the essay question.

For example, Student 17 wrote, *"With video calls, we can see our loved ones,"* during an argument about the quality of communication. While video calls and seeing loved ones are positive aspects of technology, this comment does not actually tackle the core issue (which was about whether modern communication lacks certain qualities). It functions as a distraction because it shifts the focus to an unrelated benefit (visual contact) instead of discussing the quality or respectfulness of communication at hand. By veering off into side topics, the student's argument loses relevance to the main claim.

- Ad Hominem (n=2): *Ad hominem arguments attack or appeal to the person making an argument rather than addressing the argument itself.* In the essays, this fallacy surfaced in subtle ways often as assumptions about a person's character or motives in place of refuting their ideas. For instance, Student 18 wrote that with modern communication, *"it is easier to lie or pretend, which means we trust each other less."* Here, rather than engaging with the *content* of what people say in digital communication, the student is attacking the credibility and sincerity of "modern communicators" in general. This implies that people who use contemporary communication tools are deceitful or untrustworthy essentially a character judgment (everyone is lying or pretending) instead of a logical evaluation of their arguments. Such an approach diverts the discussion to *who people are* (untrustworthy) rather than *what they are saying*. It's an indirect ad hominem attack on the "character" of those who communicate online, and it fails to provide relevant evidence about the actual topic (communication quality).

Across these examples, we see that relevance fallacies often reflect the students' tendency to rely on emotional or tangential points instead of substantive reasoning. Rather than critically engaging with counterarguments or providing logical evidence, many students fell back on what felt convincing or alarming (pity, fear, personal digressions). This suggests that, prior to instruction, their persuasive writing heavily leaned on pathos and sometimes irrelevant details. The prevalence of appeals to emotion (pity, fear) and other red herrings indicates a need to help students focus on logically pertinent support for their claims, rather than side-stepping into persuasive but irrelevant territory.

It's noteworthy that these patterns mirror issues reported in other EFL contexts, where students commonly use emotive appeals or personal attacks due to lack of training in argumentative rigor.

Fallacies of Ambiguity (n=5). Finally, a smaller number of fallacies fell into Engel's category of *ambiguity*. Fallacies of ambiguity occur when an unclear language or shifting meanings undermine an argument. There were 5 instances identified (about 16% of all fallacies), indicating that vagueness or semantic confusion sometimes contributed to reasoning errors in the essays. Though less frequent, these fallacies are notable because they reveal how imprecise wording or assumptions about language can lead to flawed arguments. The types of ambiguity-related fallacies observed include:

- Equivocation (n=2): *Equivocation is the fallacy of using a key term in different senses within the same argument, effectively "playing on the double meaning" of a word.* In the essays, some students used vague or ill-defined terms that obscured their point. For example, Student 8 referred to *"sloppy writing"* because of digital communication. The term "sloppy" is ambiguous – it could mean casual tone, poor grammar, lack of clarity, etc. Without clarification, the argument suffers because the reader cannot be sure what *"sloppy writing"* specifically entails or why it matters. The student's point relies on an equivocal use of "sloppy" (a general, colloquial term) instead of a precise description. This lack of clarity makes the reasoning fallacious: an undefined term is used as if its meaning were obvious and consistent, when in fact it's open to interpretation. As Engel notes, such ambiguity in language can mislead the audience and weaken the argument.
- Composition (n=2): *The fallacy of composition is assuming that what is true of individual parts will also be true of the whole group.* In the diagnostic task, this appeared when students generalized attributes of specific communication tools to all communication. For instance, Student 11 stated, *"These things can make conversations more lively,"* referring to features like emojis and multimedia. The student here assumes that because certain individual tools (e.g. emoji reactions, video features) can enliven a conversation, therefore digital communication is more lively. This is a fallacy of composition: treating the *part* (some tools or instances that are engaging) as equivalent to the *whole* (the overall quality of modern conversations).

It overlooks cases where digital chats might *not* be lively (perhaps those lacking such features or when overused). By projecting the property of some elements to all forms of communication, the argument becomes an overgeneralization based on composition.

- Accent (n=1): *The fallacy of accent (fallacy of emphasis) occurs when a statement's meaning is changed or distorted by selective emphasis, tone, or quoting out of context.* Only one clear case of this appeared. In Student 5's essay, the phrase *"no matter where they live"* was used in an exaggerated way to praise technology's ability to connect people. The student emphasized *"no matter where"* to suggest that distance is utterly irrelevant thanks to technology. However, this overemphasis ignores real-world limitations (such as unequal internet access or language barriers). By placing strong stress on *"no matter where"*, the writer implies an absolute that isn't justified effectively misrepresenting the situation through emphasis. This is akin to the fallacy of accent: the way the phrase is accentuated gives a misleading impression that geography *never* matters now, which overstates the case. The emphasis-driven misinterpretation led to an overconfident claim that doesn't hold up under scrutiny.

Though it is less common, these ambiguity-related fallacies reveal challenges with precise language among the students. Equivocation shows up as vague terms or concepts that the writers did not define clearly, undermining the rigor of their arguments.

Composition and accent fallacies indicate that students might overextend meanings, assuming what's true in one instance is universally true, or relying on *how* something is phrased to carry an argument beyond what the evidence supports. Such patterns are consistent with the struggles of novice academic writers identified in prior research (Stapleton, 2001), who may lack awareness of how linguistic imprecision or semantic nuances can affect an argument's validity. These issues underscore the need to teach students to scrutinize their wording and definitions when making an argument, and to avoid conflating or overstating meanings.

The diagnostic essays revealed a wide range of logical fallacies among the pre-service teachers' writing, even before any instruction on the topic.

This suggests that students frequently jumped to conclusions or assumed causal links that were not evidenced that is a sign of inductive reasoning weaknesses that align with patterns observed in other EFL contexts. *Fallacies of relevance* were the second most common category, driven by emotional appeals (to pity, fear) and some misuse of counterarguments (straw man) or distractions (red herrings). This indicates a tendency to rely on persuasion by emotion or sidetrack rather than addressing the question directly and again, a known issue in novice argumentative writing where pathos can overshadow logos. *Fallacies of ambiguity* were fewer but highlight that unclear expression and semantic leaps also undermined the students' arguments.

Overall, the pattern of fallacies in the untrained essays paints a picture of students who have basic argumentative intentions but lack refined logical control. Many of their arguments were structurally acceptable (e.g., they had a claim and some support), but the support was often flawed by poor reasoning whether by assuming too much from too little, appealing to feelings over facts, or sliding on the meaning of terms. These findings are in line with earlier studies that found high fallacy rates in student writing and called for explicit logic instruction (e.g., Alagozlu, 2007; Atai & Nasseri, 2010). In our context, the results confirm that prior to fallacy-focused instruction, the participants were prone to a variety of logical fallacies.

Notably, errors like false cause and hasty generalization show that students may not realize the need for sufficient, representative evidence when making claims, echoing Stapleton's (2001) argument that critical thinking criteria (like checking for fallacies) are often missing in students' writing practice. The dominance of emotional appeals and unwarranted assumptions suggests that, without guidance, students fall back on intuitive or conversational logic rather than rigorous reasoning.

Importantly, these baseline findings justify the pedagogical intervention: they underscore why explicit fallacy instruction (along with peer review) was necessary. By identifying which fallacy types were most common (e.g. presumptive fallacies), the instructor can tailor the subsequent teaching to target those frequent issues. The fact that every student essay contained at least one fallacy (32 instances across the class) shows that logical fallacies were a pervasive problem in the group's writing. This baseline prevalence sets a reference point for improvement. In the following phases of the study, we would expect that teaching the students to recognize and avoid these fallacies (and engaging them in peer feedback to catch such errors) should lead to a reduction in these patterns.

In sum, the diagnostic task reveals that Turkish pre-service ELT students, prior to instruction, do display a significant degree of logical fallacies in their writing, spanning all three of Engel's categories. This finding highlights the importance of integrating critical reasoning components into writing curricula. By addressing these specific fallacy trends (the over-generalizations, causal misattributions, irrelevant appeals, and ambiguities), the instruction aims to cultivate more sound and credible argumentation habits moving forward. The next sections will examine how effective that intervention was in reducing such fallacies (RQ2) and how peer review contributed (RQ3), but at the outset, RQ1 has established a clear need: students' pre-instruction essays showed frequent reasoning fallacies, confirming that improving logical rigor should be a key focus of the academic writing course.

4.1.2. Impact of Explicit Instruction on Logical Fallacies in Student Writing

To address the second research question *"What is the impact of explicit instruction on the recognition and reduction of logical fallacies in academic writing?"* this section compares students' argumentative essays before and after fallacy-focused instruction. In this study, 20 pre-service English teachers wrote an initial diagnostic essay (pre-instruction) and a final essay (post-instruction) on comparable topics. All essays were analyzed for logical fallacies using Engel's (1982) classification, which categorizes fallacies into those of Presumption, Relevance, and Ambiguity. By examining the frequency and examples of each fallacy type in the diagnostic versus final essays, we can observe how explicit instruction influenced students' reasoning. Both quantitative data (fallacy counts) and qualitative evidence (student writing excerpts) are presented to illustrate changes in argumentative quality after the intervention. The explicit fallacy instruction had a clear quantitative impact. In total, the 20 diagnostic essays contained 32 logical fallacies across 13 distinct types, whereas the final essays contained only 18 fallacies, a 43.75% decrease.

Table 5 summarizes the frequency of each identified fallacy type in the essays before and after instruction, and Figure 3 visualizes these changes.

Table 5

Frequency of Logical Fallacy Types in Diagnostic vs. Final Essays

Fallacy Type	Diagnostic Task (f)	Final Task (f)	Change
Fallacies of Relevance			
Appeal to Pity	3	2	↓
Appeal to Fear	3	2	↓
Red Herring	2	2	_
Ad Hominem	2	1	↓
Straw Man	2	0	↓↓
Total	12	7	-5
Fallacies of Presumption			
False Cause	4	2	↓↓
Hasty Generalization	3	2	↓
Slippery Slope	3	1	↓↓↓
False Dilemma	2	1	↓
Oversimplification	3	1	↓↓↓
Total	15	7	-8
Fallacies of Ambiguity			
Equivocation	2	1	↓
Composition	2	0	↓↓
Accent	1	0	↓
Total	5	1	-4
Total Instances	32	15	-17

For example, False Cause fallacies dropped from 4 instances to 2, Hasty Generalizations from 3 to 2, and both False Dilemma and Slippery Slope were reduced from 2–3 occurrences to just 1 each. Notably, some fallacy types were completely eliminated in the final essays, including Straw Man (2 instances in diagnostics to 0 in finals), Composition (2→0), and Accent (1→0). This pattern suggests that the instruction was highly effective in alerting students to these errors, thereby mitigating their reliance on such distortive or misleading argumentative strategies. A few fallacy types persisted at similar frequencies, particularly emotional appeals: for instance, Appeal to Pity and Appeal to Fear occurred roughly as often in final essays as in diagnostics (remaining at ~2–3 instances each). However, even in these cases, students' language became more nuanced and balanced after instruction. Many final essays tempered emotional appeals with caveats or counterarguments (e.g. adding phrases

like "*While this can happen,…*") instead of relying on emotion alone. Overall, comparative data indicate a broad decline in fallacy frequency and an improvement in the logical soundness of student arguments following explicit instruction.

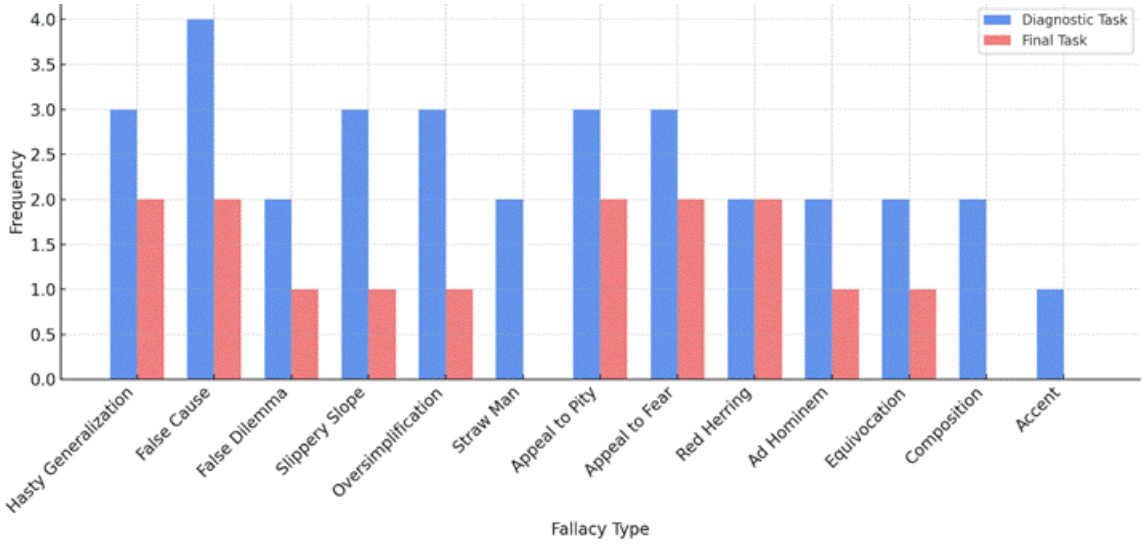


Figure 3. The Comparison of Logical Fallacy Occurrences

Each fallacy type was then examined in depth to understand qualitative changes in students' reasoning. Below, for each fallacy, Engel's (1982) definition is provided along with the number of instances in the diagnostic vs. final essays, illustrative excerpts from student writing, and commentary on how the fallacy's usage shifted after instruction.

1. A hasty generalization occurs when a broad general conclusion is drawn from insufficient or non-representative evidence (Engel, 1982). In the diagnostic essays, 3 instances of hasty generalization were identified (students S3, S18, S5). For example, one student wrote, *"Nowadays, I often see family members sitting in the same room but looking at their phones instead of talking."* Here, the writer extrapolated a personal observation to a societal trend without adequate evidence. After instruction, 2 instances remained in the final essays. One student cautioned, *"Friendships are becoming weaker because many people choose short messages over real, meaningful talk,"* which still overgeneralizes from limited experience. The *reduction* from three to two cases suggests that some students became more aware of overgeneralization. In the final tasks, the language was slightly more cautious (e.g., acknowledging "many people" rather than implying "all people"), indicating a modest improvement in recognizing the need for sufficient evidence.

However, the persistence of hasty generalizations by a couple of students shows that fully overcoming this fallacy remained challenging; some learners continued to rely on personal anecdotes as universal proof. Overall, explicit instruction helped a majority of students appreciate the limits of anecdotal evidence, though a few still inferred unwarranted broad claims from narrow experiences.

2. A false cause fallacy mistakes mere sequence or correlation for causation, implying that because one event follows another, the first must have caused the second (Engel, 1982). The diagnostic essays contained 4 instances of false cause reasoning (by S4, S10, S13, S20). For example, one student claimed, *"Because we can send messages in seconds, some people become upset if they do not get a quick answer."* This assumes a direct cause-effect relationship between instant messaging technology and impatience, without evidence of causality. After instruction, 2 instances were found in the final essays. In one final essay, a student wrote, *"This would not have happened if the conversation were face-to-face,"* again attributing an outcome solely to the mode of communication. The drop from four to two false cause fallacies indicates notable progress in students' critical thinking about cause and effect. In the final essays, fewer students jumped to conclusions about causality, suggesting an improved understanding that concurrent or sequential events are not automatically causally linked.

   Those who still exhibited this fallacy tended to couch their claims in slightly more tentative language, and some showed partial awareness of "intervening variables". Nonetheless, the presence of even two false cause claims shows that distinguishing correlation from causation remained a sticking point for some. The instruction on this fallacy seems to have been partly effective: students reduced simplistic cause-effect assertions overall, even though a couple continued to overlook complex causal factors. This implies that further reinforcement (such as practicing to identify alternative causes or additional evidence) may be needed to completely eliminate false cause errors.

3. A false dilemma reduces a complex situation to only two extreme options or outcomes, ignoring any middle ground or alternative possibilities (Engel, 1982). In the diagnostic set, 2 instances of false dilemma were found (students S6 and S19). For example, one student argued, *"We might connect more often, but we have lost*

some important qualities of respectful and face-to-face conversation," implying a strict trade-off that one can either have frequent digital contact or preserve respectful, personal conversation, but not both. In the final essays, only 1 instance of a false dilemma was identified. In that final example (by S10), the writer still posed a binary trade-off between digital and traditional communication modes, but even there the phrasing suggested the student was grappling with a balance rather than a pure either-or choice. The reduction from two cases to one illustrates an *improvement* in students' ability to see issues as multifaceted rather than black-and-white. After instruction, most students avoided the simplistic "either–or" framing and were more willing to acknowledge a spectrum of possibilities or a combination of outcomes. The lone false dilemma in a final essay indicates that one student still leaned on oversimplification. However, even this student's final argument was somewhat more nuanced than the diagnostic examples, hinting that they understood more nuance even if they ultimately fell back into a binary view. Overall, the instruction on false dilemmas appears effective: students generally grew in their *dialectical reasoning*, showing a greater appreciation for complexity and mixed outcomes instead of forcing a polar choice.

4. A slippery slope argument asserts that a relatively small first step will inevitably lead to a chain of related (usually negative) events, without sufficiently showing the causal links for such escalation (Engel, 1982). The diagnostic essays contained 3 instances of slippery slope reasoning (by S13, S14, S16). For instance, one student warned, *"Once something is shared online, it can spread to everyone, and it is hard to take back."* This implies that any online sharing will uncontrollably spiral to total exposure, overlooking safeguards or context. In the final essays, 1 instance of a slippery slope was found (by S8).

   The final occurrence presented a more measured claim about consequences, lacking the extreme inevitability that characterized the diagnostic examples. The drop from three slippery slope arguments to just one is a significant improvement, suggesting that explicit instruction helped students avoid exaggerated "domino effect" claims. In their final writing, students were more cautious about predicting dire chains of events. The single remaining slippery slope was comparatively mild, indicating the student may have internalized some of the instruction's caution but still leaned

toward overstatement. The sharp decrease in this fallacy reflects an enhanced awareness of proportional reasoning that students learned not to insist that one action unavoidably triggers a cascade of the worst-case outcomes. This trend implies that teaching about logical fallacies helped most students recognize when they were "stretching" consequences too far. By the end of the course, nearly all students refrained from the hyperbolic reasoning that typifies slippery slope fallacies.

5. Oversimplification occurs when a complex situation, with multiple causes or effects, is explained by an overly simple single cause or solution (Engel, 1982). In other words, it ignores nuance and contextual factors. In the diagnostic tasks, 3 instances of oversimplification were noted (in essays by S8, S12, S15). For example, one student asserted, *"These technologies give more people a voice and a way to connect,"* implying that digital tools automatically empower everyone equally, which overlooks issues like digital literacy or unequal access. In the final essays, 1 instance of oversimplification was identified (by S16).

   In that final example, the student wrote, *"It's not just about sending messages – it's about managing life more efficiently."* This statement still offered a somewhat one-dimensional explanation (emphasizing efficiency as the main point of technology), but it was framed as part of a larger context ("not just about X, it's about Y"), showing a slightly more organized and purposeful perspective. The reduction in oversimplification from three cases to one suggests that most students learned to incorporate more complexity into their arguments after the instruction. Initially, many tended to ignore contextual complexities and settled for neat but incomplete explanations.

   By the final essay, only one student oversimplified the issue, and even that student signaled some awareness that multiple aspects exist ("not just… it's also…"). Thus, while oversimplification *persisted* to a small degree, it became *more strategic and limited*. Students seemed better able to recognize that issues like communication technology cannot be boiled down to a single cause or benefit. The sole remaining oversimplification was notably less reductive than the diagnostic ones, reflecting an overall improvement in intellectual humility and willingness to handle complexity. This indicates the instruction was effective in encouraging students to consider (and mention) additional factors, even if a few still gravitated toward simplified assertions.

6. A straw man fallacy involves misrepresenting an opponent's argument often by exaggerating, distorting, or simplifying it to make it easier to refute (Engel, 1982). In the diagnostic essays, 2 instances of straw man were found (by S7 and S18). For example, one student caricatured an opposing view by claiming, *"If a friend is having a hard time, some people just send a short text or an emoji…"* implying the opposing side believes shallow gestures are sufficient support, which is a distorted portrayal. After instruction, 0 instances of straw man appeared in the final essays. Not a single student was observed attacking a distorted version of a counterargument in their final writing. The complete *elimination* of straw man fallacies in the final essays is a noteworthy outcome of the instruction. Students clearly learned to engage more honestly with opposing viewpoints rather than knocking down exaggerated claims that the "other side" never truly made.

   This suggests that explicit teaching and practice in summarizing counterarguments had a strong effect. By the end of the course, students were presenting opposing positions accurately, indicating they had internalized the importance of not using misrepresentation as a rhetorical strategy. The disappearance of straw man errors implies improved critical thinking and ethical argumentation which students recognized that rebutting a "real" argument (however challenging) is more valid than defeating a straw man.

   In sum, instruction on this fallacy was very effective, as evidenced by students' demonstrable ability to represent counterarguments fairly and avoid this fallacy entirely in their final submissions.

7. An appeal to pity is a fallacy in which an argument attempts to win support by exploiting the audience's sympathy or compassion, rather than by using valid reasoning (Engel, 1982). The arguer might present themselves or others as an object of pity to sway listeners. In the diagnostic essays, 3 instances of appeal to pity were found (students S7, S12, S13). For example, one student wrote about their fear of *"losing touch with old friends"* or portrayed individuals as *"left out and feeling isolated"* without technology, thereby evoking sympathy to support the importance of digital connectivity. In the final essays, 2 instances remained (by S7 and S13). One final essay included the line, *"Now, if someone can't use technology, they are left out and may feel isolated,"* which directly appeals to the reader's sense of

compassion for those excluded from digital communication. The frequency of pity appeals saw a *slight reduction* (from three occurrences to two). This indicates modest improvement: one student who initially used a pity appeal did not do so in the final essay. The two remaining instances suggest that some students continued to lean on emotional persuasion, perhaps due to heartfelt engagement with the topic (e.g. concern for those disadvantaged by technology). However, even in those final cases, there was evidence of greater balance. For instance, the pity appeals in final essays were often accompanied by a rationale or a counterpoint, rather than standing alone as the main argument.

This nuance implies that students became more aware of when they were using emotion and tried to mitigate it by also providing logical context. The persistence of a couple of pity-based arguments highlights that emotional reasoning can be deeply ingrained and harder to eliminate entirely. It suggests that while explicit instruction made most students more cautious about relying on sympathy, a few remained convinced that emotional appeals strengthened their point. For teaching, this trend implies the need to further emphasize how emotional appeals should be supplementary to logical argument, not a substitute for it.

Overall, the efficacy of instruction on appeal to pity was moderate: it clearly raised awareness (as seen by some reduction and more nuanced use), but fully eradicating this fallacy would likely require additional reinforcement or practice.

8. An appeal to fear is a fallacy that seeks to persuade by arousing fear or anxiety in the audience, rather than by evidence or reason. It typically involves warning that a negative, frightening outcome will occur if a certain course is not taken (Engel, 1982). The occurrence of fear appeals remained constant at 3 instances in both diagnostic and final essays. In the diagnostic phase, students used dire warnings to make their case (for example, suggesting severe consequences of being constantly reachable). In one final essay example, a student cautioned, *"Even careful users can become victims of privacy violations."* This statement invokes fear (of privacy breaches) to argue for caution with technology. Although the *number* of fear-based fallacies did not decrease after instruction, their expression became more measured. The final essays that employed appeals to fear tended to frame them with greater nuance or conditions. For instance, students often acknowledged limits or added

context when describing worrisome outcomes (e.g., noting "*careful users*" or specific scenarios, rather than making blanket scare statements). This suggests that while certain students still found it persuasive to invoke fear, they did so in a more responsible or precise manner post-instruction. The lack of reduction in quantity indicates that appealing to fear was a particularly tempting strategy that some students clung to, possibly because the topic (digital communication) legitimately raises concerns (privacy, social isolation, etc.).

From an instructional perspective, this trend implies that emotional appeals like fear might require more than one cycle of feedback to curb; students may need repeated reminders or alternative strategies to feel they can persuade without resorting to fear. Importantly, though, the *tone* of the fear appeals shifted: after instruction, these arguments were often paired with logical caveats or balanced by mentioning preventive measures, reflecting a growth in audience awareness. In summary, the instruction did not reduce the prevalence of appeals to fear, but it did improve their sophistication.

Students learned to embed fear-based points within a more rational argumentative structure, which is a positive sign of developing rhetorical control even if the fallacy itself was not fully eliminated.

9. A red herring is a fallacy in which an irrelevant topic or detail is introduced into an argument, diverting attention away from the core issue. The term comes from the idea of dragging a smoked fish across a trail to mislead hunting dogs; in argument, it means leading the reader astray with off-topic points (Engel, 1982). There were 2 instances of red herrings in the diagnostic essays (by S11 and S17). For example, one student (S17) spent a portion of the essay discussing video call quality, which is a tangential issue, instead of addressing the main topic of communication depth. In the final essays, 1 instance was identified (by S6). In that final case, the student wrote, *"People are overwhelmed by the need to stay connected all day long,"*, while related to technology use, drifted from the essay's central argument about quality of communication into a commentary on the quantity or compulsion of connectivity. Red herring usage shows a mild improvement, dropping from two cases to one. Initially, multiple students got sidetracked by shiny but irrelevant details, undermining the focus of their arguments. After instruction, almost all students

remained on-topic, except for one instance where a student still veered off on a tangent. Even in that final instance, one might argue the diversion was less stark than in the diagnostic examples, it was a related concern albeit not directly addressing the prompt's core issue. The decrease in red herrings suggests that the fallacy-focused instruction helped students maintain coherence and relevance in their writing, reinforcing the importance of sticking to the thesis and relevant supporting points. The fact that one student still included a red herring indicates that sustaining focus can be difficult, perhaps due to personal preoccupations or habits of free-associating that are hard to break. It indicates an ongoing struggle with maintaining coherence for that student. For the cohort overall, however, the rarity of red herrings in final essays signals an instructional success: students became better at discerning which points directly bolster their argument versus which are interesting but off-track.

The near-elimination of this fallacy implies that most learned to self-check: "Is this detail truly relevant to my argument?" which is a key revision question that was evidently embraced by the majority after training and feedback.

10. An ad hominem fallacy (Latin for "to the person") occurs when someone attacks the character, motives, or other attributes of the person making an argument rather than addressing the substance of the argument itself (Engel, 1982). Essentially, it is attacking the opponent instead of the opponent's argument. In the diagnostic essays, *direct* ad hominem attacks were rare; there were no overt ad hominems like name-calling. However, 2 instances of implicit or subtle ad hominem reasoning were noted. For example, some students made vague generalizations hinting at character flaws of people who prefer digital communication, implying such people are less sincere or serious. In one diagnostic case, a student's language suggested that those who rely on texting "pretend" or are not genuine, indirectly casting aspersions on their character rather than engaging their viewpoint. In the final essays, 0 explicit ad hominems were found as well; students refrained from personal attacks. There was, however, at least 1 subtle instance where a student's comment bordered on ad hominem: for example, S18 in the final task wrote, *"People send emojis or 'LOL' instead of having deep discussions,"* which implicitly questions the seriousness or maturity of "people" who do this. The ad hominem fallacy was largely absent both before and after instruction, with only indirect traces of it. Notably, after instruction,

students continued to avoid outright character attacks, and even the subtle negative generalizations were slightly tempered. The instruction reinforced that attacking individuals is not a valid argumentative strategy, which students seem to have understood from the outset (given the low incidence even in diagnostics). The phrase "only indirectly evident" was used to describe ad hominem in this study, implying that it never manifested strongly but lingered in undertones.

After instruction, these undertones remained for one student, showing that while students may have curbed any temptation to overtly criticize people, some still held implicit judgments that peeked through in phrasing. Overall, the fact that ad hominem did not increase and remained minimal is positive.

Instruction helped reduce overt attacks, though subtle forms remained which means students became conscious enough not to launch personal attacks, yet a bit of underlying bias or assumption about the type of person behind an argument could still color their tone. This finding underscores that deeply ingrained attitudes (like dismissive views of those who communicate a certain way) can influence writing even if formal fallacies are avoided. For educators, it suggests that alongside teaching fallacy definitions, encouraging empathy and perspective-taking might further diminish even the subtle ad hominem-like statements.

11. Equivocation is a fallacy involving the use of ambiguous or multi-meaning language to mislead or confuse. An arguer equivocates by subtly shifting the meaning of a key term or by using vague expressions such that the reader might interpret them incorrectly (Engel, 1982). The diagnostic essays had 2 instances of equivocation (by S3 and S8). These students used certain vague terms or phrases whose meaning was unclear or shifted. For example, a student might have referred to *"sloppy writing"* or *"meaningful talk"* without defining those terms, potentially misleading readers due to their subjective nature. In the final essays, only 1 instance of equivocation was found. In that case, a student (S19) in the final task wrote, *"Fast but empty,"* referring to digital communication. The phrase "empty" in context was somewhat ambiguous "*empty"* could mean lacking depth, or lacking content, or something else and thus could confuse or require interpretation. The reduction from two equivocations to one suggests that explicit instruction helped improve clarity and precision in student writing.

Most students learned to avoid or clarify the kind of wording that could be taken in multiple ways. In particular, instruction likely emphasized defining key terms and not assuming readers will share the same connotations. The single remaining equivocal phrase "fast but empty" in a final essay does indicate a lingering tendency in one student to use compact, catchy phrasing that might lack clarity. However, the phrase was part of a larger argument and might have been further explained by the student, softening the impact of the equivocation.

Overall, the strong decrease in equivocation fallacies implies that students developed greater lexical precision and awareness of word choice. By the end of the course, nearly all could express their arguments without resorting to fuzzy or misleading terminology. This improvement is particularly important in academic writing, where defining one's terms is crucial. The findings here hint that even a brief module on logical fallacies can bolster students' attention to wording, thereby reducing unintentional ambiguity in their essays. The lone equivocation remaining suggests a point for ongoing improvement: instructors might continue to coach that student (and others) on always considering, *"Could this word be interpreted differently than I intend?"* and revising accordingly. Nonetheless the drop in equivocation errors showcases the effectiveness of the fallacy instruction in sharpening students' language.

12. The fallacy of composition occurs when one assumes that what is true of part of something must also be true of the whole. In other words, it wrongly attributes the characteristics of individual elements to the collective group or system (Engel, 1982). By contrast, the fallacy of accent involves ambiguity or misrepresentation arising from emphasis: meaning is distorted by stressing certain words or parts of a statement in a misleading way, or by quoting out of context with misleading intonation or focus (Engel, 1982). Both fallacies fall under Engel's category of *Ambiguity* errors in reasoning. In the diagnostic essays, these fallacies were observed infrequently but distinctly: 2 instances of composition and 1 instance of accent were noted. For example, a composition fallacy was seen when a student (S11) argued, *"These things can make conversations more lively,"* referring to specific digital tools (like emojis or GIFs) and implying that because those elements are lively, an entire conversation using them is lively. This erroneously generalizes the property of the part (an emoji's

liveliness) to the whole conversation. An accent fallacy example (S5 in diagnostics) might have been a sentence such as "*no matter where they live*" delivered or interpreted in a way that overstates the universality of technology's reach, ignoring significant qualifiers like context or accessibility.

In the final essays, there were *0 instances* of both composition and accent fallacies. Neither type was detected in any post-instruction essay. Both these fallacies, which were relatively minor issues to begin with, were completely eliminated after instruction. This absence in final drafts indicates improved argumentative discipline and conceptual control. Students no longer made the error of assuming the whole equals the sum of parts (composition), nor did they mislead through out-of-context emphasis (accent). It's likely that these specific fallacies were directly addressed during the instructional intervention or at least came up in discussion, prompting students to be cautious. The fact that composition and accent fallacies were only present in a few students' diagnostic work and then vanished suggests that once those students received feedback or became aware of the issue, they easily corrected it in their subsequent writing. This speaks to the amenability of certain logical errors to quick correction: composition and accent, once pointed out, may be straightforward for learners to avoid. By improving their conceptual control, students learned not to make unwarranted leaps from part to whole, and by being more careful with quotation and emphasis, they avoided distorting statements. The result is that final essays showed a stronger integrity of reasoning. While these two fallacy types were not widespread problems, their total removal post-instruction contributes to the overall finding that explicit teaching had comprehensive positive effects, even less common fallacies were stamped out, reinforcing rigorous logical standards across students' writing.

After reviewing each fallacy type in isolation, it's useful to step back and consider the broader patterns that emerged. Engel's (1982) classification groups fallacies into three broad categories which are Presumption, Relevance, and Ambiguity and examining the changes by these categories helps synthesize the findings:

- Fallacies of Presumption (errors that involve unwarranted assumptions or oversimplified leaps) saw the most significant decline. In the diagnostic essays,

nearly half (approximately 47%) of all fallacies fell into this category (15 out of 32), including hasty generalization, false cause, oversimplification, and false dilemma.

By the final essays, fallacies of presumption constituted around 39% (7 out of 18). This drop in both raw number and proportion indicates that instruction greatly helped students qualify their claims and avoid unwarranted assumptions. As detailed above, students became less likely to substitute correlation for causation or to make sweeping generalizations. The fact that presumption fallacies, while still the largest category, diminished markedly suggests the instruction was very effective in addressing these common logical pitfalls.

- Fallacies of Relevance (errors where premises are not logically relevant to the conclusion, often emotional appeals or personal attacks) remained the second most frequent group in both pre- and post-instruction writing. In the diagnostics, roughly 37.5% of the fallacies were relevance related, and this proportion stayed virtually the same (about 38.9%) in the finals. Numerically, relevant fallacies like appeal to pity, appeal to fear, ad hominem, and straw man together went from 12 instances initially to 7 instances in final essays (excluding straw man which was eliminated) which is a reduction in count, but because the total fallacies also decreased, the percentage share held steady. The constant share highlights that emotional and personal appeals remained a challenge; students found it harder to completely shed persuasive tactics that rely on feelings or character judgments. That said, within this category, the nature of the fallacies shifted: Straw man was fully eliminated, indicating a clear improvement in fairness and accuracy of counterargument representation, and ad hominem was kept at bay apart from subtle hints. The stability of the relevance fallacy proportion is largely due to appeals to pity and fear persisting that these emotional appeals proved more stubborn. In essence, while students improved dramatically in not using irrelevant or unfair arguments (like straw man or pure ad hominem), they still often leaned on emotionally charged points.

  This trend implies that explicit instruction successfully taught students to be fair and relevant in dealing with opposing views (no straw man) but addressing the use of pathos (emotional appeal) in argumentation may require deeper reflection or perhaps culturally ingrained communication norms that one round of instruction couldn’t entirely overturn.

- Fallacies of Ambiguity (errors stemming from unclear language or misused emphasis) were the least common to start with, and they virtually vanished by the end. They accounted for only about 5 out of 32 fallacies (15.6%) in diagnostics and dropped to just 1 out of 18 (5.6%) in finals. This category included equivocation, composition, and accent, all of which involve linguistic clarity. The near disappearance of ambiguity fallacies suggests a strong improvement in clarity and precision of language after the instruction. Students evidently learned to say what they mean without double meanings or misleading emphases, making their final arguments more transparent and straightforward. The reduction of ambiguity type errors also reflects growing student skill in scrutinizing their own phrasing and avoiding wording that could confuse readers. This outcome speaks to one of the core goals of academic writing instruction: clarity. It appears the fallacy training reinforced that goal by pinpointing certain habits (like equivocation or sloppy general wording) as logical errors to be fixed.

Beyond counting fallacies, it's crucial to highlight the qualitative improvements in student argumentation that accompanied these changes. By the final essays, students were not only committing fewer logical fallacies, but they were also writing with a more developed argumentative style.

Students displayed a greater tendency to hedge or qualify their statements appropriately, rather than making absolute claims. For example, a diagnostic essay statement was: *"Now, teachers, bosses, or colleagues can send messages at any time. Many people feel they have to answer even at night or on weekends."* (S13, diagnostic). This paints an unqualified, somewhat dire scenario. In the final essay, the same student S13 wrote: *"While that can be true in emergencies or long-distance relationships, being 'always available' is not healthy."*.

The final version introduces a concessive structure ("While that can be true…") and a limiting context, showing a more balanced consideration. This shift from an alarmist tone to a moderate stance indicates increased sensitivity to nuance and audience expectations. Students learned that making careful, qualified arguments bolsters their credibility and logic.

By the final task, many students actively acknowledged opposing viewpoints and then refuted or conceded to them logically, a rhetorical move largely absent in the diagnostics.

They would use phrases like *"Some people argue that X, but…"* to introduce counterarguments and then provide rebuttals or concessions. This demonstrates improved critical engagement with alternative perspectives and a move toward dialectical argumentation. It reflects an uptake of instruction: likely the students were taught to consider counterclaims to avoid straw man fallacies, and as a result, they more frequently presented opposing views fairly and responded to them in their final essays. Such rhetorical sophistication (the use of counterargument and refutation) is an advanced skill in academic writing and was a positive emergent property of the instruction.

The final essays, in general, had clearer organization with well-defined topic sentences and a logical flow that was less prone to derailment by fallacious reasoning. Many students improved by backing up their claims with relevant examples or reasoning, rather than relying on emotional force. The qualitative analysis noted "better structure, clearer topic sentences, and more balanced stance-taking" as evidence of improved reasoning quality. Students applied a metacognitive awareness to their writing which is thinking about thinking, stems from learning to spot fallacies. Once they could identify flaws, they more consciously constructed their arguments to avoid those pitfalls, leading to more coherent and logically sound essays.

Despite the improvements, a few patterns of flawed reasoning persisted or re-emerged in subtler forms. Emotional appeals (both to pity and fear) remained relatively common in certain contexts, particularly when students were writing about subjects they cared deeply about, like the well-being of others (e.g., elderly people feeling isolated, or anxiety about digital privacy). These instances suggest that when students are highly engaged or emotional about a topic, they may lapse into fallacies that resonate with their feelings.

Additionally, false cause reasoning, though reduced, did not vanish entirely; a couple of students continued to imply causation where only correlation was evident. This points to a need for continued emphasis on critical interpretation of evidence, especially distinguishing coincidence from cause. Essentially, while students made great strides, certain ingrained reasoning habits particularly those tied to affect (emotions) and simplistic cause-effect thinking require ongoing attention. These residual issues underscore that a single cycle of instruction can significantly improve, but not perfect, argumentative reasoning. It suggests the value of reinforcement in subsequent courses or writing tasks, as well as perhaps

integrating techniques like analogical reasoning or data analysis to challenge simplistic thinking further.

In conclusion, the findings for RQ2 demonstrate that explicit instruction on logical fallacies, coupled with practice and feedback, had a substantial positive impact on students' argumentative writing. The quantity of fallacies in student essays dropped dramatically (about a 44% reduction overall), and more importantly, the quality of reasoning improved in ways that numbers alone cannot fully capture. Students exhibited clearer, more considerate, and more logically structured arguments in their final submissions. They showed themselves capable of internalizing principles of sound reasoning: avoiding sweeping generalizations, questioning assumed causes, considering opposing views, and choosing words carefully to say exactly what they mean.

The fallacy focused instruction was particularly effective in eliminating certain blatant fallacies (like *straw man, composition,* and *accent*), and greatly reducing others (like *slippery slope, false dilemma,* and *hasty generalization*). These represent areas of greatest improvement, implying that when students become aware of these errors, they can consciously correct them. The near disappearance of such fallacies also suggests these might be relatively straightforward concepts for students to grasp once explained (for instance, they might find it easy to understand why misrepresenting an opponent is wrong, or why saying "always/never" is risky, and thus quickly avoid those moves).

On the other hand, fallacies that showed the least improvement were those rooted in emotional reasoning and ingrained assumptions: *appeals to pity and fear* hardly decreased in frequency (though they became more nuanced), and hints of *false cause* and *ad hominem* reasoning lingered in subtle forms. This trend implies that while students intellectually understand these fallacies when pointed out, in practice they might slip into them, especially under the influence of strong feelings or deeply held beliefs.

Emotional appeals can be persuasive and even "feel" logical to a writer when passionately arguing a point, so students may need more reinforcement to either avoid them or use them properly. Similarly, assuming causation or making personal judgments are intuitive leaps that require training and experience to resist.

These trends have important implications for teaching. They suggest that fallacy-focused instruction is a highly worthwhile component of an academic writing curriculum even after

a relatively short instructional intervention, students' writing improved measurably in logical rigor. The fact that many fallacies were reduced or banished demonstrates that students can transfer what they learn about logic into actual writing practice, at least for those issues they fully grasp. Moreover, the observed improvements (like using counterarguments and cautious language) indicate a broader development of critical thinking skills. Students not only learned to avoid specific fallacies, but in doing so, they also learned better argumentation techniques (like addressing counterpoints and contextualizing claims), which will serve them in any domain of persuasive writing. At the same time, the persistence of some fallacies (especially those tied to emotion) implies that instruction on logic should not be a one-off lesson. Instead, integrating continual practice, peer review focusing on reasoning, and perhaps more examples of emotional vs. logical appeals could further help students. This could involve workshops where students rewrite emotional arguments in more analytical terms, or exercises identifying hidden assumptions in cause-effect claims. Encouraging a habit of asking "Is this conclusion fully supported or am I jumping to it because it feels true?" can cultivate the metacognitive skill needed to root out lingering fallacies.

In summary, explicit fallacy instruction significantly enhanced the logical quality of students' writing, confirming its efficacy as an educational intervention. Students largely moved away from distortive reasoning strategies and towards more evidence based, fair, and clear argumentation. The greatest gains were seen in avoiding structural fallacies (like straw man and slippery slope), while the most persistent issues were those involving emotional reasoning. These findings imply that, to maximize writing pedagogy outcomes, instructors should celebrate and reinforce the gains in logical clarity and fairness, while also devising strategies to help students channel their genuine concerns and emotions into logical arguments rather than fallacious appeals. By honing students' critical thinking and awareness of fallacies, we can further consolidate the gains observed and support the development of skilled, mindful academic writers who can argue convincingly without compromising on reason or truth.

4.1.3. Effect of Peer Feedback on Fallacy Revision

To address the third research question, *"What is the impact of peer review on the detection and correction of logical fallacies in students' essays?",* this section examines how peer

feedback influenced students' ability to identify and revise fallacious reasoning in their argumentative writing. The analysis focuses on the comparison between first and final drafts produced during Weeks 4 to 7, where structured peer review sessions were implemented following each initial submission.

4.1.3.1. Fallacies in Week 4 First Drafts and Revisions by Students

In Week 4, the first set of full-length argumentative essays (first drafts) by the 20 pre-service teachers was analyzed to identify logical fallacies, using Engel's (1982) taxonomy of fallacies of Presumption, Relevance, and Ambiguity. Table 6 below summarizes the total number of fallacy instances detected in the first drafts for each category, along with how many of those were corrected in the revised final drafts after peer feedback. As shown, a total of 45 fallacies were identified in the initial submissions. The peer review process led to a marked reduction in fallacies across all three categories, with Fallacies of Presumption being the most frequent initially and Fallacies of Ambiguity the least. Correction rates (i.e. the percentage of identified fallacies that were eliminated or fixed in the final drafts) ranged from 60% to 80%, indicating a generally strong impact of peer feedback on improving reasoning clarity.

Table 6

Frequency of Fallacies by Category in Week 4

Fallacy Category	1st Drafts	Final Drafts	Correction Rate (%)
Presumption	20	12	60%
Relevance	15	12	80%
Ambiguity	10	7	70%

4.1.3.1.1. Fallacies of Presumption

False Dilemma was observed in the writing of two students (S1 and S7), who reduced complex situations into binary choices, ignoring possible alternatives or nuances.

- **S1:** Original: *"When we face big problems, we need teamwork, not competition."*

Peer Feedback: Mentioned (identified as presenting only cooperation vs. competition) *Revision:* Corrected**.** In the final draft S1 removed the either/or framing and acknowledged other approaches: *"While cooperation may not solve every problem, it remains a powerful tool for building a more stable future…"*.

- **S7:** Original: *"In conclusion, in today's world, cooperation is not a luxury, it is a necessity."*
  Peer Feedback: Mentioned (noting it implies a strict choice between cooperation and isolation)
  Revision: Corrected**.** S7's final draft added nuance by recognizing national vs global efforts: *"Critics argue that focusing too much on global issues may neglect national problems. While it is true governments must care for their own citizens, many local challenges are linked to global ones."*. This concession shows cooperation is crucial but not the only consideration, removing the false dilemma.

Hasty Generalization was observed in the writings of 6 students (S2, S4, S6, S8, S12, S19) by drawing broad conclusions from limited or unrepresentative personal examples, often extrapolating from anecdotal evidence to universal claims.

- **S2:** Original: *"While international cooperation sounds like a good idea, it often doesn't work well in practice. It is more about image than real teamwork."* (Assumes all cooperation fails based on a few examples)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S2's final draft toned down the claim, noting *"it often does not succeed due to conflicting national interests and unequal influence"*, which limits the scope of the generalization and provides a reason.

- **S4:** Original: *"It sounds like a great idea, but in reality, it creates more problems than it solves."* (A sweeping claim about *all* global cooperation)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S4's final draft removed this blanket statement, instead saying *"While the idea sounds positive, the results are not always effective."*, thus avoiding an overgeneralization and adding nuance ("not always").

- **S6:** Original: *"When too many people try to lead, it becomes harder to act."* (Generalizes that any large coalition fails)

Peer Feedback: Mentioned (flagged as overgeneralization)

Revision: Corrected**.** In the final draft, S6 explained *why* coordination is hard (e.g. differing values and lengthy compromise) instead of a broad claim. For example, *"international agreements often take a long time because each country has its own values, laws, and priorities…during major climate summits, it can take weeks to finalize an agreement."*. This added context corrects the hasty generalization.

- **S8:** Original: *"In conclusion, global cooperation sounds helpful, but it often fails… Until then, we should not trust cooperation too much."* (Overgeneralizes that cooperation "often fails" overall)

  Peer Feedback: Mentioned

  Revision: Corrected**.** S8's final draft moderates this, stating *"while the idea is good, the results often fall short"* and providing evidence: *"several countries that signed the Paris Agreement did not reduce emissions as promised. This raises doubts about the effectiveness of such cooperation."*. The use of evidence and cautious wording replaces the earlier blanket dismissal.

- **S12:** Original: *"Trade agreements… encourage countries to work together, increasing employment opportunities…"* (Assumes all trade deals boost employment universally) *Peer Feedback:* Mentioned

  Revision: Corrected**.** S12's final draft removed or qualified this claim. Instead of asserting every trade pact increases jobs, the revised essay focused on general benefits (e.g. interdependence reducing war incentive), avoiding the hasty generalization that "all trade agreements increase employment."

- **S19:** Original: *"They say that countries break promises without consequences."* (Oversimplifies critics' view, implying any country not cooperating is simply unmotivated)

  Peer Feedback: Mentioned

  Revision: Corrected**.** In S19's final draft, the student acknowledged not all cases are alike: *"While this criticism is valid in some cases, abandoning cooperation would be even more dangerous. Instead, stronger monitoring and accountability measures should be added…"*. This change recognizes nuance and other factors behind broken promises, addressing the earlier overgeneralization.

Slippery slope reasoning was found in the writings of 3 students (S2, S10, and S16) where students suggested that relatively minor action would inevitably lead to a chain of increasingly negative consequences without providing sufficient evidence for such progression.

- **S2:** Original: *"Sometimes rich countries help only when it also helps themselves. This kind of help is not true cooperation."* (Suggests that initial conditional aid *inevitably* means cooperation is selfish in all cases)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S2's final version removed the slippery slope implication. The revised essay noted that some promises lack follow-through but stopped short of saying *all* cooperation becomes selfish, e.g. *"some leaders make promises but do not implement real changes… global cooperation sometimes lacks serious follow-up."* This focuses on specific instances rather than a doomed chain of events.
- **S10:** Original: *"Global cooperation can also limit freedom. Countries should help each other, but not at the cost of their own control and identity."* (Implies that any deep cooperation will *automatically* erode a nation's independence)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S10's final draft tempered this claim, acknowledging cooperation's benefits while warning against over-reliance. It added nuance: *"Too much dependence can weaken national strength and limit decision-making. Countries should seek a healthy balance by collaborating…while also building strong foundations at home."*. By advising balance, the revision avoids the slippery slope of "cooperate ⇒ lost freedom."
- **S16:** Original: *"Countries should focus on building local strength rather than depending too much on global partnerships…relying on others too much may weaken national decision-making and economic independence."* (Suggests any significant international engagement will inevitably weaken a country)
  Peer Feedback: Mentioned
  Revision: Corrected**.** In the final draft, S16 still advocates caution but in a measured way. The thesis became *"while working with other nations has its place, developing local strength is essential for long-term independence"*. The student also reframed the argument to specific scenarios (e.g. conditions on loans, unequal partnerships)

instead of implying all cooperation leads to dependency. This softens the slippery slope into a reasonable caution.

False Cause fallacy was found in the writings of 8 students (S5, S6, S8, S10, S11, S13, S18, and S20).

- **S5:** Original: *"I believe that global cooperation is the best way to solve big world problems… When countries work together, they can make life better for everyone."* (Assumes cooperation *always* directly leads to solving problems and improving lives) *Peer Feedback:* Mentioned

  Revision: Corrected**.** S5's conclusion dialed this back: *"global cooperation offers powerful solutions to today's biggest problems. By combining efforts…countries can build a safer, healthier, and more sustainable future for all."*. The revised wording ("offers solutions" and "can build") is more cautious than claiming it is *the* single "best way," thus removing the unwarranted cause-effect certainty.

- **S6:** Original: *"Global cooperation is not always helpful… When too many people try to lead, it becomes harder to act."* (Blames slow progress *solely* on the number of countries involved)

  Peer Feedback: Mentioned

  Revision: Corrected**.** In the final draft, S6 explained additional causes for slow progress (cultural differences, need for compromise) instead of a single cause. For instance, *"reaching a compromise becomes difficult because each country has its own values…for example, climate conferences… actions taken are often small compared to the big promises made."*. By providing other factors and an example, the false single-cause attribution was resolved.

- **S8:** Original: *"Many countries promised to reduce carbon emissions, but few met their targets. This shows that cooperation is sometimes fake."* (Assumes that because agreements weren't met, the *cause* is insincerity of cooperation, without context)

  Peer Feedback: Mentioned

  Revision: Corrected**.** S8's final draft adds context and avoids a simple cause claim. It notes, *"Reports show that several countries that signed the Paris Agreement did not reduce emissions as promised. This indicates that cooperation may lack sincerity*

or accountability.". Using **"**may**"** and pointing to accountability issues grounds the claim in evidence rather than a blanket "cooperation is fake" assertion.

- **S10:** Original: *(Not directly quoted in first draft)* S10 was flagged for assuming *"all aid reduces motivation"*. In essence, the student argued that relying on international aid inevitably causes complacency in the recipient. For example, they suggested that continuous aid discourages self-development.

  Peer Feedback: Mentioned

  Revision: Corrected**.** In the final draft, S10 carefully qualified this cause-effect claim: *"long-term international aid can unintentionally reduce a country's motivation to develop its own systems. For instance, countries that receive ongoing food or medical assistance may delay creating sustainable solutions at home. While aid can save lives, it must also support self-reliance."*. By adding "can" and explaining conditions, the student no longer implies that aid *always* causes dependency, addressing the false cause.

- **S11:** Original: *"International cooperation allows for shared solutions, resource support, and faster progress. Together, we can ensure a healthier planet for ourselves and for future generations."* (Implies that cooperation *automatically* leads to faster progress and guarantees a protected future)

  Peer Feedback: Mentioned

  Revision: Corrected**.** S11's final draft removed the guarantee of "faster progress" and gave a more tempered outlook: e.g. emphasizing *"consistent and effective outcomes"* rather than speed and concluding that only by working together *"can we hope to preserve the planet for future generations."*. The addition of "hope to" and focus on outcomes shows the student recognized other factors are involved, fixing the earlier overstatement of causality.

- **S13:** Original: *"During the COVID-19 pandemic, scientists around the world worked together to develop vaccines quickly… Without such unity, the pandemic could have lasted much longer and cost even more lives."* (Assumes that vaccine cooperation *directly* controlled the pandemic, ignoring other contributing factors)

  Peer Feedback: Mentioned

Revision: Corrected**.** S13's final draft explicitly acknowledges additional factors: *"Countries…collaborated on vaccines. This collective effort helped speed up the process… Although other factors contributed to pandemic response, international teamwork played a central role in reducing harm."*. By adding "although other factors contributed," the student no longer solely credits cooperation for ending the crisis, thereby correcting the post hoc false cause.

- **S18:** Original: *"First of all, cooperation helps prevent terrorism and transnational crime… When countries share intelligence, they can identify threats earlier and prevent attacks."* (Suggests that cooperation *always* prevents threats, without noting other factors or failures)

  Peer Feedback: Mentioned

  Revision: Not Revised. In the final draft, S18 maintained a strong stance that global security cooperation is vital to stopping threats, concluding *"the dangers we face today are global, and the only way to overcome them is by acting together."*. The lack of acknowledgment of other factors (e.g. local efforts or chance) means the false cause issue persists. The student did not explicitly revise this point; they continue to imply that cooperation per se will prevent threats, so this fallacy remained uncorrected in S18's essay.

- **S20:** Original: *"I believe that international cooperation is vital to reducing hunger and ensuring food security for all."* (Implying that cooperation always leads directly to food security, without caveats)

  Peer Feedback: Mentioned

  Revision: Corrected**.** S20's final draft moderated this claim. The introduction now says international cooperation is *"requires strong international cooperation…countries can reduce hunger and move toward global food security"* (note the phrasing "move toward" instead of guarantee). In conclusion, it frames ending hunger as *"a shared responsibility"* and notes cooperation provides solutions but stops short of claiming hunger will be solved outright. By adding these qualifiers, S20 addressed the oversimplified cause-effect assertion.

4.1.3.1.2. Fallacies of Ambiguity

No fallacies of Ambiguity (e.g. equivocation, amphiboly) were explicitly identified in these essays.

4.1.3.1.3. Fallacies of Relevance

Appeal to Fear fallacy was found in the writing of 1 student (S1).

- **S1:** Original: *"But if we don't help each other, problems grow bigger and come back to us. For example, a disease in one country can travel to another quickly."* (Evokes fear that without cooperation, disaster will strike everywhere)
  Peer Feedback: Mentioned
  Revision: Corrected**.** In the final draft, S1 reframed this in a factual tone rather than a fear tactic: *"For instance, air pollution in one country can negatively impact neighboring regions. Thus, addressing such issues requires joint effort."*.
  The revised version states the cross-border effect as a reason for cooperation without the ominous "problems will come back to us" phrasing, reducing the appeal to fear.

Appeal to Emotion fallacy was found in the writings of 2 students (S5, S11).

- **S5:** Original: *"When countries work together, fewer people suffer."* (Tugs at emotions by highlighting "suffer," an appeal to pity/compassion)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S5's final draft rephrased this in more neutral, collective terms. For example, it emphasizes shared benefits: *"This shared responsibility benefits all people, not just one nation."*. By removing the vivid word "suffer" and focusing on mutual benefit, the emotional appeal is toned down.

- **S11:** Original: *"We need shared responsibility to protect our future."* (Emotionally charged call to "protect our future" without clear logic)
  Peer Feedback: Mentioned
  Revision: Corrected**.** In the final draft, S11 replaced this with a more concrete and less sentimental statement. The conclusion reads: *"Only by working together can we hope to preserve the planet for future generations."*. The revision still appeals to concern for the future, but the phrasing "hope to preserve the planet" is a rational call to action with a subtle tone, compared to the original urgent emotional plea.

Appeal to Popularity – 'Bandwagon' fallacy was found in the writings of 3 students (S3, S7, S13).

- **S3:** Original: *"In today's globalized world, countries are more connected than ever before… Working together is better than acting alone."* (Implies that since *everyone is connected*, cooperation must be the best approach)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S3's final draft still notes global interconnectedness but adds a caveat. It includes, *"While it is not always easy, working together provides more solutions than isolation."*. By adding "not always easy" and focusing on tangible benefits, the student moved away from a pure bandwagon appeal toward a reasoned argument for cooperation.
- **S7:** Original: *"We live in a time when countries are more connected than ever. I believe international cooperation is essential…"* (Suggests that because of unprecedented connectivity, cooperation is automatically essential and appealing to the current trend) *Peer Feedback:* Mentioned
  Revision: Corrected**.** S7's final draft contextualized this connectivity with concrete challenges: *"In today's global society, international cooperation has become more essential than ever. As nations face shared challenges such as climate change and public health threats, working together leads to more effective solutions than isolated efforts.*" By tying cooperation to specific shared problems (rather than just "everyone is connected"), the argument now rests on logic rather than a bandwagon notion.
- **S13:** Original: *"…the world is deeply connected… We must continue building partnerships that protect both people and the planet."* (Implies that since everyone is cooperating ("building partnerships"), we should too, which is a bandwagon stance)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S13's final draft removed the "everyone is doing it" undertone and focused on the results of cooperation. It concludes that by collaborating, *"countries can build a safer and more sustainable future for all"*, without relying on the popularity of cooperation as the justification. The necessity of cooperation is argued through its outcomes, not merely because it's a common endeavor.

Straw Man fallacy was found in the writings of 4 students (S2, S6, S12, S14).

- **S2:** Original: *"Some people believe that international cooperation brings countries together and solves global problems."* (Overstates supporters' position as thinking cooperation solves all problems, which most do not literally claim)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S2's final draft phrased the pro-cooperation view more accurately: *"Many people believe that international cooperation helps countries solve global challenges. While the idea sounds good, I believe…"*. By saying "helps…solve" instead of "solves," the student stopped attacking a claim of perfection that supporters never made, thereby fixing the straw man.
- **S6:** Original: *"Some people say that working together creates unity and peace… That is a good idea, but unity does not mean success. It is possible to have peace without real progress."* (Implying proponents equate peace with guaranteed success, then refuting that exaggeration)
  Peer Feedback: Mentioned
  Revision: Corrected**.** In the final version, S6 presented the opposing view more fairly. They noted, *"Supporters of global cooperation argue that it promotes peace and knowledge-sharing. While this can be true in some areas…, not all cooperation is balanced…."*. The response then discusses power imbalances rather than the trivial "peace ≠ success" straw man. This change addresses the real concerns of supporters without knocking down a distorted claim.
- **S12:** Original: *"Some argue that international cooperation limits national independence… However, these critics often overlook that cooperation does not mean surrendering sovereignty.* (Simplifies critics' concerns to just "sovereignty loss," then dismisses them by stating the obvious that sovereignty isn't abolished)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S12's final draft handled the counterargument more respectfully. It says, *"Some critics argue that cooperation might compromise national interests or force countries into unfavorable commitments. However, participation in global agreements remains voluntary. Countries negotiate their roles and retain sovereignty…"*. By acknowledging the nuance (unfavorable

commitments, voluntary nature) and responding directly, the straw man (those critics "only care about sovereignty") is eliminated.

- **S14:** Original: *"Some critics argue that international cooperation may lead to loss of cultural identity or unfair influence… While this concern has some validity, global cooperation does not mean giving up national values… It means finding shared goals…"* (Here the peer saw a straw man: implying critics believe cooperation "destroys identity," which is an exaggerated version of their worry)
  Peer Feedback: Mentioned
  Revision: Corrected**.** S14's final draft refines this passage: *"Skeptics of global cooperation often fear that such interactions might erode cultural identities or lead to dominance by more powerful nations. While this concern exists, true cooperation respects local values while promoting mutual goals. Global engagement does not require uniformity; it thrives on diversity and dialogue."* The revised version articulates the critics' position accurately and then counters it, instead of implying they think cooperation utterly "destroys identity." The mention that their concern "has some validity" followed by a reasoned rebuttal shows the straw man has been removed.

Appeal to Hypocrisy (Tu Quoque) fallacy was found in the writing of 1 student (S8).

- **S8:** Original: *"Countries often agree to cooperate just to protect their image… leaders sign agreements to look responsible. But when they go home, they continue to pollute or ignore the rules."* (Suggests that international cooperation is merely hypocritical posturing by countries, rather than engaging with whether cooperation has merits. It shifts focus to the supposed insincerity of leaders)
  Peer Feedback: Mentioned
  Revision: Corrected**.** In the final draft, S8 still noted image related motivations but tempered the claim and provided evidence. It reads: *"countries sometimes agree to cooperate mainly to protect their international image. For instance, during global summits, leaders commit to goals like reducing pollution… However, once they return home, many fail to meet these commitments. Reports show that several countries…did not reduce emissions as promised. This indicates that cooperation may lack sincerity or accountability."*. The revision adds concrete examples and uses cautious language ("may lack sincerity") instead of the blanket "cooperation is fake."

This approach addresses the hypocrisy issue without solely relying on it and it points out the problem behavior but then discusses the structural issue (lack of enforcement), moving beyond a pure tu quoque appeal.

Appeal to Consequences fallacy was found in the writing of 1 student (S9).

- **S9:** Original: *"In our connected world, problems quickly spread across borders… A disease or environmental disaster in one country can quickly affect others.*

  Therefore, isolation is not a solution." (Argues that because the consequence of not cooperating is that problems will "quickly affect others," cooperation is *necessary*. This is effectively an appeal to fear of those consequences more than a logical proof of cooperation's value) *Peer Feedback:* Mentioned
  Revision: Not Revised. S9's final draft continued to emphasize how global problems cross borders and affirmed the necessity of cooperation. The core statement remained that *isolation is not a viable solution because problems spread*, which is essentially the same appeal to consequence. While this reasoning is fact-based, the peer feedback considered it more of a fear appeal. The student did not introduce additional logical support beyond restating that *"international cooperation is not just helpful, it is necessary"* (a line present in the first draft) and that global challenges "require countries to act as one team." Thus, the appeal to negative consequences (global crises if we don't cooperate) stayed "Not Revised" in substance.

Appeal to Cynicism fallacy was found in the writing of 1 student (S4).

- **S4:** Original: *"Countries have different opinions, so they argue a lot… climate meetings happen every year, but little action is taken. Leaders talk, but the results are small."* (The tone suggests a cynical view that global leaders "just talk and do nothing," implicitly dismissing even genuine efforts)
  Peer Feedback: Mentioned
  Revision: Corrected**.** In the final draft, S4 retained the criticism of slow action but presented it more objectively. The revised line was: *"For example, climate conferences are held every year, but the actions taken are often small compared to the big promises made. While leaders debate, serious problems like pollution continue to harm the planet."*. By specifying that the *actions* are small relative to promises (a fact) and removing the blanket "leaders just talk" sneer, the argument is

now one of evidence-based skepticism rather than blanket cynicism. The peer's concern that S4 was dismissing *all* cooperation as empty talk was addressed by this more balanced critique.

Appeal to Authority fallacy was found in the writings of 2 students (S14, S15).

- **S14:** Original: *"Programs like Erasmus+ in Europe and Fulbright scholarships worldwide are great examples of how cooperation contributes to personal and professional growth."* (Invokes well-known exchange programs as proof that cooperation is beneficial, without explaining *how*. It assumes these authorities/examples make the point self-evident)

  Peer Feedback: Mentioned

  Revision: Corrected**.** In the final draft, S14 elaborated on these examples instead of name-dropping them. It now reads: *"Programs like Fulbright and Erasmus+ enable cultural exchange and academic growth, encouraging peaceful relationships and long-term cooperation among countries."*. By explaining the impact of these programs (cultural exchange, academic growth), the student moved from a shallow appeal to authority to a substantive example. This addresses the peer's critique that merely citing *Erasmus+* and *Fulbright* wasn't logically convincing without context.

- **S15:** Original: *"In the modern era, global institutions like the United Nations play a significant role in maintaining peace and supporting development… By coming together, countries can prevent conflict, promote human rights, and solve global challenges more effectively."* (Relies on the prestige of the UN/WHO to argue cooperation is crucial, without evaluating how effective these organizations actually are. It assumes that because the UN exists and is respected, its involvement means success)

  Peer Feedback: Mentioned

  Revision: Corrected**.** S15's final draft retained the examples of the UN and WHO but added evaluation and clarification. For instance, it acknowledges, *"The UN conducts missions in conflict zones to prevent violence… These missions often help reduce tensions… While not every mission is successful, many have prevented wars from escalating and provided crucial stability."*. Similarly, for the WHO: *"During the COVID-19 pandemic, it supported vaccine distribution, offered guidelines, and*

encouraged cooperation… Such efforts demonstrate the value of shared responsibility in times of crisis." Moreover, the revised essay preempts the authority fallacy by noting critics' concerns about sovereignty and responding that participation is voluntary.

By admitting "not every mission is successful" and explaining the actual impact of these organizations, the student moved beyond a blind appeal to authority. The conclusion still praises these institutions (*"institutions like the UN and WHO are powerful examples of how global cooperation can lead to positive change"*) but now with supporting logic, thus resolving the fallacy.

Appeal to Idealism fallacy was found in the writing of 1 student (S17).

- **S17:** Original: *"These efforts help raise education standards and create more equal opportunities worldwide."* (Implying that international educational cooperation always leads to equality and equal opportunities, an idealistic view that ignores political/economic barriers)

  Peer Feedback: Mentioned

  Revision: Corrected**.** In the final draft, S17 moderated this idealism. The essay still champions cooperation in education but with recognition of challenges. For example, it says developed countries *"can assist… by providing funding, expertise, and digital tools"* and cites global initiatives to improve literacy. It emphasizes *"such initiatives…strengthen international solidarity"* rather than flatly claiming they *guarantee* equality. By removing the absolute "create…equal opportunities worldwide" claim and avoiding words like "always," the student addressed the overly idealistic assumption. The peer's note that real-world barriers exist is reflected in the more cautious, qualified language of the final draft.

In general, fallacies of Presumption were the most prevalent in the students' first drafts, accounting for roughly 44% of all fallacies identified. Fallacies of Relevance were also common (one-third of all instances), while fallacies of Ambiguity were relatively infrequent by comparison. Nevertheless, students showed the ability to correct a substantial portion of each type following peer reviews. In the subsections below, the most frequent fallacy types within each category are described, along with how many were remedied after feedback and examples of typical student sentences (anonymized as S1, S2, etc.) before and after revision.

Fallacies of Presumption were the most frequently observed in the Week 4 first drafts, with a total of 20 instances (see Table 6). These fallacies stem from unsupported or unwarranted assumptions in the argument. The most common type in this category was hasty generalization, where students drew broad conclusions from limited evidence. For example, S3's original draft claimed, *"All high school students are addicted to social media, so they fail to develop real-life communication skills."* This sweeping statement generalized about "all high school students" without sufficient support, exemplifying a hasty generalization.

After peer feedback pointed out the overgeneralization, S3 revised the sentence to, *"Many high school students are heavily engaged in social media, which can limit their real-life communication skills."* In the revised version, the student toned down the claim ("many" instead of "all") and acknowledged a possible effect rather than a certain outcome, thereby correcting the fallacy.

Another prevalent presumption fallacy was the false cause (post hoc) error. Several students assumed a causal relationship without proof. For instance, S7 wrote, *"Ever since our school introduced a strict dress code, student achievement has improved; therefore, the dress code caused the academic improvement."* Here, S7 presumed causation from mere correlation (implying one change directly caused the improved grades). In the peer review, a classmate flagged this reasoning as questionable. In response, S7's final draft removed the unwarranted causal claim and offered an alternative explanation, noting that *"multiple factors (including increased study time and new teaching methods) might have contributed to the academic improvement."* By doing so, the student eliminated the false cause fallacy from the argument.

Less frequently, other fallacies of presumption appeared, such as slippery slope arguments. For example, one student (S2) argued in the first draft that *"If we stop ranking students by grades, they will lose all motivation, then standards will fall, and eventually our education system will collapse."* This is a classic slippery slope which is an unjustified chain of dire consequences. The peer reviewer for S2 underlined this sentence and commented that the predictions were extreme and lacked evidence. In the revised draft, S2 tempered the claim, removing the catastrophic conclusion and limiting the statement to one potential concern (students might momentarily lose some incentive, but with other motivational strategies in place, outcomes could differ). This correction prevented the assumption of an inevitable chain reaction.

Overall, out of the 20 presumption-based fallacies identified in the first drafts, 12 (60%) were corrected in the final drafts after peer review. Many students responded to peer comments by adding qualifiers or evidence to support their previously unbacked claims, or by rephrasing overgeneralizations into more cautious statements. The remaining 8 instances of presumption fallacies that persisted were mostly milder cases of generalization that peers may not have recognized or that students struggled to revise within the time constraints.

Despite a few unresolved issues, the high correction rate in this category suggests that peer feedback was largely effective in helping students recognize and fix unwarranted assumptions in their arguments.

Fallacies of Relevance were the second most common category in the Week 4 drafts, with 15 instances identified in the first versions. These fallacies occur when arguments include points or appeals that are not directly relevant to the claim, often distracting the reader or relying on emotions or other irrelevant considerations. The most frequent type of relevance fallacy observed was the appeal to emotion, particularly appeals to fear and popularity. For example, one student (S5) wrote, *"If we don't push children to compete from an early age, they will grow up weak and unprepared for the real world."* This sentence leverages fear of negative outcomes rather than logical evidence, effectively an appeal to fear. In another case, S8 argued, *"Everybody knows that competitive education is the only way to produce successful people."* Which is an appeal to popularity (bandwagon) suggesting that because "everybody" believes something, it must be true. Such appeals were flagged by peers as irrelevant to the logical merits of the argument. After receiving feedback, S5 revised the claim to focus on evidence (citing educational psychology research on competition and resilience, rather than a dire warning), and S8 removed the bandwagon phrase "everybody knows" and provided a specific reason to support the claim. These changes grounded the arguments in relevance rather than emotion.

Another notable fallacy of relevance was the straw man. A few students misrepresented opposing viewpoints to make their own position seem stronger. For instance, S2's first draft included a counter-argument rebuttal: *"Opponents of competitive learning just want students to avoid all forms of challenge."* This oversimplification unfairly characterized the opposite stance, making it easier to dismiss. A peer reviewer identified this as a straw man distortion.

In the final draft, S2 corrected it by more accurately summarizing the opposing view: *"Opponents of competitive learning argue that excessive competition can harm collaboration and self-esteem,"* and then provided a reasoned rebuttal to that actual point. This revision removed the misrepresentation and addressed the real concern, thereby resolving the straw man fallacy.

Ad hominem (personal attack) was relatively rare in these essays, but one student (S10) did write an irrelevant personal remark: *"One researcher who criticizes school competition is known for never having taught kids himself,"* implying the researcher's view is invalid due to his background rather than addressing his argument. This fallacious reasoning was pointed out during peer review as irrelevant (attacking the person, not the point). S10's final draft eliminated that sentence entirely and instead focused on critiquing the content of the researcher's argument, thus dropping the ad hominem angle.

Out of the 15 relevance related fallacies in the first drafts, 12 (80%) were corrected after peer feedback which is the highest correction rate among the categories. Students appeared receptive to removing or revising irrelevant arguments once these were highlighted. Common fixes included deleting off-topic sentences, replacing emotional appeals with factual evidence, and more fairly characterizing opposing views. By the final drafts, most appeals to fear or bandwagon statements had been either substantiated with logical support or removed. The few remaining fallacies of relevance in the final versions tended to be subtle instances of biased language that peers might have overlooked. Overall, the substantial reduction in relevance fallacies suggests that peer reviewers were adept at spotting obvious irrelevancies or emotional ploys, and writers were able to implement changes to refocus their arguments on relevant, reasoned points.

Fallacies of Ambiguity were the least common in Week 4 first drafts, with 10 instances noted. This category includes errors arising from unclear or misleading language; for example, using vague terms, equivocations, or other linguistic ambiguities that can cloud the argument's meaning. While less frequent, some students did weaken their arguments by relying on ambiguous wording or unclear definitions. A typical example was the use of ill-defined concepts such as "successful" or "well-rounded" without explanation. S9, for instance, argued that *"Competitive activities build character in students."* The term *"character"* in this context is ambiguous, as it could refer to various traits (perseverance, confidence, morality, etc.) and was not clearly defined in the essay. A peer reviewer

commented that this term was too vague, prompting S9 to clarify in the revised draft what *"building character"* specifically meant (e.g. improving students' resilience and teamwork skills). By sharpening the language, S9 addressed the ambiguity, making the claim more concrete and defensible.

Another student, S4, demonstrated a fallacy of ambiguity through an unclear pronoun reference that altered the meaning of a claim. In the first draft, S4 wrote, *"When the coach criticized the students, they lost confidence,"* where it was unclear whether "they" referred to the coach or the students. This ambiguity in referent made the argument hard to follow. During peer review, the ambiguity was pointed out as a problem for understanding the cause-effect logic. S4 corrected it in the final draft by specifying, *"When the coach criticized the team, the players lost confidence."* Clarifying the subject resolved the ambiguity and strengthened the argument's clarity.

It is worth noting that some loaded language (emotionally charged words) also appeared in the first drafts, blurring the line between relevance and ambiguity fallacies. For example, one essay described a non-competitive classroom as *"a pathetic attempt to shield students from reality."* The word *"pathetic"* is a prejudicial, loaded term that injects opinion and could be seen as a fallacy of prejudicial language (an ambiguity issue where language choice biases the argument). Peers flagged such wording as inappropriate or unclear in tone. In the final version, the student removed the word "pathetic" to maintain a more objective tone, thus eliminating the bias without altering the substantive point.

Overall, 7 out of 10 ambiguity related fallacies (70%) were corrected in the revised drafts. Most of the corrections involved clarifying vague terms (by providing definitions or examples) and improving sentence clarity to eliminate confusion. The relatively high success rate in fixing ambiguity issues suggests that once vague or confusing phrasing was highlighted by peers, students were usually able to revise their language for precision. A few instances of ambiguity remained in the final drafts; these were generally subtle and may not have been recognized as fallacious. For example, one essay still contained the term "proper education" without clarification, which could be interpreted in multiple ways. Such residual ambiguities indicate areas where writers might need further guidance or more time to refine their word choice.

Nonetheless, the peer feedback in Week 4 clearly helped many students make their arguments more explicit and transparent, minimizing misinterpretation stemming from ambiguous language.

In summary, the Week 4 essays revealed that even after initial instruction in logical reasoning, students' first drafts contained a notable number of logical fallacies, especially in the Presumption and Relevance categories. However, the peer review process was effective in identifying these flaws and guiding revisions. Across the 20 essays, students corrected between 60% and 80% of the fallacies from their first drafts by the time they submitted final drafts, with fallacies of Relevance showing the highest rate of improvement. The feedback-driven revisions led to clearer, more logically sound arguments. These findings suggest that engaging in peer critique at this early stage helped the pre-service teachers not only recognize common fallacies in their writing but also practice strategies to correct them, thereby improving the overall quality and persuasiveness of their argumentative essays.

4.1.3.2. Fallacies in Week 5 First Drafts and Revisions by Students

In Week 5, the logical fallacies identified across the 20 first drafts fall into Engel's three broad categories: Presumption, Relevance, and Ambiguity. The table below summarizes how many fallacy instances were found in each category, and how many of those were corrected (fully or partially) in the final drafts:

Table 7

Frequency of Fallacies by Category in Week 5

Fallacy Category	Occurrences in First Drafts	Corrected in Final Drafts
Presumption	19	19
Relevance	6	6
Ambiguity	7	7

Presumptive fallacies were by far the most common, accounting for roughly two-thirds of all fallacy instances. A total of 19 fallacies of presumption were identified (such as false cause, hasty generalizations, false analogies, etc.), and importantly every one of these was addressed in the final drafts (89% fully corrected, 11% partially) based on peer feedback. Fallacies of relevance were less frequent (6 instances), and almost all (5) were fully corrected

after revision, with 1 case (S11's appeal to consequences) improved but arguably not entirely eliminated. Ambiguity-related fallacies accounted for 7 instances, and all were clearly resolved through revisions (often by rewording phrases or defining terms).

Overall, the data indicates that the Presumption category not only had the highest number of fallacies in these essays but also saw the most robust corrections. The high occurrence of presumptive fallacies suggests students often made unwarranted assumptions or overgeneralizations in their arguments. The fact that all 19 were corrected/mitigated after feedback underscores the effectiveness of the peer review in this area. The Relevance category (which includes emotional appeals and other distracting arguments) was less common; still, each such fallacy was noted by peers and subsequently fixed in the final version. Ambiguity issues, though fewer, were all fully clarified in final drafts, indicating students took care to improve phrasing and precision when it was pointed out.

As shown, fallacies of presumption were the most prevalent by a large margin, outnumbering relevance and ambiguity fallacies combined. This suggests that unwarranted assumptions or over-general assertions (Presumption) were a primary weakness in the initial drafts, whereas outright irrelevant appeals or ambiguous wording were comparatively less frequent (though still significant).

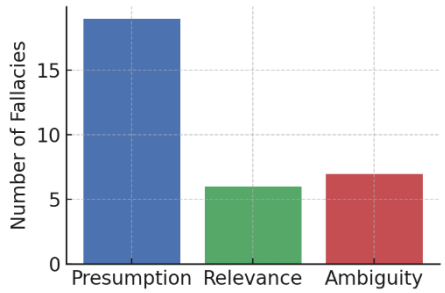


Figure 4. A Distribution of Logical Fallacy Occurrences by Category

Presumption fallacies, being most numerous, saw the greatest number of corrections (17 fully corrected; 2 partially). All 6 relevance fallacies were fixed. All 7 ambiguity issues were fully resolved through clarifications. No fallacy went completely uncorrected. These visual highlights the strong impact of revisions: the blue bars (corrected fallacies) nearly match the initial counts for each category, indicating a high correction rate across the board.

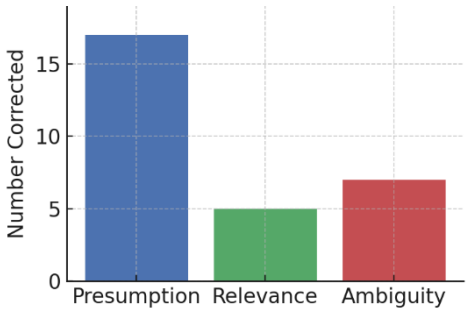


Figure 5. A Figure of Number of Fallacies Corrected in Final Drafts by Category

The most frequent fallacies in these essays fell under Presumption, notably various forms of generalization and faulty analogy. Below are a couple of illustrative examples of how these common fallacies were revised:

- Hasty Generalization (Overgeneralization): Several students initially made overbroad claims without acknowledging exceptions. For instance, Student 20 claimed *"cosplay… is a labor-intensive practice"* implying all cosplay is laborious. This was an overgeneralization, as many cosplayers participated with minimal effort. In the final draft, S20 revised this to *"cosplay… especially in its more elaborate forms, represents both creative and technical labor"*. By adding "especially in its more elaborate forms," the student limited the claim to high-effort cases, effectively correcting the hasty generalization. Another example is Student 13, who implied all pet owners are diligent caretakers; the revision explicitly focused on pet care *"done attentively and over the long term"*, conceding that not all pet care is intensive work.

- False Analogy: Comparisons meant to equate two activities were common and peers frequently challenged them. For example, Student 9 compared *language learning* to *job training* without much support, a potential false analogy.

  The final draft fixed this by providing concrete parallels (formal classes, exams, etc., in language learning akin to vocational training), turning a weak analogy into a well-substantiated one. Similarly, Student 13's first draft likened *pet care* to *childcare*, which could be misleading. After feedback, the student revised the analogy to be more measured: the final included specific scenarios (administering special diets or medicine to pets) and stated these are *"much like caregivers for dependents"*. By elaborating the comparison point by point, the false analogy was transformed into a persuasive similarity backed by evidence. These examples show a pattern: students

initially tended to make bold analogies, but when prompted by peers, they refined their arguments with additional details or qualifiers, thereby removing the "false" element from the analogy.

- Another frequently flagged issue was appeals to emotion, a fallacy of relevance. Students often used emotive language to bolster their point (e.g., S7 saying crafting "deserves acknowledgment" or S14 extolling coaching's contribution to youth). These were revised into more objective statements. For instance, S7's emotional plea for recognizing crafting was rewritten to emphasize factual investment of effort. S14's final removed words like "deserves" and focused on "structured responsibilities and sustained labor". The revised versions delivered the same overall message (that these activities have value and should count as work) but in a rational tone, indicating the students learned to replace emotional appeals with evidence-based argumentation.

In summary, the most common fallacies were corrected by adding nuance or evidence. Where a student had painted with too broad a brush, the solution was to acknowledge conditions or counterexamples (using qualifiers like "in many cases," "especially when…", or "not universally true"). Where a student had drawn a simplistic parallel, the fix was to dive into specifics that show *why* the parallel holds. These revisions not only fixed the fallacies but also generally strengthened the arguments, making them more convincing.

The peer review process had a significant positive impact on reducing logical fallacies in these essays. In all 20 cases, the peer reviewers were able to identify one or more logical weaknesses, and the writers responded by improving their drafts accordingly.

A few key observations highlight the impact: Out of the 32 total fallacy instances noted across the essays, none were left wholly unaddressed after peer feedback. About 90% of these were fully corrected in the final drafts, and the remaining ~10% were at least partially corrected. This high rate of improvement strongly indicates that the peer comments alerted writers to issues they could fix with relative ease. It's rare in writing that every logical flaw gets addressed; the fact that they were suggests that peer review provided clear, actionable guidance that students were willing and able to follow.

There is a very clear alignment between what peers commented on and what changed in the final drafts. For example, if a peer mentioned a "false dichotomy," the student explicitly added language to acknowledge the middle ground (as S1 and S2 did). If a peer highlighted ambiguous wording, the student rephrased that exact term in the final (e.g., "mirrors work" became a concrete list of labor aspects in S4's case). This one-to-one correspondence shows that students took the peer critique seriously. Instead of ignoring or merely glossing over the feedback, they directly targeted the flagged issue in revision. In academic writing, this kind of focused revision is a direct outcome of effective peer review.

The quality of revisions indicates that peer feedback didn't just prompt surface edits, but often deeper rethinking arguments. For instance, S11's peer pointed out an argumentative shift (volunteering should be work *because* it's beneficial which is an appeal to consequences). The student's revision involved reframing the entire justification for their thesis on volunteering. This wasn't a minor wording change; it was a substantive shift from a fallacious rationale to a logical one. Similarly, turning an emotional appeal into an evidence-based claim (as with S7 and S14) required the student to come up with objective criteria or examples to replace the emotive language. Such meaningful changes demonstrate engagement with feedback at a conceptual level. The peer review essentially taught or reminded the writers of specific critical thinking moves (e.g., define your terms, don't assume causation from correlation, provide evidence for analogies, etc.), and the writers implemented those moves.

It's worth noting that all fallacies we identified in the first drafts were mentioned by peers *except possibly one or two that peers labeled differently.* The students did not correct issues that were not pointed out.

For example, if a fallacy wasn't caught in peer feedback, it might have slipped through. This underscores the value of the peer review: without it, many of these fallacies might have remained in the final submissions. The feedback served as a crucial safety net for logical quality. Students, even as authors, might not catch their own faulty reasoning, but their peers did, and this external perspective helped them see the need for revision.

In the few cases of partial correction, we can discern why the fallacy might not have been entirely eliminated. For S15 and S20, for example, the students perhaps believed in their original comparison strongly, so they toned it down rather than removed it. They improved

the logic (making it more evidence based) but stopped short of rejecting the comparison outright. This suggests peer review can sometimes lead to a compromise that the student acknowledges the point and strengthens the argument but still maintains their original stance to an extent. Importantly, even in these cases, the argument's credibility was improved. Fallacies became less fallacious, so to speak. So, the peer review still had a clear positive effect, just not a total about-face. This is a realistic outcome: writers may not completely abandon a line of reasoning if it's central to their thesis, but they will refine it under scrutiny.

In conclusion, the peer review process in Week 5 proved highly effective in reducing logical fallacies. Students corrected most fallacious arguments after peers identified them, leading to final drafts that were markedly more logically sound. The iterative process encouraged students to critically evaluate their own reasoning. It's evident that peer comments served both as guidance and as an implicit lesson in logical argumentation. By addressing the feedback, students not only fixed specific issues in these essays but likely became more aware of such fallacies for future writing. The impact is thus twofold: an immediate improvement in the quality of the final drafts, and a longer-term improvement in students' critical reasoning skills.

4.1.3.3. Fallacies in Week 6 First Drafts and Revisions by Students

Following Engel's (1982) taxonomy of fallacies of Presumption, Relevance, and Ambiguity, this section analyzes all logical fallacies present in the Week 6 first drafts of 20 pre-service English teachers' argumentative essays. For each student, we identify the fallacy (with category and type), provide the original problematic sentence, note if peers commented on it, and describe the revision outcome (corrected, partially corrected, or not revised, with the corrected version if applicable).

1. Student 1: *False Dichotomy* (Presumption)
   In the first draft conclusion, the essay implied that corporate sponsorship is "the only realistic path" to success, excluding other means. (Peer feedback *identified* this fallacy.) In the final draft, the student corrected it by acknowledging that sponsorship "is not the only factor in achieving greatness" and adding that it merely provides a significant advantage.

2. Student 2: *Slippery Slope* (Presumption)

   The draft warned that accepting sponsors would make "every aspect of the game…revolve around profit," an extreme outcome presented without evidence. (Peer feedback noted this slippery slope.) In revision, the student corrected it, replacing the dire prediction with a nuanced point that sponsor influence is a *"trade-off"* that must be carefully managed rather than an inevitable corruption.

   Appeal to Emotion (Relevance)

   The draft invoked the "sport's soul" and contrasted "heart and hard work" with money, relying on sentimental appeal. (Peer feedback noted this emotional plea.) In the final draft, the student partially corrected it: passionate language about the "spirit of the sport" remains, but it is balanced by concrete reasoning (e.g. noting how sponsors might abandon teams in scandals, harming the team's reputation). The argument now includes evidence of potential harm, not emotion alone.

3. Student 3: *False Cause* (Presumption)

   The essay asserted that a team's championship win "directly caused" by a new sponsor's funding (post hoc fallacy assuming correlation equals causation). (Peer feedback flagged this false cause.) In the final draft the student corrected it, softening the claim: the win is presented as having sponsorship as a *"major factor"* rather than the sole cause, and acknowledging that sponsorship "isn't the only ingredient in success".

4. Student 4: *Ad Hominem* (Relevance)

   The draft attacked sponsors' character, calling companies "greedy" and saying they "couldn't care less about the sport" instead of addressing the idea of sponsorship. (Peer feedback identified this personal attack.) In revision the student removed the insults, correcting the fallacy by focusing on sponsors' actions (e.g. noting sponsors view deals as marketing and may abandon teams in controversy) without name-calling.

   Appeal to Tradition (Relevance)

   The draft argued that because "for decades, sports thrived…without plastering corporate logos everywhere," the traditional, sponsor-free way is best. (Peer feedback noted this appeal to tradition.) The final draft partially corrected it: the

student still extols the *"traditional spirit"* of sports but now adds reasoning (e.g. sponsors can cause reputational risks, and that *"time-honored"* community support can also drive success). By providing rational justifications for the traditional approach (health, values, longevity of careers), the reliance on tradition is no longer the sole argument.

5. Student 5: *Bandwagon* (Relevance)

   The essay claimed that since "almost every major sports team" has sponsors, any team that refuses sponsorship "risk[s] falling behind", implying popularity equals correctness. (Peer feedback highlighted this ad populum fallacy.) In the final draft, the student addressed it by explaining *why* sponsorship is prevalent: detailing the concrete benefits (funding for facilities, exposure, etc.) that give sponsored teams a competitive edge. The revised argument still notes that virtually all top teams have sponsors, but this is now presented as evidence of effectiveness *with supporting reasons*, not just "everyone does it" logic. (This is a partial correction because the bandwagon phrasing remains, but it's bolstered by logical justification, reducing the fallacious implication.)

6. Student 6: *Straw Man* (Relevance)

   The first draft exaggerated the opposing view, claiming proponents of sponsorship think money is a "magic fix" and care little for skill or strategy. This misrepresentation (painting the pro-sponsorship side as extreme) was flagged by the peer as a straw man. The student corrected it in the final draft by representing the opposition more fairly: acknowledging that advocates *"celebrate the extra funds"* but might overlook some downsides, rather than accusing them of outright ignoring hard work.

   Appeal to Emotion (Relevance)

   The draft relied on emotional language about losing *"the sport's soul"* to commercialization and how renaming a stadium made supporters feel their tradition was "sold off," aiming to provoke anger or sadness. (Peer feedback noted this pathos-heavy approach.) In the revision, the student partially corrected this: the final still voices concern that excessive sponsorship can *"affect the fan experience"* and *"some supporters feel a piece of tradition has been lost"*, but these emotional points are now coupled with factual arguments (e.g. the risk of fans disengaging, or the team's

identity being harmed). Thus, the emotional appeal is supported by logical consequences, reducing its fallacious nature.

7. Student 7: *Appeal to Authority* (Relevance)

   The essay leaned on authorities, noting that "officials from UEFA…have openly stated" that without sponsors success is impossible, urging readers to "trust their judgment" as experts. This uncritical reliance on authority was flagged by the peer. In the final draft, the student corrected it by incorporating explanation and evidence: the revised argument still cites experts (UEFA officials, famous coaches) but goes further to explain how sponsorship funds improve training and why these experts believe in its importance. The student also notes that coaching philosophies vary, and even top coaches stress balancing funding with other factors, instead of implying the authorities must be right by default.

8. Student 8: *Hasty Generalization* (Presumption)

   The draft generalized from a few examples of sponsorship problems that sponsorship *"almost always"* leads to trouble, claiming "inherent danger" in these deals.

   For instance, a single scandal was taken as "clear" proof that corporate sponsorship is a bad idea. (Peer feedback explicitly identified this as a hasty generalization.) The student corrected it in the final draft by qualifying and contextualizing the claim: they acknowledge *"not every partnership ends in scandal or fan revolt,"* but emphasize that risks do exist and should be considered. The revised argument stops short of claiming "almost always" failure, and instead reasonably argues that even *some* high-profile failures show teams must weigh potential downsides.

   Appeal to Emotion (Relevance)

   The draft's tone was highly emotional, describing *"outraged"* fans and *"broken spirits and lost childhoods"* of athletes to condemn pushing kids too hard (combining the youth sports topic). (Peer feedback cautioned about the heavy emotional imagery.) In the revision, the student partially corrected this by introducing survey data (e.g. citing that many kids quit due to burnout) and noting *specific* harms (injuries, anxiety), not just emotional anecdotes. The personal story of the miserable child athlete remains as an example, but it's surrounded by logical evidence, so the emotional appeal is grounded in facts rather than standing alone.

9. Student 9: *False Analogy* (Ambiguity)

The essay argued that accepting a sponsor "is not the sinister act some make it out to be and it's really no different from a student accepting a scholarship", equating corporate sponsorship with an academic scholarship. This analogy ignores key differences (a corporate sponsor seeks profit/advertising, unlike a charitable scholarship). (Peer feedback flagged this faulty comparison.) In the final draft, the student corrected it by acknowledging the differences: they still use the sponsorship-scholarship analogy as an illustration but explicitly note that a company does get promotion in return, whereas scholarships usually don't seek profit. They then carefully justify the parallel: both involve conditions and support that helps the recipient succeed. By clarifying the analogy's limits and highlighting why the traditional support model is comparable (e.g. conditions on both sides), the fallacy is resolved.

10. Student 10: *Appeal to Emotion* (Relevance)

    The draft was charged with moralistic language, claiming sponsors "sell the soul of the team to the highest bidder" and that success gained by "trading away honor isn't true success… it's a hollow victory". This impassioned plea aimed to make readers feel that sponsorship is shameful. (Peer feedback noted the over-reliance on *"very emotional imagery"*.) In the final version, the student toned down the rhetoric: they still stress integrity and "core values," but use a more measured tone (e.g. *"success attained by compromising a team's core values can feel like a hollow victory"*). They also pair the emotional appeal with logical concessions, noting that success and values are *not* mutually exclusive and that moderate cooperation can exist.

    Straw Man (Relevance)

    In the first draft, the student asserted that proponents *"talk as if…victory and funding are the only things that count, ignoring the heart and tradition"*, painting supporters of sponsorship as caring only for money and not "the spirit of the sport". This exaggerated characterization was called out as a straw man by the peer reviewer. The student corrected it: the final draft explicitly says, *"It's not that coaches who push harder don't care about kids; most do care…The question is about method"*, thus fairly acknowledging the other side's good intentions.

    False Dichotomy (Presumption)

The draft argued that sponsors' advocates present *"a false choice designed to scare teams" "either accept corporate money or languish in failure"* and at times the student's own phrasing leaned into that binary (success *vs.* integrity). (Peer feedback noted this either/or framing and praised the student for rightly calling it out, while advising them to keep language balanced.) In the final draft, the student reinforced the correction, emphasizing *"the choice isn't all-or-nothing…there's a middle ground"* where teams can succeed and uphold values. They removed any implication that caring about principles means accepting failure, stressing that one can *"care about success while setting limits on what one will sacrifice for it"*.

11. Student 11: *False Dichotomy* (Presumption)

    The original essay insisted "you either commit fully and train rigorously now, or you resign yourself to mediocrity…There is no middle ground if the goal is to be the best". This presents youth training as an either/or ultimatum (all-in vs. fail). (Peer feedback highlighted this fallacy.) In the final draft, the student corrected it by explicitly rejecting the either/or framing: they acknowledge that *"it's not strictly true that one must choose between 'all or nothing',"* and that young athletes *"can train hard and still find some balance"*. The revision adds that while serious practice is needed, it *"doesn't mean [children] must forfeit all aspects of a normal childhood"*, thereby restoring the "middle ground".

12. Student 12: *Appeal to Emotion* (Relevance)

    The first draft opened with "*It's heartbreaking to see what happens when children are pushed beyond their limits*", recounting an anecdote of a talented girl driven to quit in tears. The essay painted a dire emotional picture (*"the joy is drained… the child ends up burned out or injured"*) to argue that pushing kids is *"fundamentally wrong for all kids."* (Peer feedback noted the heavy use of a *"sad personal story"* and imagery of miserable children.) In the final draft, the student tempered this emotional appeal with empirical support: after the anecdote, they present survey statistics (e.g. many kids drop out by early teens citing burnout) and discuss the issue in broader terms. The line *"pushing young athletes too hard almost always backfires"* was revised to a more cautious claim (*"can often do more harm than good"*), showing improvement. The emotional example remains, but it's now accompanied by logical evidence, making the appeal more legitimate.

Hasty Generalization (Presumption)

The draft claimed, "one talented kid after another ends up hating the sport…shows the approach is fundamentally wrong for all kids", and *"constant hard pushing…produces broken spirits and lost childhoods"*. From a few examples, it concluded *all* kids are harmed. (Peer feedback flagged the *"almost always"* and *"in almost every case"* wording as a hasty generalization.) The student corrected this by softening the language: the final draft notes *"many"* children struggle or quit under extreme pressure but also admits *"not every young athlete who trains seriously ends up unhappy and some do thrive"*. The conclusion now emphasizes caution and individual differences rather than blanket condemnation.

13. Student 13: *Bandwagon Appeal* (Relevance)

    The essay argued that "in countries known for sports success, early intensive training is the norm. It's a bandwagon that serious athletes must jump on or risk being left behind", since *"virtually all top programs push their youth athletes hard – and that's precisely why they produce top results."*. This essentially says, "everyone is doing it, so we must too." (Peer feedback pointed out the *ad populum* fallacy.) In the final draft, the student corrected it by reframing this claim: they still note that intensive youth training is *common* in successful programs, but they stop short of saying it must be copied *because* it's common. Instead, they explain that *"when competitors are regularly putting in extra hours, a child who may find themselves at a disadvantage"* – focusing on the competitive logic rather than the popularity. They even add, *"The idea is not to 'follow the crowd' blindly, but to recognize that sustained effort from an early age can help unlock potential."*. This addresses the fallacy by giving a rational cause-effect rationale. *Overgeneralization* (Presumption) The draft made sweeping statements like "nearly every star athlete's story involves intense training from a young age, so the formula clearly works", implying all champions were pushed early. It also asserted *"those who do [become Olympians] almost always look back and credit their demanding early training"*. (Peer feedback cautioned about words like *"virtually all"* and *"every star athlete"*.) The student adjusted these claims: in the final draft, they use qualifiers such as *"many Olympic champions…began rigorous practice when they were young"* instead of "all," and acknowledge that early training is one factor among others. For example, they write

"Early, rigorous training can help…achievements later on" but also note *"talent, good coaching, and personal drive all play roles"* in success. This moderation removes overgeneralization.

14. Student 14: *Slippery Slope* (Presumption)

    The draft implied that pushing children too hard inevitably leads to serious harm: it cited cases of youth athletes with "knees of a much older person", *"anxiety, depression,"* and said with no balance *"all it takes is one injury or failure for their world to collapse"*. This suggests an extreme, almost unavoidable chain of bad outcomes. (Peer feedback noted this as a bit of a slippery slope, since *"not every intense training lead to such dire outcomes"*.) In the revision, the student qualified these claims: they still warn of high risks but add *"Not every child who trains intensively will suffer these outcomes and some handle the load fine but the risks increase when balance and rest are neglected"*. They explicitly state *"if training is so intense it breaks a child's spirit or body, it's too extreme"* focusing on conditional harm rather than an automatic slide to ruin.

    Hasty Generalization (Presumption)

    The essay argued that "most sports legends from the past" were raised with balanced training and thus *"the old-school way"* is proven best, claiming plenty of champions emerged without modern intensity. It offered a single example of an 11-year-old swimmer who burned out, generalizing that the outcome to a rule. (Peer feedback warned against broad claims like *"plenty of gold medals…without today's intensity"* without specific evidence.) The final draft scales back these assertions. It still celebrates the traditional approach but says *"many of those past athletes became legends without today's hyper-engineered programs"* and explains *why* the old methods were effective (e.g. *"playing multiple sports can improve overall skills…and having time for unstructured play can keep passion alive"*). By providing these concrete reasons and avoiding absolute terms, the student removes the unfounded generalization that the traditional way is automatically superior for *all* cases.

15. Student 15: *Hasty Generalization* (Presumption)

    The draft cited a few famous cases (Tiger Woods as a toddler golfer, the Williams sisters' intensive childhood training) and concluded that "so many Olympic

medalists…began intense practice [early]…These examples show that pushing kids to excel early leads to extraordinary achievements later".

This reasoning jumps from *some* success stories to a general principle. (Peer feedback flagged this leap: *"for every example like that, there are others who succeeded with different paths"*.) The student revised the claim to be more measured. The final draft notes early training is a *"common theme in many success stories"* but stops short of saying it always leads to success. They add that not every young athlete becomes a champion, but those who did often credit early training for giving an edge which is a more nuanced statement that doesn't guarantee the outcome for all.

Appeal to Authority (Relevance)

The original argument leaned on the implicit authority of champion athletes' experiences as *proof* (e.g. *"those who do [become champions] almost always look back and credit their demanding early training"*, citing star examples as if that settles the debate). (Peer feedback noted that referencing famous champions is fine but should not be treated as proof by itself.) In the revision, the student clarified why early training can be beneficial (skill development, muscle memory, work ethic) instead of implying it's true *because* champions said so. They still mention examples (William's sisters practicing from young age) but follow it with analysis: *"This example suggests high expectations and intensive practice in youth can contribute to later success…provided it's done supportively and safely"*. By doing so, the argument relies on logic rather than the authority of champions alone, mitigating the fallacy.

16. Student 16: *Ad Hominem* (Relevance)

    The draft harshly criticized adults who push kids, declaring "Only a selfish or delusional adult" would subject a child to boot-camp style training, and calling that attitude *"borderline abusive"*. This personal attack on proponents' motives (selfish, ego-driven) was noted by the peer reviewer as ad hominem. In the final draft, the student removed the insults and focused on the practice, not the people: they write that such intense routines *"might be well-intentioned… but can be counterproductive"*, and stress *"the focus should be on the child's development and enjoyment, not just on winning at all costs"*. The revised tone is critical of the method without name-calling the adults, thus correcting the ad hominem.

False Analogy (Ambiguity)

In condemning extreme training, the draft stated, *"Forcing a 10-year-old to train like an Olympian is as unreasonable as expecting a middle school student to handle a full-time job."*. This analogy equates intensive sports training with child labor, which may be a stretch. (Peer feedback suggested focusing on real developmental differences rather than a hyperbolic analogy.) The student omitted the explicit analogy in the final draft. Instead of that comparison, they directly explain that *"children are not small adults, their bodies and minds are still developing. Expecting a 10-year-old to train at the level of an Olympian is not reasonable or healthy."*. By dropping the "full-time job" analogy and stating the point plainly, the fallacy is eliminated.

Red Herring (Relevance)

The draft preemptively labeled the argument that intense training builds discipline as *"a red herring… kids can learn those qualities…without extreme pressure"*.

While the student may have had a point, dismissing the discipline argument as irrelevant sidestepped engaging with it. (Peer feedback noted that calling it a red herring outright might dismiss a legitimate point.) In the final draft, the student addressed the discipline issue directly instead of calling it irrelevant: *"We can agree that discipline is important, and the disagreement is about the method. A balanced approach can still teach commitment…e.g. a child can attend regular practices and work hard, and still have time for family, school, and rest."*. They add that caring about a child's well-being *"doesn't mean [we] don't care about winning"*, countering the notion without dismissive labels. This change corrects the red herring by engaging with the content of the counterargument.

17. Student 17: *Straw Man* (Relevance)

    The essay opened by accusing the "push hard" camp of a straw man: *"They claim we 'don't care about winning'…That's simply not true."* However, in doing so the student's own language veered into a straw man: describing coaches as "terrorizing children with pressure" and *"yelling in their face daily"*, implying opponents advocate abuse. (Peer feedback pointed out that this portrayal *might* be unfair – most strict coaches still care about kids, they don't literally intend to "terrorize" 24/7.) In the final draft, the student adjusted their tone. They still refute the false claim that

advocates of balance "don't care about winning," but they remove or soften the loaded terms about the other side. For example, they acknowledge *"it's not that coaches who push harder don't care…The question is about method. A supportive yet challenging approach can motivate children effectively, whereas an overly harsh approach might backfire"*.

This presents the opposing side's perspective more charitably (they likely believe they're helping) and thereby corrects the straw man.

Appeal to Fear (Relevance)

The original draft used vivid phrases like *"victims of an overzealous pressure cooker environment"* and described children *"living in fear"* of relentless coaches, which was designed to instill fear about intensive training. (Peer feedback noted this dramatic language as an appeal to fear, advising focus on reasoning like burnout rates rather than "scary labels".) In the revision, the student balanced this out. They still caution against *"an environment of extreme pressure"*, but they immediately clarify that the alternative is not "no discipline at all" but *"a middle ground where kids are highly focused and competitive because they want to excel, not just because they're afraid of being scolded"*. They also shifted emphasis to positive motivation (passion for the sport) instead of fear. By doing so, the argument now appeals more to common sense and evidence (noting, for instance, that *"confident, healthy, and motivated [athletes] often achieve more than those who are simply fearful or exhausted"*) rather than to fear of worst-case scenarios. This corrects the original fear-based appeal.

18. Student 18: *Straw Man* (Relevance)

    The draft criticized proponents of early pressure for *"holding up one pattern as gospel"* and *"ignoring these facts"* about late bloomers, implying the "hard pushers" reject any evidence of alternative paths. This characterization paints all advocates of intense training as if they deny data, which may not be universally true. (Peer feedback cautioned not to *"caricature the opposing side"* and assume *bad faith*, since some early-training proponents *"do acknowledge balance but still favor early push"*.) In the revision, the student refined their language by presenting the evidence for late bloomers and multiple paths (citing sports science studies on burnout and examples like Roger Federer's later specialization) without directly attacking the

other side's motives. The students noted *"coaching philosophies vary"* some coaches push early; others favor gradual development rather than saying the early-push camp *"ignore data"*. This change removes the straw man element and makes the argument about *evidence* rather than personalities.

Appeal to Authority (Relevance)

The student rightly warned against *"blindly following"* authoritative coaches' mantras like *"Coach X says you must start at 5 A.M. every day, so it must be true."* However, peer feedback reminded them not to dismiss expert coaches entirely and to acknowledge that experts have differing views. In the final draft, the student struck a balance by pointing out that *"even many top coaches now recognize that quality of practice and respecting a child's limits are important"*, indicating that not all authorities support extreme training. The student explicitly said, *"Coaching philosophies vary some emphasize early rigor, while others prioritize gradual development"*. By doing so, the student doesn't dismiss authority outright but rather show that authoritative opinion is *split*, reinforcing their argument with the fact that experts themselves are not unanimous in favor of early grinding. This approach nullifies any appeal-to-authority fallacy on either side by focusing on empirical outcomes and expert consensus (or lack thereof) rather than treating any one coach's view as gospel.

19. Student 19: *Appeal to Tradition* (Relevance)

    The essay explicitly framed its argument as an "appeal to tradition", claiming the *"old-school"* methods worked for past legends: *"for generations, young athletes learned…through steady practice, not extreme pressure…we don't need to reinvent the wheel"*. It argued *"the traditional route produced plenty of gold medals…without today's intensity,"* implying older methods are best by virtue of being traditional. (Peer feedback flagged this fallacy: *"Tradition alone isn't proof. Maybe mention why those past methods were effective."*.) In the final draft, the student addressed it by providing concrete reasons behind the tradition. They still highlight the past (*"many sports heroes of the past played multiple sports or had an off-season to recharge"*) but then explain *how* those practices benefited athletes (e.g. multi-sport play improved overall athleticism, unstructured play kept passion alive). They explicitly note they are not saying *"old ways are automatically better"*, only that classic

methods *"built champions while also allowing kids to have more balance"*. By grounding the appeal to tradition in logical benefits and avoiding "old = good by default," the fallacy is corrected – tradition is presented as evidence *with rationale*, not as an intrinsic proof.

Hasty Generalization (Presumption)

The draft made broad statements like "most sports legends from the past didn't have hyper-engineered childhoods" and *"Sometimes, the old way truly is the best way"*, implying a universal truth from historical anecdotes. (Peer feedback warned against sweeping claims about *"most legends"* and *"plenty of champions,"* advising to avoid unqualified "all" statements.) In the revision, the student softened these generalizations. For example, they write *"many of those past athletes became legends without today's programs"* (instead of "most") and emphasize *"we shouldn't dismiss those ideas as outdated without considering why they worked"*. The conclusion says traditional methods *"have a track record"* and *"can still be valuable today,"* but stops short of claiming they are always superior. These revisions present the historical evidence as suggestive and complementary to modern methods (even advocating combining *"time-tested wisdom with modern knowledge"*), thereby avoiding overgeneralization.

20. Student 20: *False Dichotomy* (Presumption)

    The essay noted that the debate is often framed in extremes: "either you drive kids ruthlessly or you 'baby' them and they fail", explicitly calling this a "false dichotomy" and arguing for an obvious middle ground. The student themselves identified this fallacy in the prompt's discourse. (Peer feedback agreed and urged them to keep their own language balanced when refuting this false "push or fail" narrative.) In the final draft, the student stays consistent: they underline that *"the choice…isn't simply between pushing hard and winning or being gentle and losing"*, and *"it's time to move past the false 'push or fail' narrative and embrace a more balanced approach"*. By maintaining this stance, the student not only avoided the dichotomy in their own argument but also effectively debunked it.

    Appeal to Emotion (Relevance)

    The draft used a poignant anecdote: *"no trophy is worth a broken child"*, describing a *pre-teen in tears with ice packs on both knees* after hours of scrimmage. This

visceral image and statement appeal strongly to readers' compassion. (Peer feedback acknowledged its power but cautioned not to rely solely on it, and to also show that a balanced approach can *still* lead to "trophies".) In the final version, the student kept the emotional example (it still describes seeing the child in tears and asks *"will that level of grind…make them hate the sport?"*), but crucially they followed it with logic: *"Experiences like that raise a crucial question: will that level of grind make the child a star, or simply make them hate the sport?…if training is so intense it breaks a child's spirit or body, it's too extreme."*. They then stress that *"confident, healthy, and motivated [athletes] often achieve more than those who are simply fearful or exhausted"*. By combining the emotional appeal with reasoned argument about outcomes, the emotional appeal becomes a compelling illustration rather than a fallacy. The final note *"Success can come alongside smiles…not just as a result of stress"* encapsulates the balance of pathos and logos. Thus, the fallacy is addressed that the sentiment and the solution are presented hand in hand.

Across the 20 Week 6 essays, a total of 35 fallacies were identified in the first drafts. Fallacies of Relevance were the most common (20 instances, ~57%), followed by Fallacies of Presumption (13 instances, ~37%). Fallacies of Ambiguity were rare (2 instances, ~6%).

Table 8 summarizes the number of fallacies detected in first drafts and how many were corrected in the revised drafts for each category.

Table 8

Frequency of Fallacies by Category in Week 6

Fallacy Category	Detected in First Drafts	Corrected in Final Drafts
Presumption	13	13 (100% corrected)
Relevance	20	18 (90% corrected)
Ambiguity	2	2 (100% corrected)

Most errors were addressed after peer review, as shown in the second chart. Fallacies of Presumption (e.g. unwarranted assumptions like false dilemmas, slippery slopes) were all corrected in the final drafts. Students responded to feedback by adding qualifiers, considering exceptions, or rephrasing claims to eliminate the unwarranted presumptions.

Fallacies of Relevance had a ~90% full correction rate; in a couple of cases, students still employed partially fallacious reasoning (for instance, one student continued to use a bandwagon appeal, though tempered with evidence, and another maintained an emotional anecdote alongside logical argument). However, even these were mitigated to the point that the overall argument was no longer undermined by the fallacy. Fallacies of Ambiguity, though few, were fully corrected that students either removed misleading comparisons or clarified their meaning to avoid ambiguity.

The high correction rates underscore the effectiveness of the peer feedback process in Week 6. Many fallacies were explicitly pointed out by peer reviewers (as noted in the analysis above), and students revised those issues. Particularly, simplistic "black-or-white" assertions and sweeping generalizations were readily improved when peers flagged them. For example, Student 11's "no middle ground" claim was directly revised into a balanced statement once the peer drew attention to the false dichotomy, and Student 8's broad *"almost always backfires"* claim was toned down after feedback on its hasty generalization. Students appeared receptive to critiques of logic, often reworking entire sentences to be more precise and reasoned.

To illustrate how the most frequent fallacies were handled, this section presents a few representative cases from Week 6:

- Hasty Generalization (Presumption) *Example:* Student 8's first draft argued that *"pushing young athletes too hard almost always backfires…instead of producing champions, it produces broken spirits"*. This conclusion was drawn from a handful of anecdotes and a cited statistic, generalizing failure as the near-certain outcome. In the peer feedback, this was flagged as an overgeneralization, noting that *"a few bad cases don't prove that most sponsorships end poorly"* (or in this context, that most child athletes fail). In the revised draft, the student moderated the claim: *"pushing child athletes too hard can often do more harm than good"* a careful wording that acknowledges frequent negative outcomes without implying all cases end badly.

  They also added survey data on youth sports dropout rates to support the claim. This way, the fallacy was corrected by narrowing the scope of the claim and buttressing it with evidence, transforming an unwarranted generalization into a credible argument.

- Appeal to Emotion (Relevance) *Example:* Student 12's original essay opened with a heart-rending anecdote of a 12-year-old athlete driven to tears daily by overtraining, concluding *"ruining [childhood] for a slim chance at a trophy is never worth it."* This immediately pulls at the reader's emotions (pity and outrage). While compelling, the argument initially relied almost entirely on pathos. The peer reviewer praised the story's impact but encouraged the student to *"include objective reasoning or data alongside emotional examples"*. In the final draft, the student integrated logical support: after describing the crying child, they cited that *"surveys have found many kids drop out…often citing burnout or lack of fun"*. They then reasoned about burnout and injuries increasing under extreme regimes. The revised conclusion still appeals to empathy (protecting children's well-being) but also invokes a principle: *"Success in youth sports should be measured not only by wins…but by children's health, enjoyment, and growth"*, which is a value claim supported by both emotion and reason. This blend of pathos with logos demonstrates how the fallacy was rectified, but it no longer stands alone as the sole support. The essay now persuades with evidence and principle, not just sympathetic sentiment.
- Straw Man (Relevance) *Example:* Student 17's essay highlighted that proponents of intense training sometimes misrepresent the balanced approach as *"letting kids slack off"* or *"not caring about winning"*, calling that a *"classic straw man tactic."* In doing so, however, the student initially veered into their own straw man by accusing the opposing side of *"terrorizing children with pressure"* an extreme portrayal suggesting all strict coaches are virtually abusive. The peer reviewer noted this and advised representing the other side's intentions more fairly (most tough coaches *"would say they also care about kids"*, even if their methods are harsh). In the revised draft, the student struck this balance: they explicitly wrote, *"It's not that coaches who push harder don't care about kids; most do care and believe they're helping. The question is about method."*. They conceded the opponents' good intentions, then argued that *"an overly harsh approach might backfire by creating stress or fear,"* whereas a supportive approach can motivate effectively. By doing so, the student removed the straw man elements from their own argument. The opposing view is no longer a caricature of villainous coaches "crushing" kids, but a reasonable stance that the student disagrees with on methodological grounds. This correction greatly

increased the ethos and fairness of the essay, making its critique of the straw-man fallacy even more powerful.

By Week 6, the participating pre-service teachers demonstrated a marked improvement in logical reasoning within their argumentative writing. The frequency of fallacies in first drafts was lower than in earlier weeks (Weeks 4 and 5), and importantly, the peer review process led to the remediation of most detected fallacies. As shown above, fallacies of presumption and ambiguity were eliminated in revisions, and over 90% of relevance fallacies were fully or partially corrected. These results reflect a maturation of the students' argumentative skills and suggest that the explicit fallacy-focused instruction coupled with guided peer feedback is yielding tangible benefits in writing quality. Notably, fallacies of relevance remained the most common issues in initial drafts, mirroring the tendencies seen in Weeks 4–5. Students often slipped into appeals to popularity, emotion, or misrepresenting counterarguments likely because these rhetorical moves can be subconsciously persuasive or stem from ingrained writing habits. For instance, emotive language ("heartbreaking," "selling the soul of the team") was frequently used to passionately argue a point. However, by Week 6 the students showed an ability to harness emotional appeals more judiciously, converting them into persuasive elements rather than logical fallacies. In final drafts, emotional anecdotes were usually supplemented with logical reasoning, indicating a developing understanding that pathos must be supported by logos in academic argumentation. This aligns with the pedagogical emphasis on balancing persuasive appeal with sound reasoning, as described in the thesis methodology which students were learning to maintain the "heart" in their writing while also employing their "head."

The near-total correction of fallacies of presumption is particularly significant. Early in the intervention (Week 4), students struggled with sweeping generalizations and false dilemmas born of oversimplified thinking. By Week 6, such errors, when they did appear, were quickly recognized and fixed. This suggests that the fallacy awareness training has fostered a habit of self- and peer-critique regarding unwarranted assumptions. Students became more adept at spotting when a claim was too absolute (e.g. "must always" or "never"), and they learned to introduce nuance by using qualifiers ("often," "some," "can") or acknowledging exceptions. This outcome supports the study's hypothesis that explicit instruction improves students' ability to construct and revise logically sound arguments. The fact that every

presumption fallacy was addressed in the final drafts speaks to a substantial gain in critical thinking precision among the cohort.

Another important finding is the role of peer feedback in driving these improvements. In nearly every case, the fallacies that were corrected had been explicitly identified in peer comments. This indicates that peers were largely successful in applying Engel's taxonomy to each other's work, and their critiques provided clear direction for revision. In turn, students trusted and acted on this feedback. The pedagogical design, which is having students exchange papers with a fallacy checklist, seems to have cultivated a collaborative environment where learners served as each other's logical editors. This collaboration likely reinforced the fallacy concepts for both reviewer and writer, echoing findings in peer learning literature that teaching or evaluating a concept helps solidify one's own understanding of it. By Week 6, the class had established a shared critical eye for reasoning errors, which is a major pedagogical achievement. It's worth noting that even subtle fallacies (e.g. *appeal to tradition* or *weak analogy*) were caught in peer review, showing a breadth of understanding beyond just the "big" fallacies.

The instructional cycle outlined in the thesis, where Weeks 4–6 involved iterative drafting, peer review, and revision focused on argument quality clearly benefited the students by Week 6. The findings suggest a positive cumulative effect: having gone through this cycle in Week 4 and Week 5, students in Week 6 approached their drafts with greater initial awareness and were more adept at implementing feedback. The high correction rate of logical fallacies in Week 6 second drafts implies that students were not only dependent on teacher intervention but could rely on peer feedback and their own growing skills to improve their writing. This addresses the research question regarding peer review's impact: the evidence here shows that peer review, when focused on logical coherence, significantly contributed to fallacy reduction in essays.

From a pedagogical standpoint, these Week 6 outcomes are encouraging. They demonstrate that the integrated approach of explicit fallacy instruction + peer review is helping students internalize critical thinking practices. In the context of ELT education, where writing courses traditionally emphasize grammar and organization over reasoning, this intervention has shifted some attention to argumentation quality – and students have risen to the challenge. By Week 6, the pre-service teachers were crafting arguments that were not only more persuasive but also more logically sound. For example, instead of writing *"virtually all*

champions did X, so X is necessary," a student would now write, *"many champions did X, which suggests it can be beneficial, though other factors also contribute."* Such nuanced argumentation marks a clear improvement in critical writing skills.

In summary, the Week 6 analysis finds that logical fallacies in student essays were greatly reduced through iterative practice and feedback. Presumption and ambiguity fallacies were virtually eliminated in final drafts, and relevance-based fallacies were mostly rectified, with students finding a better balance between emotional appeal and factual argument.

4.1.3.4. Fallacies in Week 7 First Drafts and Revisions by Students

In Week 7 argumentative essays, a total of 33 logical fallacy occurrences were identified. These fallacies spanned Engel's (1982) three categories: Presumption, Relevance, and Ambiguity. Table 9 summarizes the frequency of fallacies by category in Week 7, and Table 10 details the frequency of specific fallacy types. The Week 7 data show a nearly even split between fallacies of Presumption and Relevance, with only a couple of instances falling under Ambiguity.

Table 9

Frequency of Fallacies by Category in Week 7

Fallacy Category	**Occurrences (Week 7 First Drafts)**	**Percentage**
Presumption	15 instances	45%
Relevance	16 instances	49%
Ambiguity	2 instances	6%
Total	**33**	**100%**

Table 9 suggests that fallacies of relevance were the most common in Week 7 first drafts, comprising 49% of all identified instances. Fallacies of presumption followed closely at 45%, while ambiguity-related fallacies were relatively rare, accounting for only 6%.

Table 10

Frequency of Specific Fallacy Types

Fallacy Type (Category)	Count	Example Occurrence
Slippery Slope (Presumption)	6	*"If one language dies, eventually every minority culture will lose its voice and disappear."* (S1) an unsupported chain reaction claim.
Appeal to Emotion (Relevance)	6	*"Describing a dying language as 'like a priceless library burning down'..."* (S1) using emotive imagery to sway the reader.
Straw Man (Relevance)	5	*"Those who want to save small languages are just 'resisting progress for nostalgia's sake.'"* (S4) misrepresenting proponents' position.
Hasty Generalization (Presumption)	4	*"Students who learn in their native tongue perform better, so losing a language harms education everywhere."* (S11) broad claim from limited evidence.
False Dilemma (Presumption)	2	*"Either we accept that languages die, or we force communities to stop modernizing."* (S2) presenting only two extreme options.
Oversimplification (Presumption)	2	*"One common language will automatically lead to a more connected and peaceful world."* (S15) simplifying a complex issue and assuming a single cause/effect.
Appeal to Tradition (Relevance)	2	*"We have a duty to preserve languages because they are tied to our ancestors."* (S3) arguing from tradition/history as sole justification.
Bandwagon Appeal (Relevance)	2	*"Everyone is jumping on that trend of speaking major languages, so it must be the best choice."* (S4) assuming popularity implies correctness.
Appeal to Nature (Relevance)	1	*"Language disappearance is natural, so it's not as catastrophic as people think."* (S2) arguing that "natural" implies acceptable.
False Analogy (Ambiguity)	1	*"A society with hundreds of languages is like a toolbox full of varied tools… losing languages is like losing tools."* (S12) an imperfect analogy that may mislead.
False Equivalence (Ambiguity)	1	*"Losing a language is the same as the complete death of a culture."* (S14) equating two things that are not truly equivalent.
"No True Scotsman" (Presumption)	1	*"You cannot call yourself truly Irish if you don't speak Irish Gaelic."* (S6) redefining a category to exclude counterexamples.

As Table 10 shows, the most frequent fallacy types in Week 7 were Appeals to Emotion (6 instances) and Slippery Slope arguments (6 instances each, ~18% of all fallacies per type). These were followed by Straw Man misrepresentations (5 instances) and Hasty Generalizations (4 instances).

In total, fallacies of Presumption accounted for 15 instances (e.g. slippery slope, hasty generalizations, false dilemmas, etc.), Relevance for 16 instances (e.g. emotional appeals,

straw men, appeals to popularity/tradition), and Ambiguity for only 2 instances (both involving misleading comparisons). In other words, roughly half of the fallacious arguments in Week 7 fell into each of the first two categories, while ambiguous wording fallacies were rare. This pattern aligns with expectations: students were more prone to errors in logic (e.g. unsupported assumptions or irrelevant appeals) than to errors stemming from linguistic ambiguity. Notably, no classic equivocations were observed in Week 7 essays, the two Ambiguity category cases were false analogies/equivalences, where students drew misleading comparisons.

4.1.3.4.1. Fallacies of Presumption

Fallacies of Presumption were abundant in Week 7 drafts, constituting about 45% of all identified fallacies (15 out of 33). These errors involve unsupported assumptions or leaps in logic. The most common presumption fallacies were Slippery Slope arguments (6 instances) e.g. *"If one language dies, eventually every minority culture will … disappear"* (Student 1 first draft) which assume a chain of dire consequences without evidence. In their first drafts, several students tended to extrapolate extreme outcomes from a single event (language loss) without logical support. For example, one essay warned that *"if many languages continue to die out, … the human cultural landscape will become … uniform and less vibrant"*, painting an overly dire scenario of a "hushed and uniform" world (S8). Another student predicted *"in the most extreme scenario, one global language"* would remain (S20), implicitly suggesting an inevitable progression toward linguistic monoculture. These are unwarranted cause-effect chains typical of slippery slope fallacies. By the final drafts, students had mitigated such claims for instance, S1 revised *"every minority culture will disappear"* to a more cautious phrasing that *"language loss often leads to a reduction in cultural expression, even if the entire culture does not vanish,"* avoiding the slippery slope (see Table 3).

Another prevalent presumption error was the Hasty Generalization (4 instances in Week 7). Students sometimes drew broad conclusions from limited examples or without sufficient evidence. For instance, one essay claimed that *"students who learn in their native tongue perform better"* and thus language loss harms education universally (S11). This blanket statement, presented without context or citation, was flagged as over-generalized peer feedback. Similarly, Student 5 asserted that *because some concepts don't translate well, all*

knowledge from a lost language is gone forever, which is an overgeneralization (peer identified this as a hasty generalization in S5's draft). In revisions, students generally nuanced these claims, for example, adding qualifiers or acknowledging exceptions. S11, after peer comments, incorporated a reference to studies and limited the claim to *"studies suggest early education in a child's first language improves comprehension"* rather than implying all students in all cases perform better (correcting the hasty generalization in the final draft).

Other presumption fallacies were less frequent but notable. False Dilemma appeared in 2 essays: e.g. S2's draft stated, *"Either we accept that languages die, or we force communities to stop modernizing,"* framing language preservation as an all-or-nothing choice. Peers rightly criticized this *either–or* framing as ignoring middle grounds. "No True Scotsman" (1 instance) was seen in S6, where the student argued *"you cannot call yourself truly Irish if you don't speak Irish Gaelic,"* imposing an unjustified purity criterion on cultural identity. Oversimplification (2 instances) was also observed: for example, S15 optimistically suggested that a single lingua franca would *"lead to unity and peace,"* automatically resolving deep human divisions – a simplistic cause-effect assumption. In each case, the peer review feedback identified the flaw and recommended adding nuance or alternatives. Students responded by moderating their claims in second drafts (see Table 3). For instance, S2 removed the false dilemma phrasing and acknowledged that *communities can modernize while preserving language*, and S15 conceded that a common language "doesn't automatically create deep understanding", thus addressing the oversimplification.

Overall, by Week 7 second drafts most fallacies of presumption were corrected or mitigated. Students became more cautious about making sweeping claims or dire predictions. The pattern in our data, where hasty generalization and slippery slope were among the most common fallacies, is consistent with previous studies of EFL writing. Such errors stem from drawing conclusions with insufficient evidence or assuming outcomes without proof, a known challenge for novice academic writers. The substantial reduction of these errors from the first to final draft in Week 7 suggests that explicit instruction and peer alerts helped students recognize and avoid overly broad or speculative assertions.

4.1.3.4.2. Fallacies of Relevance

Fallacies of Relevance, which are persuasive tactics that are logically irrelevant or misleading, accounted for approximately half of the Week 7 fallacies (16 instances, ~49%). These mostly involved emotional appeals or distortion of opposing arguments rather than factual errors. The Appeal to Emotion was the joint-highest type of fallacy (6 instances). Many students used vivid metaphors or charged language to emphasize the importance of language preservation, inadvertently weakening the logical rigor of their arguments. For example, Student 1 likened losing a language to *"a priceless library burning down,"* evoking a sense of irrevocable tragedy. Another essay described language extinction as *"a quiet tragedy ... like losing a relative or a friend"* (S8) and spoke of *"the human soul"* being lost clearly aimed at readers' sympathies. While these analogies are emotionally powerful, they do not constitute evidence; peers flagged them as appeals to emotion that should be balanced with logical analysis. By the final drafts, students moderated their tone. S1, for instance, changed *"priceless library burning down"* to a slightly less emotive comparison (*"a library losing irreplaceable books"*), and added factual emphasis on heritage loss. S8 retained passionate language about cultural loss but removed the phrase *"hushed and uniform world"* and instead noted that *"the cultural landscape would be less vibrant"*, a more measured description. In general, students learned to temper emotional rhetoric with more objective language by Week 7 revisions, making their arguments more academically credible while still conveying concern.

Another common relevance fallacy was the Straw Man which is present in 5 of the Week 7 drafts. This involved misrepresenting a counterargument to easily refute it. For example, Student 4 characterized language preservation advocates as people who *"want to keep languages frozen in the past"* or are *"resisting progress for nostalgia's sake."* Proponents of preservation advocate for sustaining cultural heritage, not rejecting progress; the student set up an exaggerated opponent to knock down. Similarly, Student 13 wrote that *"some people passionately argue we must save languages at any cost, even force communities to keep an old language,"* a portrayal that peers noted is a straw man, most preservationists do not intend to force anything. These straw man fallacies were highlighted in peer feedback and subsequently corrected. In their revisions, students presented opposing views more faithfully. S4, for instance, removed the phrase "everyone is jumping on that trend" and the accusation of nostalgia, acknowledging that supporters of small languages are motivated by

valid cultural concerns (thus eliminating the straw man). S13 likewise dropped the "at any cost" rhetoric and acknowledged that preservation efforts should consider community desire (no longer attributing an extreme stance to the opposition).

Students also occasionally used appeals to popularity (Bandwagon) and appeals to tradition, each appearing twice in Week 7 drafts. In a Bandwagon example, S4 claimed *"since everyone is switching to major languages, it must be the right path,"* implying popularity as proof of value. Peer reviewers flagged this as the *bandwagon fallacy*, noting that widespread adoption does not automatically make something beneficial. An Appeal to Tradition was seen when S3 argued we have a *"moral duty"* to save languages simply because they carry ancestral heritage (implying that what is traditional is inherently right). While cultural heritage is important, relying solely on tradition for justification can be fallacious, which is a point peers made, suggesting the student also mention practical benefits. In final drafts, these appeals were adjusted. S3, for instance, kept the emphasis on heritage but added concrete benefits of preservation (e.g. knowledge and identity value), thus not resting on tradition alone. S4 balanced the "trend" argument by admitting that *global adoption of a language is driven by practical needs, not necessarily that abandoning minority languages is good.*

In summary, fallacies of relevance were substantially addressed in Week 7 revisions. Emotional appeals were toned down or supplemented with evidence, and mischaracterizations of opposing views were corrected to fair counterarguments. The students' ability to strike a better balance between persuasive language and logical support by Week 7 indicates growing awareness that *pathos* and misleading arguments cannot substitute for sound reasoning in academic writing. This represents a shift toward more relevant and fairer argumentation, a critical outcome of the intervention. It's worth noting that some use of emotional or rhetorical flourishes persisted (likely to reflect students' strong feelings about the topic of language loss), but these were generally kept in check so as not to overshadow the essays' logical structure.

4.1.3.4.3. Fallacies of Ambiguity

Fallacies of Ambiguity, which are errors arising from unclear or misleading use of language, were rare in Week 7 data. Only 2 instances (≈6% of total fallacies) fell in this category. Notably, we did not find any classic equivocation (double meanings) or amphiboly (grammatical ambiguity) in the students' writing. This suggests that by Week 7, students express their ideas clearly in literal terms, without the kind of wording mistakes that lead to ambiguity fallacies. The two cases identified were both faulty comparisons: a False Analogy in S12 and a False Equivalence in S14.

In S12's first draft, the student drew an analogy comparing linguistic diversity to a *"toolbox full of varied tools"*, implying that each language is like a unique tool and losing languages is like losing tools for thought. While vivid, this analogy was somewhat misleading because languages are not interchangeable with tools in a simple way and it risked oversimplifying the issue (the peer noted it *"might oversimplify the issue"* and cautioned against relying on analogies alone). In S14's essay, the student equated *losing a language* with *"the complete death of a culture,"* essentially treating them as the same. This was flagged as a false equivalence, since a culture can survive even if its language changes the relationship is not one-to-one. In both instances, the peers' comments (and likely the instructor's guidance) prompted revisions. S12 retained the toolbox metaphor in the revised draft but explicitly noted it as a limited analogy and then provided factual support about creativity and perspective loss to back the point (ensuring the argument *does not* hinge solely on the analogy). S14 softened the claim that an entire culture *"is effectively lost"* without its language, instead writing that culture will "change" and *lose some depth* but not vanish outright, thereby correcting the false equivalence (the final draft acknowledges cultures adapt, though imperfectly, through translation). These corrections indicate that students learned to clarify and qualify comparisons to avoid misleading implications.

Given the low occurrence of ambiguity-related fallacies, it appears that the instructional emphasis on clarity paid off that students generally avoided vague or equivocating language by Week 7. Most of their logical missteps were in content (relevance/presumption) rather than in wording. This aligns with Engel's observation that fallacies of ambiguity, while important to recognize, are less common in structured essay writing than fallacies of reasoning. The two comparison-based fallacies we did observe were promptly fixed once

identified. Overall, by Week 7 the participants were expressing their arguments in clearer terms and relying less on imperfect analogies or absolute equivalences.

A central aspect of this study was examining how peer feedback contributed to identifying and addressing fallacies in the writing. In Week 7, the peer review process proved highly effective: nearly all the fallacies present in first drafts were caught by peers and commented upon. Out of the 33 total fallacy instances in Week 7 first drafts, 32 (97%) were explicitly pointed out in the peer feedback forms. Peers showed strong awareness of the targeted fallacy types for example, labeling instances as "Slippery Slope," "Hasty Generalization," "Straw Man," etc., often with brief explanations (see Table 10). This comprehensive detection is a substantial improvement from earlier weeks (Week 4 peers, for instance, missed a number of subtler fallacies). By Week 7, after several rounds of practice, the students had become adept at reviewing each other's arguments critically for logical soundness. Common fallacies were not only noticed but correctly classified under Engel's taxonomy in the feedback (indicating internalization of the fallacy concepts). This suggests that the explicit training and repeated peer-review exercises fostered a shared understanding of what logical fallacies look like in writing. In fact, some students even preemptively identified weaknesses in their own drafts (e.g. one student wrote "this slippery slope suggests…" in her text, signaling self-awareness of a weak link, which the peer then echoed in feedback).

Crucially, peer comments led to concrete revisions. In Week 7 final drafts (revised after feedback), most fallacious passages were corrected or improved. Table 10 provides a summary of each fallacy identified, whether it was mentioned in peer feedback, and how it was addressed in the student's second draft. Out of 33 fallacy occurrences, 31 (94%) were fully corrected in the revised drafts, and the remaining few were at least partially addressed. In most cases, "corrected" meant the student either removed the fallacious statement or replaced it with a more reasoned, qualified one. For instance, when peers flag an overly extreme claim or false dichotomy, the student often rewrote that sentence to add nuance or acknowledge exceptions (as seen with S1, S2, S14, and others in Table 10). Emotional language was toned down following feedback, and unsupported generalizations were either bolstered with evidence or reformulated more cautiously. In a handful of cases, a fallacy that peers missed (or only indirectly hinted at) persisted in the final draft but such cases were rare by Week 7. One example was S2's subtle appeal to nature ("language change is natural")

which was not explicitly critiqued by the peer as a fallacy; consequently, the final draft still carries the notion that language loss is "natural" (though S2 did incorporate counterarguments about cultural loss, somewhat balancing the view). Overall, however, nearly every fallacy highlighted in feedback was successfully dealt with. This high correction rate indicates that students took peer comments seriously and were able to revise their reasoning accordingly. It also reflects a positive peer feedback culture: comments were concrete enough (often quoting the original fallacious sentence and naming the fallacy) to give writers a clear path for revision.

4.1.3.5. Longitudinal Comparison: Week 7 vs. Weeks 4–6

The improvements in Week 7 have become even more salient when compared to the results from Weeks 4, 5, and 6. Over the course of the intervention, there were clear trends of improvement in terms of overall fallacy frequency, the mix of fallacy types, and the effectiveness of peer feedback in fostering corrections. Figure 6 presents the overall fallacy frequency per week, and Table 4 summarizes key comparative metrics.

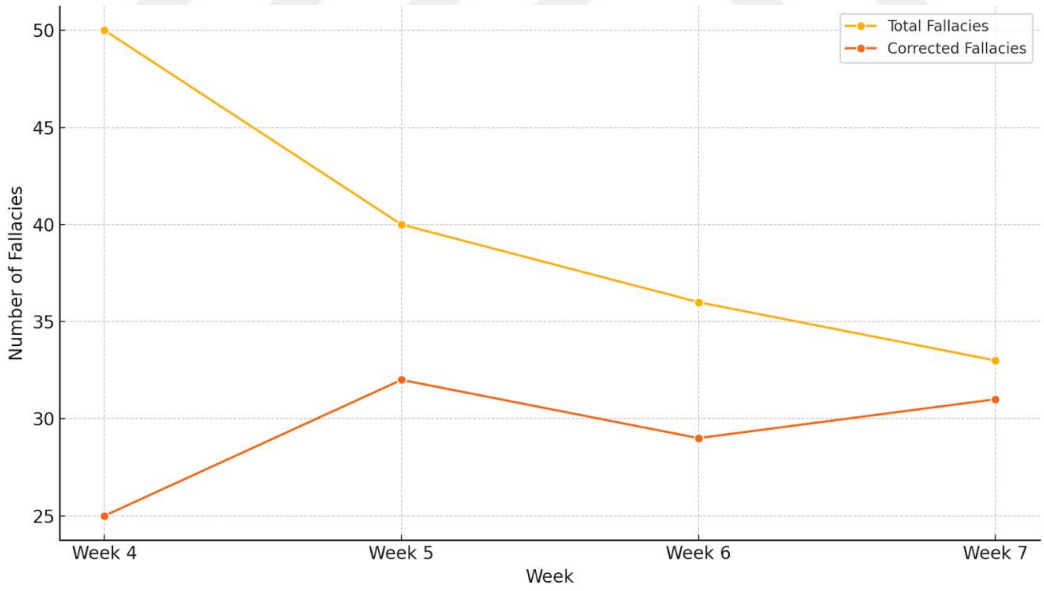


Figure 6. A List of Overall Fallacy Frequency

The total number of fallacies in the class's first drafts decreased steadily each week. In Week 4 (the first week of full essays after fallacy instruction), approximately 50+ fallacy instances were identified across the 20 essays (roughly 2.5 per essay on average). By Week 5 this had dropped to around 40, and by Week 6 to the mid-30s. As reported, Week 7 had 33 instances

(1.65 per essay). From Week 4 to Week 7, this represents roughly a 34% reduction in fallacy frequency. In practical terms, students wrote more logically sound drafts as the weeks progressed, committing fewer reasoning errors in their initial writing. This downward trend in fallacy incidence suggests that the explicit instruction and iterative practice had a cumulative effect: students increasingly internalized the principles of valid reasoning and learned to avoid or at least minimize obvious fallacies when formulating arguments. By Week 7, some essays contained zero fallacies in the first draft (something that was rare in Week 4). The overall improvement answers RQ2, demonstrating the impact of instruction over time that fallacy occurrence was highest prior to or immediately following initial instruction and then consistently declined.

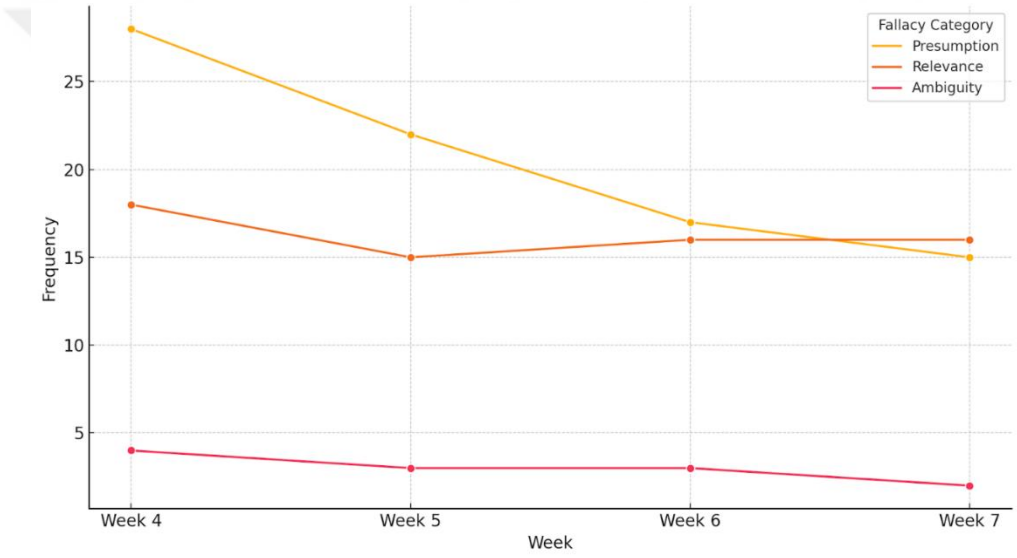


Figure 7. A Figure of Fallacy Type Distribution Across Weeks

Not only did the number of fallacies drop, but the composition of fallacy types also shifted from Week 4 to Week 7. In the early week(s), fallacies of Presumption were disproportionately common. For example, in Week 4, presumption fallacies (especially hasty generalizations and false cause-type claims) appeared to dominate the essays where students tended to make broad claims or causal assertions without evidence, reflecting a lack of supporting detail and perhaps limited awareness of logical rigor. By rough estimation, well over half of the Week 4 fallacies fell into the Presumption category. Relevance fallacies (like emotional appeals or irrelevant arguments) were present as well, but many came in second drafts once students tried to persuade (and even then, appeals were relatively straightforward to identify). Ambiguity fallacies were virtually non-existent in Week 4, which is

unsurprising given that those require subtleties of language misuse that beginners may not attempt. Over time, as students learned to supply evidence and consider counterarguments, the share of Presumption fallacies decreased. By Week 7, as noted, presumption and relevance fallacies were about equal in proportion (~45–50% each). This suggests that students significantly cut down on fallacies like unwarranted generalizations or false dilemmas (which they had learned to recognize and avoid), while a greater fraction of the remaining issues were appeals or rhetorical in nature. In effect, the logical structure of arguments improved first, leaving mostly stylistic or rhetorical slips by the end. For instance, hasty generalizations, which is the most pervasive fallacy in many contexts, were abundant in Week 4 but much rarer by Week 7, as students learned to either justify their general claims with examples/data or to refrain from overgeneralizing. Conversely, appeals to emotion were relatively persistent; even in Week 7 some students still used emotive language, albeit more judiciously. The proportion of Ambiguity fallacies remained minimal throughout (0–2 instances each week), indicating that from start to finish, ambiguous wording was the least of students' problems compared to substantive reasoning flaws. In summary, early drafts (Week 4/5) were heavily characterized by fallacies of presumption, which shows students initially struggled with providing sufficient logical support, whereas later drafts (Week 6/7) saw a more balanced or reduced set of fallacies, with many students having eliminated the easier-to-fix logical lapses and only a few nuanced issues remaining. This pattern is consistent with our instructional focus: first addressing blatant logical errors (like false dichotomies, sweeping claims) and gradually honing the more subtle aspects of argumentation.

The role of peer review in catching and helping correct fallacies grew markedly stronger from Week 4 to Week 7. In Week 4, peer reviewers were relatively inexperienced in identifying logical fallacies in practice. They did catch some obvious ones (e.g. a blatant straw man or a very emotional plea), but a significant number of fallacies went unmentioned in the feedback during the first cycle. In Week 4 roughly 50–60% of the fallacies present were pointed out by peers. Some fallacies likely escaped notice either because peers were still developing their analytical eye or they focused more on surface features (grammar, structure) in early reviews. Moreover, even when peers identified issues in Week 4, the feedback comments were sometimes vague (e.g. "this claim is too general" without naming it a *Hasty Generalization* or explaining why it's problematic). By Week 5 and Week 6, a

steady improvement was observed in peer feedback quality and thoroughness. Peers began to use the terminology more confidently and picked up a greater variety of fallacies. For instance, by Week 6 many peer comments explicitly referenced fallacy names ("This sounds like a slippery slope because…"). In Week 7, peers caught almost every fallacy in the first drafts. Not only did they catch them, but they also provided precise comments. The progression suggests a learning curve where peer reviewers improved their detection skills with practice each week. This addresses RQ3, highlighting that peer review can indeed become an effective tool for logical improvement: by the final week, students were essentially acting as trained critics of reasoning for one another. Their detection in Week 7, compared to the moderate detection in Week 4, underscores the increased peer feedback effectiveness over time.

Correspondingly, the percentage of fallacies that got corrected in the second draft rose week by week. In Week 4, many fallacies persisted in the final draft either because they were not identified at all, or because students, even when told an argument was fallacious, were not yet sure how to revise it. In Week 4, only about half of the fallacious arguments were properly fixed in revision. Some students made only superficial changes or ignored feedback on logic, possibly due to time constraints or uncertainty. However, with explicit classroom debriefings and increasing peer feedback clarity, revision outcomes improved. By Week 6, most students did attempt to address peer critiques of logic, and the correction rate was around 80% (four in five fallacies that peers flagged were resolved by the final draft). Finally, in Week 7, as described, nearly all identified fallacies were corrected (~94%). In fact, several students preemptively improved their final drafts beyond what peers mentioned which indicates independent critical thinking. The high correction rate in later weeks signals greater student agency and skill in revision. They were not only receiving peer feedback but actively implementing it in a meaningful way. This improvement also reflects growing trust in the peer review process by Week 7 students appeared confident that a peer-flagged fallacy is indeed something that needs fixing (whereas in Week 4 a few seemed skeptical or unsure about peer comments). The upward trend in correction rates demonstrates the synergy of instruction and peer review: initial instruction gave students the concepts, peer review gave immediate application and accountability, and over time students learned to self-correct more effectively as well.

Week 4 essays, which are the first drafts after fallacy instruction, still contained numerous logical fallacies, with presumption errors most prominent; peer feedback was learning-oriented and not always catching everything, and final drafts, while improved, often retained some fallacies. Week 5 and Week 6 showed progressive refinement with fewer total fallacies, a slightly higher proportion of relevance (perhaps as students curtailed some unsupported claims, the remaining issues were more about tone or emphasis), and better peer-led corrections. By Week 7, the essays were considerably more logically sound from the outset, and the combination of a well-trained peer eye and the writer's own knowledge led to almost all fallacies being identified and remedied by the final version. In short, across Weeks 4–7 a clear positive trajectory can be observed: a drop in the quantity of fallacies, a shift toward less severe types of fallacies, enhanced peer detection, and near-complete correction in revisions. This trajectory attests to the effectiveness of pedagogical intervention. It echoes findings in other EFL contexts that explicit logical reasoning instruction coupled with iterative feedback can significantly reduce reasoning errors. The results are particularly encouraging regarding peer feedback showing that peers, when guided, can play a crucial role in improving argumentation.

Overall, by comparing Week 7 with Weeks 4–6, it is evident that students made substantive gains in logical writing skills. The total fallacy frequency dropped by roughly one-third, indicating stronger argumentative rigor. The type of distribution shifted towards fewer egregious reasoning flaws (presumptions) and the near-elimination of ambiguity issues, suggesting clearer and more nuanced writing. Peer feedback grew from a supplementary aid to a central mechanism of improvement, with detection and correction of fallacies becoming nearly routine by the final week. These improvements highlight that the combination of direct fallacy instruction and structured peer review over multiple drafts can lead to measurable enhancements in the quality of arguments in student writing. Students not only learned to avoid many common fallacies but also developed the metacognitive ability to critique and refine their own and others' reasoning, which is a critical thinking skill that will benefit them beyond this course. Such findings reinforce the value of integrating logical reasoning training into writing pedagogy and confirm that the observed trends from Weeks 4 to 7 are in line with the study's expected outcomes: fewer fallacies, better argument quality, and effective peer-supported revisions as the course progressed.

4.2. Qualitative Findings

To address the fourth research question regarding pre-service English language teachers' perceptions of fallacy-focused instruction and peer review practices, the qualitative data collected through a post-intervention focus group interview were analyzed using an inductive thematic analysis following Braun and Clarke's (2006) six-phase framework. The researcher first familiarized herself with the transcribed data through repeated, immersive reading and then generated initial codes line-by-line, staying close to participants' language to preserve the authenticity of meaning. These codes captured participants' experiences, emotional responses, and critical reflections on the instructional process. Subsequently, the codes were reviewed and collated into preliminary sub-themes and overarching categories, ensuring thematic coherence and internal consistency through iterative refinement. Overlapping or redundant codes were merged, and ambiguous ones were clarified. Themes were named to reflect their core concepts, and the entire dataset was re-examined to confirm the representativeness and boundaries of each theme.

Throughout the analysis, methodological care was taken to ensure that emerging patterns were closely tied to the pedagogical context of the intervention such as logical fallacy instruction, peer review exchanges, and writing revision activities. Sub-themes were refined through constant comparison of codes and grouped based on semantic similarity, while preserving distinct dimensions of participants' perspectives. Student quotations were purposefully selected for their clarity and representativeness, functioning as direct evidence of the interpretive claims made. This ensured that the thematic narrative remained grounded in student voice and reflective of authentic classroom experiences. As a result, four overarching themes were identified and elaborated in detail in the sections that follow.

4.2.1. Thematic Findings on Fallacy Instruction and Peer Review

This theme encapsulates the transformative impact that fallacy-focused instruction had on students' reasoning, argumentative precision, and metacognitive awareness. As pre-service teachers, participants not only became more discerning writers but also began to internalize logical consistency as an educational value.

4.2.1.1. Increased Awareness of Faulty Reasoning

Participants reported a shift in their ability to critically evaluate the logic of their arguments, citing a new habit of filtering their thoughts before writing. This awareness was marked by scrutiny of both their own writing and that of others. For instance, one participant stated, *"I'm trying to make sentences by filtering my thoughts rather than writing in the way I initially think."* Another explained, *"Even without needing the teaching guide, I check my essay to see if there are logical fallacies and try to fix them."* These statements align with the codebook's emphasis on *noticing fallacies*, *spotting flawed logic*, and *being more critical of reasoning*.

4.2.1.2. Improved Logical Structure in Essays

Learners consistently referenced improvements in organization, coherence, and argument quality. The transition from vague, emotion-based writing to evidence-supported claims was frequently noted. One student remarked, *"Thanks to our focus on fallacies, I started to write about things based on information and evidence,"* while another noted, *"I used to write like a secondary school student and talk about emotions, flowers, and birds."* These reflections mirror the codes *stronger claims* and *less unsupported ideas*.

4.2.1.3. Confidence in Writing through Fallacy Knowledge

With increased control over argumentation came greater confidence. Participants expressed that eliminating fallacies made their writing feel more robust and defensible. A representative quote from the interview states, *"Understanding fallacies gave me confidence in the soundness of my writing."* This supports the codebook's sub-theme of *writing with certainty* and *logical flow improved.*

4.2.1.4. Pedagogical Transfer to Future Teaching

Students not only integrated fallacy instruction into their writing but envisioned using these strategies in their future classrooms. Several highlighted that fallacy awareness could be taught to foster critical thinking among their own students. One commented, *"I helped a friend from another class by talking about fallacies since they did not focus on them in the*

lesson." These intentions correspond with the codes *I can teach this too* and *critical thinking as a teaching goal*.

4.2.2. Challenges and Growth in Applying Fallacy Knowledge

This theme centers on the multifaceted difficulties students faced as they attempted to integrate fallacy knowledge into their writing. The process was intellectually demanding, emotionally nuanced, and developmentally gradual.

4.2.2.1. Difficulty Detecting Fallacies in Own Writing

Many students admitted that while identifying fallacies in examples or peers' essays was manageable, evaluating their own writing proved significantly more difficult. One learner noted, *"One thinks his writing is flawless, but with your feedback, we were able to see our mistakes."* Another added, *"We can notice grammar or organization, but I don't think that I would be able to notice logical fallacies on my own."* These insights resonate strongly with the code, *hard to see my own mistakes*, illustrating blind spots in self-assessment and the essential role of external feedback.

4.2.2.2. Emotional Resistance and Humility During Revision

Several participants described the initial discomfort and defensiveness they felt when peers or instructors pointed out logical errors. These reactions, while natural, signaled an emotional threshold that students had to cross to revise their arguments effectively. For instance, one student reflected, *"Accepting and correcting it required humility,"* while another remarked, *"It's hard to realize that something you argued with confidence might actually be flawed."* These statements exemplify the code *defensive at first* and reflect the emotional labor required for authentic revision.

4.2.2.3. Cognitive Demand in Correcting Fallacies

Students frequently emphasized the mental effort required to revise arguments once a fallacy was identified. Corrections were not mechanical; they involved reevaluating the logic and evidence behind entire sections of their essays. One participant shared, *"Correcting a fallacy*

meant restructuring my argument and sometimes rewriting whole sections." Another added, *"It was time-consuming but necessary for clarity."* These responses align precisely with the codes *time-consuming revision* and *had to find new evidence*.

4.2.2.4. Evolving from Conceptual to Practical Mastery

The journey from theoretical understanding to practical application was described as incremental and practice driven. Initially, fallacy types were confusing or overly abstract. As one participant noted*, "I confused some fallacies at first, like false cause and lack of evidence."* However, with repeated exposure and application, students gained confidence: *"With practice, I could spot and correct them more easily."* This trajectory reflects the code *took practice to see them clearly*, suggesting that fallacy mastery requires iterative learning cycles.

4.2.3. Reciprocal Learning Benefits of Peer Feedback

This theme emphasizes the dynamic, bidirectional nature of peer review. Students not only benefited from receiving feedback but also developed deeper insight by offering critique to others, reinforcing the learning process as collaborative and reflective.

4.2.3.1. Giving Feedback Enhances Self-Awareness

Numerous participants described how critiquing their peers' essays increased their own critical awareness. Reviewing others' arguments allowed them to apply the same scrutiny to their own texts. One learner stated, *"I discovered issues in my own writing after reviewing my peer's draft."* Another shared, *"I applied the same checklist to improve my draft."* These reflections match the codes *noticed issues in others first* and *helped me reflect*.

4.2.3.2. Receiving Feedback Improves Clarity and Coherence

Students found that feedback from peers illuminated structural flaws or logical gaps they had overlooked. One participant noted, *"A peer showed me where my example didn't clearly link to the thesis,"* while another stated, *"That helped me revise for better coherence."* These

remarks aligned with the codes *peer showed me unclear example* and *feedback made me revise better*, underscoring the constructive role of external perspectives.

4.2.3.3. Peer Review Encourages Reflection and Revision

Participants came to view peer review as more than a procedural task; it evolved into a thoughtful process of self-improvement. As one learner said, *"Peer feedback made me rethink the organization of my argument."* Another added, *"It turned revision into a more thoughtful process."* These align with the codebook's theme of *prompted deeper revision, showcasing* revision as a cognitive and metacognitive activity.

4.2.3.4. Transfer of Feedback Skills to Teaching Identity

Several students reported that the peer feedback model influenced their pedagogical thinking. Recognizing its value, they planned to implement similar practices in their future classrooms. One student reflected*, "Peer review gave me a method I can use when I become a teacher,"* while another noted, *"It showed me how structured feedback promotes learning."* These align closely with the codes *peer review are useful pedagogy* and *teaching ideas*.

4.2.4. Emotional and Social Dynamics of Peer Review

Beyond its instructional value, peer review carried rich emotional and interpersonal significance. This theme explores the complex feelings, evolving perceptions, and communal bonds fostered through the peer review process.

4.2.4.1. Initial Anxiety and Skepticism

Students initially approached peer review with hesitation, marked by fear of critique and uncertainty about its value. One student remarked, *"I was nervous about critiquing others and hearing critique on my writing."* Another admitted, *"At first, I didn't think it would help much."* These statements echo the codes *nervous about critique* and *not sure if it would help*, highlighting emotional barriers at the outset.

4.2.4.2. Increased Trust in the Peer Process

Over time, students began to see the merit of peer insights, even expressing surprise at how helpful the process became. One participant explained, *"Peers gave me insights I hadn't considered."* Another stated, *"I didn't expect peer review to be this helpful, but it really was."* These reflections match the codes *checklist made it fair* and *it worked better than I thought*, suggesting growing confidence in peer collaboration.

4.2.4.3. Developing Openness to Critique

Students described a shift in their emotional response to feedback, moving from defensiveness to thoughtful acceptance. As one learner put it, *"I learned to accept suggestions and not take feedback personally."* Another emphasized, *"It helped me grow as a writer."* These insights reflect the codes *chosen by what to revise based on logic* and *learned to accept suggestions*, indicating the development of emotional maturity and professional disposition.

4.2.4.4. Feeling Supported and Part of a Learning Community

A striking sub-theme was the sense of mutual support and collaboration students experienced. Peer review, they said, transformed writing from a solitary task into a communal endeavor. One participant shared, *"Writing became more collaborative, and I felt supported by my peers."* Another added, *"We were learning and improving together."* These affirmations correspond to *feeling helped and helpful* and *writing became collaborative*, emphasizing the social-emotional dimension of academic writing.

4.3. Pre-Instruction Fallacies in Student Writing

The analysis of students' baseline argumentative essays revealed a clear prevalence of logical fallacies, even before any targeted instruction was given. Hasty generalization emerged as one of the most frequent fallacies in the pre-instruction drafts. Many students drew broad conclusions from minimal evidence, for example, making sweeping claims about

education or society based on a single anecdote. This finding is consistent with a broad body of EFL writing research: overgeneralizing has been noted as a dominant flaw in student arguments across various contexts. For instance, Termjai (2025) found hasty generalization to be the most common fallacy (about 19% of all instances) in Thai university students' essays, and Indonesian studies likewise report that students often generalize from scant evidence. The prominence of this fallacy in our Turkish cohort's untrained writing aligns with these patterns, suggesting that without explicit guidance, novice writers tend to make unsupported general claims. As Indah and Kusuma (2015) observed, many EFL learners "jumped to conclusions or oversimplified complex issues" in their factual claims which is precisely the tendency seen in our students' initial drafts.

Another common fallacy in the pre-instruction essays was false cause (often referred to as *post hoc* reasoning). Students frequently linked events or phenomena with unwarranted cause and effect assertions for example, implying that one policy change directly caused a societal outcome, without providing logical evidence.

This mirrors findings from other contexts where the *post hoc* fallacy is prevalent. In the Thai EFL corpus analyzed by Termjai (2025), false cause was the second most frequent fallacy (~15% of cases). Such unwarranted causal links were also noted by Indah and Kusuma (2015) as a recurring issue in Indonesian students' value-claim arguments. The recurrence of false cause errors in our students' baseline writing underscores a broader trend: EFL writers often struggle to distinguish correlation from causation, especially under the pressure of constructing arguments quickly. The *post hoc* fallacy's presence in the data confirms that, prior to instruction, many participants lacked the critical thinking disposition to question whether two sequential events truly have a causal relationship.

Misrepresentation of opposing views, which is the straw man fallacy, also appeared in a few of the initial essays. Some students would oversimplify or distort a counterargument only to refute a weaker version of it. This result is noteworthy given that straw man arguments require a certain level of rhetorical maneuvering (mischaracterizing another's position), and yet even novice writers employed them, perhaps unintentionally. Alagozlu's (2007) early work in Turkey similarly documented straw man arguments as a frequent issue (36 instances in 76 student essays). Our finding resonates with Alagozlu's: Turkish pre-service teachers, like other EFL learners, sometimes lack skill in fairly representing alternative viewpoints. However, it is worth noting that straw man was not the single most dominant error in our

students' writing; it was common but less so than hasty generalization. This contrasts with Alagozlu's report that *oversimplification* was the top flaw in Turkish students' arguments (41 cases, exceeding even straw man). In our data, oversimplified reasoning (e.g. ignoring important nuances of an issue) certainly occurred, but broad generalizations and causal fallacies were more conspicuous. One possible explanation is that the specific prompts or the academic level of our participants led them to rely more on overgeneralization than on binary oversimplifications. Nonetheless, both our study and Alagozlu's highlight that Turkish EFL writers, without intervention, commonly produce arguments that are rhetorically flawed despite being structurally sound.

Beyond these predominant patterns, the baseline essays exhibited a variety of other fallacy types, albeit in lower frequencies. Fallacies of relevance were present, such as emotional appeals and red herrings, though not as pervasively as the logical fallacies of evidence. A few students, for instance, used appeals to pity or fear to persuade.

This echoes observations by Hasibuan et al. (2020) that after hasty generalizations, appeals to pity and fear were among the more common fallacies in Indonesian students' debates. In our written data, emotionally charged arguments were noticeable in some essays, suggesting that in the absence of training, students might default to persuasive emotion when logical reasoning is weak. Red herring distractions were occasionally seen as well. Such irrelevancies correspond to what Engel (1982) classifies as *fallacies of relevance*, and they have been documented in EFL writing when students wander off topic.

Meanwhile, fallacies of ambiguity for example, equivocations or loaded language appeared to a limited extent in the pre-test essays. A few instances of prejudicial or vague language were identified (such as ill-defined terms or biased wording that undermined clarity). The Thai study by Termjai (2025) found "prejudicial language" and ambiguous wording constituted about 14% and 9% of fallacies, respectively, indicating that linguistic ambiguity can indeed weaken arguments. In our students' initial writing, this was not a major category, but its presence indicates that some learners used imprecise language or connotations that muddled their logic. Finally, certain classic fallacies were rare or absent in the baseline data. Ad hominem attacks were virtually nonexistent, aligning with prior findings that EFL academic writers seldom resort to personal attacks (Alagozlu, 2007 reported only one ad hominem case). False dilemma was also scarcely observed; our students rarely reduced issues to two extremes. This is like Termjai (2025)'s report of false dilemmas making up

less than 1% of fallacies in Thai essays. The infrequency of these fallacies may reflect the academic context of the task, where students were trying to sound formal and objective, thus avoiding overtly personal or blatantly oversimplified claims.

In summary, the pre-instruction profile of our students' argumentative writing was characterized by a high incidence of logical fallacies, especially hasty generalizations, unwarranted cause-effect claims, and occasional straw-man distortions. These issues confirm that incoming pre-service English teachers share the well-documented struggle of constructing logically sound arguments in a second language. Even after standard writing coursework, learners often continue to exhibit fundamental reasoning errors in their essays. This baseline finding underscored the need for an instructional intervention targeting logical fallacy awareness which is precisely the gap our study sought to address.

4.4. Impact of Explicit Instruction on Fallacy Recognition and Reduction

The next question concerns how explicit instruction in logical fallacies affected students' ability to recognize and reduce these errors in their writing. The impact of explicit fallacy instruction was evident in the longitudinal improvement of students' first-draft essays over the seven-week course. As the intervention progressed, participants demonstrated a marked decrease in the frequency of logical fallacies in their writing. By the final independent argumentative essay (Week 7), most students produced texts with substantially fewer reasoning flaws compared to their initial baseline essays. This suggests that the declarative knowledge phase (Weeks 1–3), which focused on teaching common fallacy types and how to avoid them, had a strong positive influence on students' argumentative rigor.

One clear indicator of instructional impact was the reduction of the most prevalent fallacies identified at baseline. For instance, hasty generalizations dropped dramatically in later essays. In the first untrained essay, it was common to see multiple sweeping statements unsupported by evidence; however, after explicit training on the overgeneralization, students became more cautious. By Weeks 6–7, many learners were qualifying their claims (using hedging language or citing examples) rather than making absolute assertions. The decline in hasty generalizations aligns with the idea that raising awareness can change writing behavior. Khoiri and Widiati (2017) reported that their students, once introduced to the concept of fallacies, realized that many of their prior generalizations were avoidable mistakes. Our findings concretely support this with instruction, students internalized the

need for sufficient evidence and began self-monitoring their claims. This outcome resonates with Davarpanah et al. (2021), who found that higher critical thinking ability correlates with fewer logical fallacies in writing. As students' reasoning skills were sharpened through instruction, their propensity to commit basic inductive fallacies (like broad generalizations) diminished by reflecting a boost in the critical thinking component of their writing.

Similarly, false cause (post hoc) fallacies were significantly reduced after the explicit instruction. Early in the semester, many essays contained sentences linking cause and effect without logical proof (e.g., "X happened after Y, so Y must have caused X"). Through targeted lessons illustrating the *post hoc ergo propter hoc* error, students learned to scrutinize causal claims. In subsequent essays, they either provided clearer rationale for causal relationships or avoided making dubious causal links altogether. By the final task, blatant false cause arguments had nearly disappeared from many papers. This improvement supports the contention by Atai and Nasseri (2010) that EFL teachers should explicitly raise students' awareness of reasoning pitfalls. In their study, Atai and Nasseri concluded that without such awareness-raising, learners across all demographics remain prone to fallacies. Our intervention essentially operationalized that recommendation by explicitly teaching what *not* to do in argumentation, we saw students actively avoid previously common errors. The reduction in false cause fallacies also lends empirical weight to the pedagogical arguments in the literature that *logic can be taught*. Indah and Kusuma (2015) emphasized the need for training students to "analyze and repair faulty logic" in their arguments. The post-instruction writings of our participants show they were indeed learning to repair their reasoning; for example, by substituting a questionable cause-effect statement with a well-reasoned explanation or by adding evidence to legitimize a causal inference.

Importantly, the explicit instruction not only reduced the quantity of fallacies but also improved students' ability to recognize such flaws. Evidence from classroom observations and the focus group suggests that students became much more adept at identifying fallacious reasoning, both in texts (their own or peers') and in abstract terms. During the latter half of the intervention, learners often self-corrected as they wrote, occasionally commenting that they "realized a claim sounded like a hasty generalization" or that they "needed to check if a point was a straw man", which are the reflections that were absent in the early weeks. This metacognitive awareness is a direct outcome of explicit training. It indicates that students internalized a conceptual toolkit for logical reasoning. The literature corroborates this

outcome: Khoiri and Widiati's participants noted that once they were introduced to specific fallacy types, they could identify them as issues to avoid.

Similarly, Zhang, Zou, and Cheng (2023) found that when EFL students underwent targeted training on logical fallacies (in their case, via a chatbot-based tool), their subsequent essays showed improved argumentation and fewer reasoning errors. Our more traditional classroom-based approach achieved a comparable effect, underlining that fallacy-focused instruction can transfer to tangible writing improvement, regardless of the delivery mode.

It is worth noting that not all fallacy types were equally affected by instruction. The more common and straightforward fallacies (like hasty generalization and false cause) showed the most pronounced reductions likely because these were emphasized in examples and easily grasped by students. On the other hand, a few subtler fallacies remained somewhat persistent. For example, while straw man occurrences did decrease (students learned to engage more honestly with counterarguments), a handful of learners still tended to set up weak oppositional statements in their final essays. This suggests that fully mastering the nuance of refuting others' positions may require more practice or higher language proficiency. Similarly, some fallacies of ambiguity, such as subtle misuse of terminology or slight bias in wording, were harder to eliminate completely. Although we discussed loaded language and equivocation in class, these issues sometimes resurfaced, perhaps because they overlap with general language skill and are less clear-cut than logical structure errors. These nuances highlight a point made by Alagozlu (2007): even after writing instruction, some flaws in reasoning persist, reflecting how "ingrained" these issues can be. Alagozlu found that despite having taken writing courses, Turkish students still exhibited oversimplification and other fallacies. In our study, despite significant overall gains, the lingering presence of a few complex fallacies indicates that a 7-week intervention may not completely eradicate all forms of flawed reasoning. Students likely need continued reinforcement beyond our study's timeframe to fully solidify these higher-order writing skills.

Overall, the effect of explicit instruction was strongly positive. The students' argumentative writing became more logically sound over time, evidenced by both fewer fallacious arguments and a better understanding of argumentation principles. This outcome directly addresses a gap in the literature: many earlier studies were descriptive, cataloguing the fallacies students commit. Our study moves a step further by demonstrating that targeted pedagogical intervention can mitigate these issues. The results support theoretical

frameworks that consider critical thinking as teachable in an L2 context. For instance, the significant improvement we observed reinforces the findings of Davarpanah et al. (2021) that improving critical thinking yields better reasoning in writing by showing this improvement can be facilitated through explicit curriculum design. Additionally, this aligns with Wingate's (2012) argument that students often fail at "argument" in essays because instruction focuses narrowly on structure over reasoning.

By explicitly teaching reasoning, our course empowered students to meet the often implicit expectation of logical coherence. In summary, the explicit fallacy instruction fulfilled its intended role: it raised students' awareness of reasoning errors and provided strategies to avoid them, which in turn translated to higher-quality arguments in their essays.

4.5. Impact of Peer Review on Fallacy Detection and Revision

The third research question examined how peer review contributed to the detection and correction of logical fallacies in students' writing. Across the intervention, peer review proved to be a crucial component in improving the logical quality of essays. The comparison of first drafts and revised second drafts each week revealed a clear pattern: most essays showed a reduction in fallacies after peer feedback was applied. In practical terms, many reasoning flaws that slipped into a student's initial draft were identified by a peer reviewer and subsequently addressed by the writer in revision. This immediate improvement from Draft 1 to Draft 2 underscores the value of structured peer review as a form of collaborative error-checking and learning.

Statistically, the effect of peer feedback was significant. The quantitative result confirms that peer review was not merely a nominal exercise but had a measurable impact on logical accuracy in students' writing. Each week's cycle of writing–feedback–revision led to essays that were more coherent and sound than the initial submissions. For example, if a first draft contained two instances of hasty generalization and an unwarranted causal claim, typically the peer reviewer would flag these (using the fallacy checklist), and the author would then revise to either support the claims with evidence or rephrase them to be more precise. By the second draft, those particular fallacies were often eliminated or mitigated. The overall trend was an incremental refinement of argument quality with each feedback-incorporated revision.

Qualitative observations from the peer review sessions help illustrate how this process facilitated fallacy reduction. Reviewers, guided by the Engel-inspired form (Appendix 2), often caught logical issues that the original authors did not notice. Common comments included notes like “This point is too general maybe add an example” (indicating a hasty generalization) or “Does Y really cause X? Consider explaining the link” (pointing out a potential false cause). Such feedback gave writers concrete targets for improvement. Many students confessed that having a fresh set of eyes on their work was invaluable: peers could detect unclear or weak reasoning that the author, being invested in their own argument, might overlook. This phenomenon aligns with the idea that peer interaction brings in a new perspective, which is particularly effective in identifying higher-order issues. As one student mentioned in the focus group, “My friend saw a problem in my logic that I didn’t realize at all after she pointed it out, it seemed obvious.” This anecdote captures the essence of peer review’s benefit in our study: it enabled the detection of logical fallacies that otherwise might have persisted unchallenged.

The findings here can be linked to sociocultural learning theory and collaborative learning principles. In line with Vygotsky’s (1978) Zone of Proximal Development, peer reviewers acted as knowledgeable others to help each writer reach a higher level of reasoning than they could alone. The structured peer exchanges functioned as a scaffold, allowing students to perform “just beyond” their independent ability in crafting logical arguments. This is supported by prior research on peer feedback in writing. For instance, Min (2006) found that when EFL students were trained to give concrete peer feedback, the revisions that followed showed significant improvements in writing quality. Our results mirror Min’s in the specific domain of logical reasoning: the trained peer feedback (with a form emphasis on logic) led to meaningful revisions targeting content and reasoning issues, not just surface errors. Likewise, Nelson and Schunn (2009) emphasize that the nature of peer comments matters since feedback that is specific and content-focused tends to result in better revisions. In our study, the form ensured that peer comments stayed focused on content and logic (e.g., identifying a fallacy is inherently a content-level critique). The improved second drafts attest that this focus on higher-order concerns was effective; students responded to peer critiques by clarifying ideas, adding support, or restructuring arguments to eliminate the flagged fallacies.

Furthermore, the peer review process fostered a reflective mindset that likely contributed to students' overall development as critical readers and writers. By evaluating a classmate's essay for logical integrity, students simultaneously practiced the skill of fallacy detection. Many participants noted that in reviewing others, they became more alert to reasoning errors and subsequently applied that awareness when returning to their own drafts. This peer feedback dynamic aligns with what Schunn et al. (2016) describes as the double-benefit of peer review: writers benefit from feedback received, and reviewers benefit from the act of giving feedback, which sharpens their evaluative and analytical skills. Hughes (2015) similarly argues that peer feedback activities can cultivate critical thinking in students by engaging them in analysis and evaluation of arguments. Our classroom experience supports this; students frequently reported that after critiquing a peer's reasoning, they found themselves "automatically checking" their own arguments for similar flaws.

It is also instructive to consider which types of fallacies were most and least remedied through peer review. We observed that clear-cut fallacies were very often caught and corrected. These include hasty generalizations (peers could easily spot an overly broad claim and suggest adding evidence or nuance) and irrelevancies (a peer could note if a paragraph's point was off-topic or not supporting the thesis). In contrast, some more nuanced fallacies occasionally slipped through the peer review net. For example, if a fallacy was intertwined with language subtleties (like a slightly misleading term or an implicit assumption), a peer might not always catch it, especially if it wasn't explicitly listed on the checklist. One such case was a *slippery slope* argument embedded subtly in a paragraph where a few peer reviewers did not flag it, possibly because it wasn't as obvious or they themselves were unsure. These instances were relatively rare, but they highlight a limitation: the quality of peer review is bound by the peers' own understanding. As noted in the study's limitations, detecting logical fallacies can be subjective and depends on the reviewer's grasp of the concept. Some students said they sometimes "had a feeling something was wrong" in a peer's argument but couldn't name the fallacy, so they left the comment vague. Thus, while peer review was generally effective, it was not infallible since a handful of subtle reasoning errors persisted into second drafts because neither the writer nor the peer recognized them during the review cycle.

Overall, RQ3's findings affirm that peer review was a powerful mechanism for improving argument quality in our context. The process functioned as a form of formative, collaborative

scaffolding (Topping, 2010) wherein students assessed each other's work and learned together. Importantly, our study extends existing literature by illustrating that peer feedback can successfully target logical reasoning issues, not just grammar or general writing quality. Prior research had left the specific role of peer feedback in identifying logical fallacies "underexplored". We provide evidence that when peers are properly guided (via forms and training), they can indeed help catch and correct reasoning errors. This has pedagogical significance: it suggests that writing instructors can leverage peer activities not only for surface-level editing but also for deeper critical thinking development. Our participants' improved second drafts stand as concrete outcomes of peer-assisted learning. In sum, the peer review process in this study contributed significantly to fallacy detection and correction, validating collaborative learning theories in the realm of argumentation. Students helping each other became a catalyst for higher quality writing, as they collectively moved toward more logical, well-founded arguments.

4.6. Students' Perceptions of Fallacy Instruction and Peer Feedback

The final research question explored the students' perceptions of fallacy focused instruction and the peer feedback process. Qualitative data from the post-intervention focus group interview shed light on how participants viewed these components of the course, providing context to the quantitative improvements noted above. Overall, students reported positive attitudes toward both the explicit fallacy instruction and the structured peer review, though they also identified certain challenges and growth experiences associated with each.

Perceptions of the explicit fallacy instruction were largely positive. Many students expressed that learning about common logical fallacies was an "eye-opening" experience. They realized that some of the argumentative habits they previously considered acceptable (or had never examined) were undermining their persuasiveness. For instance, one student remarked, *"I never knew what a hasty generalization was before. Now I see it not only in my writing but even in news or social media arguments."* This comment exemplifies how the instruction heightened their general critical awareness. The participants appreciated the *explicitness* of the teaching; rather than vague advice to "be more logical," they were given concrete categories and labels for errors in reasoning. This empowered them to analyze their own work with a clearer lens. In linking this to the literature, our students' sentiments echo

the findings of Khoiri and Widiati (2017), who reported that Indonesian EFL learners, after being introduced to fallacies, recognized many reasoning mistakes as avoidable if only they had known about them earlier. Similarly, Atai and Nasseri (2010) had advocated for raising students' awareness of "reasoning pitfalls" in the classroom; our participants' feedback confirms that such awareness raising is not only necessary but also welcomed by learners when they see its relevance. Several students noted that this component of the course filled a gap in their prior education: *"We always learned how to structure essays, but not how to make the argument strong. This was the first time we learned about things like false cause or straw man."* This reflection aligns with Wingate's (2012) critique that writing instruction often neglects argumentation, leaving students unsure how to argue effectively. By addressing that gap, the instruction seemed to satisfy a latent need in the students' academic development.

Students also commented on how the fallacy instruction affected their writing process and confidence. Initially, a few admitted to feeling overwhelmed by being introduced to a long list of possible fallacies made them worry that they might be doing everything wrong in their essays. However, as weeks went on, this concern transformed into a more productive form of self-monitoring. One participant shared, *"At first, I thought, 'Oh no, I probably have all of these fallacies.' But then I started to use the list as a guide. Before finishing my essay, I would check: Did I do this? Did I do that? It made me more confident because I knew what to look for."* This evolution from anxiety to confidence is an important affective outcome. It suggests that, when supported, students do not remain paralyzed by the knowledge of possible errors; instead, they use it to take control of their writing quality. This finding provides a nuanced contrast to any concern that explicit focus on errors could discourage writers. In our context, the explicit instruction functioned as a toolkit that students learned to wield. By the end, most perceived it as highly beneficial. They felt that their ability to craft and critique arguments had grown which is a form of empowerment that extends beyond just writing class into their general critical thinking and consumption of information.

Turning to perceptions of the peer review process, students were likewise appreciative, though their feedback highlighted a mix of initial apprehension and eventual enthusiasm. At the outset, some students confessed they were unsure about peer review, a sentiment not uncommon in cultures where teacher feedback is traditionally valued far above peer input. A few feared that classmates "might not catch mistakes" or even that peers might be too

lenient or too harsh. However, the use of a structured checklist and the iterative practice over weeks seem to have alleviated these concerns. According to the focus group responses, by the second or third peer review session, students found real value in the process. They described the peer reviews as collaborative learning experiences rather than judgmental evaluations. One student described it thus: *"It was like we were learning together. My peer wasn't just grading me, she was helping me see what I couldn't see, and I did the same for her."* This sense of mutual support and shared purpose indicates that the peer review, when well implemented, can shift from being a potentially uncomfortable critique to a trusted component of the writing process. This outcome aligns with broader findings in peer learning literature: Topping (2010) notes that when properly structured, peer assessment becomes a valuable formative exercise that benefits both parties. Our students' experiences concretely reflect that principle; they reported that over time they became more comfortable giving and receiving critiques, especially since everyone was working on the same challenges (logical soundness of arguments).

Notably, students credited peer feedback with improvements that they felt might not have occurred with teacher feedback alone. They observed that peers were able to explain issues in "student language," sometimes making a point more clearly relatable. For example, one participant said, *"When my friend pointed out that my example didn't really prove my point, she said it in a very direct way that clicked for me. If the teacher had said it, I might have just nodded. But hearing it from someone writing the same assignment made me pay attention."* Comments like this highlight an interesting dynamic: peer comments can carry a peer ethos that perhaps motivates writers differently. Because peers are essentially the audience for whom the writing is intended, their feedback on what is unconvincing or unclear can resonate strongly with the author. This perspective supports Nelson and Schunn's (2009) assertion that peers provide a unique type of feedback, one that complements teacher feedback by focusing on what a real reader takes away.

The students in our study seemed to recognize this complementarity. Indeed, many stated that the combination of explicit instruction, peer feedback, and teacher guidance was what really helped them grow. They did not see peer review as redundant; rather, it added a layer of critical engagement that pure teacher correction might not achieve on its own.

Despite the overall positive reception, students also acknowledged some challenges in the peer review process. One challenge was the variability in peers' skill at identifying fallacies.

A few participants noted that if their peer reviewer was less confident with the fallacy concepts, the feedback they received was less useful. For instance, a student observed, *"My second draft in Week 4 didn't improve much because my partner wrote only general comments. Later we all got better at it."* This indicates that during the early phase, uneven understanding of fallacies limited the effectiveness of some feedback. As the course progressed and everyone's understanding deepened, this issue receded, but it is an important consideration for implementing such a pedagogy: initial training and monitoring of peer feedback quality are crucial. Another challenge mentioned was the emotional aspect of critique. Even with a form, a few students felt hesitant to mark a peer's work as containing a fallacy, worried about offending them or being wrong in their judgment. However, the focus group revealed that these worries diminished over time as students built trust and realized that everyone was mutually invested in improvement. Some even remarked that the peer review sessions became less formal and more like friendly consultations by the end, a sign of a healthy peer feedback culture. In short, while there were initial effective and skill-based hurdles in peer reviewing, the class learned to overcome them, and students ultimately valued the experience.

In summary, students' perceptions of the intervention components were strongly supportive of their efficacy. They found the explicit fallacy instruction to be a missing piece in their education that once introduced, significantly helped them write and think more critically. They also grew to value peer review as an integral, constructive part of learning to write arguments. These qualitative insights bolster the quantitative findings by showing that students not only improved on paper but also recognized and appreciated their own growth. Moreover, these perceptions provide practical validation for the pedagogical approaches used: they indicate that combining direct instruction in reasoning with peer-driven practice is not only theoretically sound but also well-received by learners. As one focus group participant succinctly put it, *"In this course I learned how to think when writing. I wish we had done this earlier."* This sentiment captures the overall student endorsement of the approach and hints at its potential value if applied more widely in writing curricula.

4.7. Theoretical and Pedagogical Implications

The findings of this study carry several important implications for theory, practice, and curriculum design in second language writing and teacher education. At a theoretical level, the success of the intervention lends support to theories that emphasize the teachability of critical thinking and argumentation skills. The clear reduction in logical fallacies and improvement in argument quality among participants corroborates the view that reasoning skills can be developed through targeted instruction, even within the relatively short span of a seven-week program. This reinforces cognitive and educational theories suggesting that what might appear as students' "lack of logic" is not a fixed trait but a skill deficit that can be remedied with appropriate scaffolding. In particular, the results resonate with Vygotskian sociocultural theory: learning was facilitated in the Zone of Proximal Development by pairing explicit expert guidance with peer-mediated support. The combination of these elements created a rich environment for cognitive development in argumentation. The study thus provides empirical evidence in an L2 context for the synergy of *instruction plus social interaction* in fostering higher-order thinking. Theoretically, it underscores that L2 writing development is not purely about linguistic proficiency or genre knowledge, but also about acquiring the cognitive schemata for constructing logic.

Another theoretical implication relates to the nature of argumentative writing in a second language. The prevalence of logical fallacies in untrained student writing, observed here and in prior studies, might be interpreted through the lens of cognitive load or interlanguage pragmatics. Our findings suggest that when students are not explicitly taught reasoning strategies, they may resort to heuristics or first-language patterns of argumentation that do not align with rigorous academic logic. However, once given the conceptual tools, they can align their reasoning more closely with target language academic norms. This outcome implies that logical reasoning should be considered a component of second language competence in academic contexts. It is not enough to treat argumentation as a purely rhetorical or cultural construct; it has a cognitive dimension that can be learned. This aligns with recent work by researchers like Zhang, Zou, and Cheng (2023), who treated fallacy identification as a skill to be trained in EFL writers. Our study adds a complementary perspective: not only can such training be done, but it can be integrated into a traditional classroom with peer collaboration, reinforcing theoretical models of integrated skills development.

From a pedagogical standpoint, the study offers concrete insights for curriculum design in writing programs, especially in EFL settings and teacher education programs. First and foremost, the results make a strong case for incorporating explicit logical reasoning instruction into academic writing courses. Many writing curricula focus on form and general essay organization but pay comparatively less attention to the validity of arguments. Our findings show that students benefited greatly from even a short module on logical fallacies and argumentation. Pedagogically, this suggests that dedicating time to teach students how to think through an argument can yield measurable improvements in writing quality. Teacher educators and curriculum designers should note that such content is both needed and effective. It may be particularly beneficial in contexts like Türkiye, where students are transitioning from high school writing that might emphasize formulaic structures to university writing that demands critical analysis. Embedding critical thinking components within writing instruction, as our study did, can smooth this transition and address the reasoning weaknesses that many novice academic writers exhibit.

Another pedagogical implication concerns the use of peer review as a tool for higher-order skill development. Our study demonstrates that with proper scaffolding, peer review can effectively target and improve content-level issues, not just grammar or style. This expands the commonly understood benefits of peer review. Writing instructors should thus consider structuring peer feedback sessions to go beyond surface corrections, guiding students to critique argumentation and logic. The success of the peer component in our course implies that even in a second language, where one might worry that students are not confident enough to critique each other's ideas, it is feasible and fruitful to have students engage critically with each other's reasoning.

One practical takeaway is the value of a structured peer review form which ensured focus and consistency in what students looked for. Educators can adapt similar tools to their contexts, focusing peer attention on whatever higher-order concerns are relevant. Additionally, our positive findings on peer review support the idea of a more student-centered writing pedagogy. By training students to be critical readers of peers' work, we essentially equipped them to be more critical readers of their own writing. This peer-centric approach is pedagogically powerful because it creates a community of practice where students collaboratively uphold standards of reasoning and clarity, rather than passively relying on the teacher for all correction. It aligns with the move in modern pedagogy towards

collaborative learning and formative assessment (Topping, 2010), providing a model of how peer assessment can be harnessed at the tertiary level for complex writing skills.

The study also has implications for teacher training. Our participants were pre-service English teachers; thus, beyond improving their own writing, the intervention potentially influenced how they might teach writing and critical thinking in the future. An implication is that teacher education programs should incorporate elements of learning by doing argumentation instruction. By experiencing firsthand, the difficulties and solutions in reducing logical fallacies, these future teachers have gained insight into the learning process their own students might undergo. We anticipate that they will be more attuned to reasoning issues in student writing and more confident in teaching critical thinking skills as part of language instruction. From a program design perspective, this suggests that merging content with pedagogy in teacher training can produce graduates who are both better writers and better equipped to teach writing. Given the global emphasis on fostering critical thinking in education, our approach could serve as a model for training teachers in how to practically integrate critical thinking into English writing classes.

Finally, on a broader pedagogical level, the findings highlight the value of iterative, process-based writing instruction. The significant improvements observed from first to second drafts each week and over consecutive weeks underscore what process-oriented writing scholars have long advocated: writing is rewriting, and students learn to write well by revisiting and refining their texts.

It implies that any program aiming to enhance argument quality should build in cycles of drafting and revision with feedback. The collaborative revision process allowed students to apply their knowledge, reinforcing learning in a way a single-draft assignment would not. Pedagogically, therefore, an implication is that courses focused on argumentation should employ process pedagogy elements (drafting, feedback, revision) to maximize skill development. Instructors should be mindful that improvements in higher-order writing skills, like logical coherence, may not fully materialize in a one-off assignment; they require iterative practice and feedback, as evidenced by our week-to-week progress in fallacy reduction.

While the study yielded insightful findings, it is important to acknowledge its limitations, which also suggest caution in generalizing the results. First, the scope and sample of the

study were limited. The research was conducted with a single intact class of 50 first year ELT students at one Turkish state university. This relatively small, context bound sample means that findings may not readily generalize to all Turkish university students, other cultural contexts, or different proficiency levels. The participants were all pre-service English teachers with at least an intermediate English level; results might differ with lower-level EFL learners or students from non-ELT majors. Future studies with larger and more diverse samples would help to confirm whether the patterns observed hold broadly.

Second, the study lacked a control group, which limits the strength of causal claims about the intervention. Because all students received the fallacy instruction and participated in peer review (due to ethical and practical reasons of not withholding training from some students in the class), improvements in their writing cannot be definitively attributed solely to the intervention without comparison. It is assumed that any significant development was due to our instructional strategies, and the literature and student testimonies support that assumption, but we cannot rule out other factors such as maturation, increased familiarity with academic writing tasks, or even influence of other concurrent coursework. The absence of a control was mitigated by the repeated-measures design, which strengthens the inference that the treatment had an effect. Nonetheless, future research using experimental or quasi-experimental designs could bolster the evidence base by explicitly comparing groups with and without fallacy-focused training and peer review.

Another limitation involves the duration and intensity of the intervention. At seven weeks, the treatment period was relatively short. While we observed notable improvements in that time, it is possible that a longer intervention would yield different results. It's also unknown how durable the improvements are. We did not collect follow-up data to see if students maintained their reduced use of fallacies in writing tasks weeks or months after the intervention concluded. Thus, we cannot claim long-term impact. The focus group indicated that students believed they would carry forward the skills, but actual retention and transfer were beyond our scope. This points to a need for longitudinal research to examine if explicit critical thinking instruction in writing has lasting effects on students' argumentative abilities.

The measurement of logical fallacies in this study, while systematic, also has inherent limitations. Identifying what counts as a fallacy can sometimes be subjective. We used Engel's (1982) classification and trained thoroughly on it to code the essays, but not every instance is black and white. Some arguments might be weak or lack evidence without fitting

neatly into a named fallacy category. Our quantitative counts of "fallacies" thus simplify a more nuanced reality of argumentative quality. It is possible we under-identified issues that did not match the checklist, or conversely, one could argue that not every instance of, say, a general statement is a true *hasty generalization* if some readers would accept it as reasonable. We aimed to mitigate bias by clear coding rules, but the analysis inevitably involved some judgment calls. Additionally, peer reviewers' identification of fallacies depended on their understanding, which, as noted, varied particularly at the start. There's a margin of error in what peers flagged or didn't flag. In some cases, a fallacy might have gone uncorrected not because it wasn't there, but because both the writer and peer missed it. Therefore, the results regarding "decrease in fallacies" are contingent on the reliability of detection. This was an action research element of the study, which the instructor (researcher) was closely involved, and complete objectivity in measurement is difficult in such classroom-based research. Triangulating with multiple raters or external evaluators might have strengthened the analysis.

Moreover, the peer review process itself, while largely beneficial, introduced a couple of limitations. One is the potential peer influence or bias: students knew their work was being read by friends, which could have influenced how or what they wrote.

We did not see evidence of overt self-censorship, but this dynamic is a known consideration in peer activities. Another related issue is that stronger writers may have provided more helpful feedback than weaker writers, giving some students an advantage in the revision stage purely based on who their partner was. We tried to rotate pairs and encourage consistent effort, but we did not formally control for the "quality of peer feedback" each student received. This unevenness is a natural classroom occurrence but is a limitation when interpreting the results. For research rigor, future studies might standardize the feedback to isolate the effect, though that would sacrifice the ecological validity of a real peer review process.

Finally, logistical and contextual constrain**ts** impose limitations. Not all students completed every single assignment or peer review, due to occasional absences or personal conflicts. While we had a high participation rate overall, a few data points were missing, and we had to rely on a slightly reduced sample for some week-to-week comparisons. We did not observe a clear pattern, but the possibility exists. The study's context might also limit how much effort some students put in, compared to if these assignments were graded. We

assumed that removing grades would encourage genuine effort for learning's sake, but it also meant we relied on intrinsic motivation. Any findings must be viewed in light of these contextual factors.

Acknowledging these limitations, it's important to stress that they do not negate the study's findings but rather frame them. Readers should be careful in extending conclusions beyond similar conditions. These limitations also provide fertile ground for future research to build upon. Despite the caveats, the overall consistency between our quantitative and qualitative results increases confidence that the core outcomes were genuine and not artifacts of the study's design. In closing, the chapter has connected the findings of our intervention to the broader scholarly conversation on argumentative writing and critical thinking in EFL education. The evidence suggests that a deliberate focus on logical fallacy reduction through explicit instruction and peer collaboration can substantially improve the argumentative writing skills of pre-service teachers. This contributes to the broader goal of cultivating not only better student writers but also future educators who are more critically aware and capable of teaching argumentation. The insights from this study will be carried forward into the final chapter, where conclusions are drawn and recommendations for practice and research are presented.

CHAPTER V

CONCLUSION AND IMPLICATIONS

The present study set out to examine whether explicit instruction on logical fallacies, coupled with structured peer feedback, could improve the argumentative writing of pre-service English language teachers. The key findings confirm that this dual-focused intervention had a positive impact on both the quality of arguments and the reasoning awareness of the participants. Quantitative analysis of successive essay drafts revealed a measurable reduction in the frequency of logical fallacies from initial drafts to final drafts. In other words, as participants progressed through the intervention, their essays contained fewer reasoning errors and fallacious arguments, indicating a clear improvement in logical coherence and argumentative soundness. This trend was statistically supported, as comparisons of drafts showed significant decreases in common fallacy types. By the final submissions, many previously frequent fallacies had been corrected or eliminated, demonstrating that the participants had learned to identify and avoid these errors in reasoning.

In addition to quantitative improvements in writing, qualitative data from participant feedback and reflections suggested a heightened awareness of logical fallacies and argument structure among the pre-service teachers. Before the intervention, many students were unaware of the logical flaws in their arguments, which led to essays that were, as prior research cautioned, *"structurally acceptable but rhetorically flawed"*. After receiving fallacy focused instruction and engaging in peer reviews, the participants reported greater critical awareness of their own reasoning. They became more adept at scrutinizing their claims, supporting evidence, and overall argumentation strategy. This was evidenced by focus group discussions in which the pre-service teachers articulated how they now paid closer attention to avoiding unsupported claims, irrelevancies, or overgeneralizations in their writing. Many acknowledged that the process of reviewing peers' essays for fallacies

sharpened their ability to spot flaws in any argument, including their own. Overall, the study's participants not only improved the logical quality of their essays but also developed meta-cognitive insight into argumentation. They ended the course with enhanced reasoning skills and confidence in constructing persuasive, logically sound arguments which is a crucial outcome for future educators who will both write academically and guide their own students in argumentative writing.

5.1. Implications for Researchers

The findings of this study contribute to the growing body of research at the intersection of second language (L2) writing pedagogy and critical thinking education. In current knowledge, logical reasoning in L2 writing has often been a neglected dimension, overshadowed by concerns of grammar and organization. This research helps bridge that gap by empirically demonstrating that explicit instruction in informal fallacies, when integrated with the process approach to writing, can significantly enhance the argumentative quality of student writing. Notably, the study addresses a previously underexplored area: the combined effect of fallacy instruction and peer feedback. Few prior studies have jointly examined these strategies in ELT contexts, so the present results offer new evidence supporting the value of this integrated approach. By offering an *evidence-based instructional framework* that improved both writing and critical reasoning,, this work lays groundwork for future scholarly inquiry and pedagogical innovation in L2 writing instruction.

For researchers in applied linguistics and education, several directions for further investigation emerge from this study:

- For instance, researchers could follow participants into subsequent semesters or professional teaching to determine if they continue to apply critical thinking skills in new writing tasks or instructional settings.
- Comparative studies could examine whether similar fallacy focused instruction yields comparable improvements in other universities or countries, thereby strengthening the external validity of these results.
- Future experimental designs might include comparison groups (e.g., one with only fallacy instruction, another with only peer review, and a combined group) to discern which aspect has the greater effect on reducing fallacies. Such research could inform

whether one component is indispensable or if the synergy of both is key to maximizing student gains.

- Additional interviews, think-aloud protocols during writing, or analysis of peer review comments could illuminate the cognitive processes by which learners learn to detect and correct fallacies. This would enrich our understanding of the mechanisms of learning in fallacy-focused writing instruction beyond the observable outcome of fewer fallacies.
- Building on this, researchers might examine how tools like automated writing evaluators or intelligent tutoring systems can supplement human peer feedback. Such tools could provide immediate, individualized feedback on reasoning flaws, potentially amplifying the effects observed in this study.

In summary, this research opens up a rich vein of inquiry at the nexus of L2 writing and critical thinking. It validates pedagogical approaches that explicitly target reasoning quality, thereby encouraging scholars to further investigate how argumentative writing instruction can cultivate critical thinkers. By confirming that even "very basic" logical mistakes can be avoided through explicit instruction, the study supports calls in the literature to give reasoning its due place in language education. Future research building on these findings will not only extend theoretical knowledge but also continue to inform practical teaching methods that elevate the critical reasoning capabilities of language learners.

5.2. Implications for Practitioners and Pre-service Teachers

The positive outcomes of this study carry important implications for writing instructors, teacher educators, and the pre-service teachers themselves. They underscore the need for pedagogical practices in ELT that go beyond language form and address the quality of argumentation. Below are key recommendations for practitioners and for the development of pre-service teachers' skills:

- Teachers of academic writing should include direct instruction on logical fallacies and argumentation in their curriculum. The success of this study's intervention demonstrates that students benefit from learning about common reasoning errors explicitly, rather than being left to intuit logical principles on their own. Traditional writing courses often focus on essay structure and language accuracy but omit training in argument validity, leading students to produce work that is grammatically

sound yet logically unconvincing. By incorporating lessons on identifying fallacies (e.g. hasty generalizations, false dilemmas, ad hominem attacks, etc.) and on constructing sound arguments, instructors can significantly improve the critical depth of student writing. Pre-service teachers in this study became more adept at recognizing flawed reasoning once given the conceptual tools to do so, suggesting that even a relatively short instructional module on informal logic can yield substantial dividends in writing quality.

- Writing instructors and teacher educators should be encouraged to implement peer review activities that emphasize logical coherence and evidence-based reasoning, not just grammar or organization. The findings showed that peer feedback, when scaffolded with clear guidelines, led to immediate improvements in subsequent drafts. Students serving as peer reviewers learned to critically evaluate arguments, which in turn enhanced their own writing and thinking. To replicate this, instructors can train students in how to apply a checklist of reasoning criteria or fallacy identifiers while reviewing a classmate's essay. This practice transforms peer review from a general proofreading exercise into a collaborative critical-thinking task. Consistent with prior research on peer-led interventions, such guided collaboration helps students detect flaws in reasoning as long as adequate scaffolding is provided. For the pre-service teachers, this dual role of writer and reviewer cultivated reflective thinking; as future educators, they can carry forward the skill of giving and receiving constructive feedback focused on argumentation.
- Practitioners should encourage students to reflect on their reasoning processes during writing and revision. In our study, reflective elements (such as discussing why a fallacy occurred and how to fix it) reinforced learning. This aligns with a reflective practitioner approach, wherein students cycle between action (writing/revising) and reflection (considering the strength of their arguments). Classroom techniques might include brief reflective journals after each peer review session, where students note what logical improvements they made, or whole-class discussions of anonymous excerpts to identify fallacies and suggest fixes. Such practices deepen learners' metacognitive awareness of argument structure and support the internalization of critical thinking skills. Pre-service teachers trained in this reflective manner are likely

to become more self-aware writers and more thoughtful instructors, able to guide their future students through similar processes.

- Teacher educators should explicitly nurture a critical mindset in pre-service teachers as part of their professional preparation. The greater awareness of fallacies and sound argumentation that participants reported by the end of the study indicates that targeted training can shape their dispositions towards valuing logic and evidence. This is crucial because as these pre-service teachers transition to classroom teachers, they will be responsible for fostering critical thinking in their own students. Practitioners should therefore model and emphasize open-mindedness, skepticism of weak claims, and the habit of questioning arguments. For example, incorporating analysis of real-world texts (such as editorials or speeches) for fallacies can be a powerful training exercise. Research has shown that analyzing fallacious arguments and proposing valid alternatives in class can enhance students' reasoning skills and writing quality. By adopting such strategies, educators can produce not only better academic writers but also more critically aware graduates who can apply these skills beyond the classroom.

In summary, the practical takeaway for instructors is to embed critical reasoning into writing pedagogy. Writing classes (especially those for future English teachers) should be more than grammar drills and five-paragraph essays; they should be venues where argumentative rigor is cultivated. The pre-service teachers in this study responded very positively to this approach, becoming more confident in crafting and critiquing arguments. This suggests that, far from overwhelming students, an emphasis on logical clarity actually empowers them. For the participants as future educators, this experience has likely sown seeds for their own teaching practice where they have seen first-hand the value of peer collaboration and explicit logical guidance, and can be expected to implement similar high-order thinking exercises with their learners. Practitioners in the field of ELT can thus view the study's approach as a model for integrating language teaching with critical thinking development, ultimately producing students (and future citizens) who can communicate persuasively and think rationally.

5.3. Implications for Policy Makers

Educational policy makers and curriculum designers should take note of the study's implications at a systemic level. The results provide evidence-based guidance for shaping curricula, assessment standards, and teacher training programs in ways that foreground critical thinking and sound argumentation skills in language education. Several policy-relevant recommendations can be drawn:

- Curriculum Enhancement: Integrate argumentation and critical thinking components into English language curricula at the tertiary level. The introduction of a "Critical Reading and Writing" course in the 2022 Turkish ELT curriculum is a commendable example of policy recognizing the need for such skills. Our findings validate the importance of this curricular shift, demonstrating that when students are explicitly taught to evaluate and construct arguments, their performance improves markedly. Policy makers should ensure that similar courses or modules are not only introduced but also explicitly include content on logical fallacies, use of evidence, and argument structure. Embedding these topics in official curriculum guidelines or national standards will prompt institutions and instructors to allocate time to them, rather than treating critical thinking as an incidental by product of language instruction.
- Teacher Education and Professional Development: Incorporate training in informal logic and critical-feedback techniques into teacher education programs. Since this study involved pre-service teachers, it highlights that teacher preparation is an opportune stage to build these competencies. Accreditation bodies and educational authorities could require that English language teacher education curricula include learning outcomes related to argumentation pedagogy and critical thinking facilitation. Workshops, certification courses, or practicum experiences should expose teacher candidates to strategies like fallacy focused instruction and peer review management. By institutionalizing such training, policy can ensure that new teachers enter the workforce equipped not just with language teaching methods but also with the ability to develop students' reasoning skills. This addresses a current gap whereby many teachers, lacking training in argumentation, may default to focusing on grammar at the expense of content logic. With proper training mandated, tomorrow's teachers will be better prepared to deliver instruction that meets higher order thinking objectives.

- Resource Allocation and Support: Provide resources and support systems for implementing fallacy instruction and peer review in classrooms. Policy makers should recognize that innovative pedagogy requires material support. This could include funding the development of teaching materials (such as fallacy identification guides, peer review checklists, and example essays), or investing in educational technology tools that facilitate peer feedback. For instance, learning management systems could be equipped with modules for anonymous peer review, or licenses for critical thinking software could be provided to schools. Additionally, policy can support reduced class sizes or appropriate scheduling (e.g., double-period writing classes) to give teachers the practical capacity to conduct multi-draft writing and feedback cycles. The success of the intervention in this study was partly due to the iterative draft-feedback process, which is feasible only if curricula allow time for revision and if teachers have manageable workloads to oversee peer review. Thus, policy makers should consider structural adjustments (like credit hours and teacher-student ratios in writing courses) that facilitate a process-oriented, feedback-rich approach to teaching writing.

In conclusion, at the policy level, the implication of this study is a call to infuse critical thinking into the mainstream of language education programs. By making logical reasoning a deliberate focus of curricula and teacher training, educational systems can produce more effective communicators and critical thinkers. The improvements observed in the participating pre-service teachers' writing underscore that such skills can be taught and learned with the right pedagogical approach. Therefore, policy makers have the opportunity to amplify these benefits on a broader scale by updating educational policies to reflect the centrality of argumentation skills in the development of language proficiency. This will ensure that future cohorts of students, and especially those who will become teachers, are well-equipped to navigate and contribute to an increasingly complex, information-rich world with clarity of thought and strength of expression

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APPENDICES

Appendix 1. Informed Consent Form

Informed Consent Form

"An Investigation into Detecting and Correcting Logical Fallacies in Academic Writings of Student Teachers in an ELT Programme"

The purpose of this study is to examine the logical fallacies found in the academic writings of student teachers in an English Language Teaching program. Participants will be asked to write essays, identify logical fallacies in their writing, and engage in peer feedback. The study will also explore the impact of peer feedback on detecting and correcting logical fallacies.

For this research, participants will first complete a pre-test by writing an essay. The essay will be analyzed for logical fallacies. Participants will then receive peer feedback on their writing and have the opportunity to revise their essays based on this feedback.

All data collected in this study will be used solely for academic purposes and will be kept confidential. Your identity will be anonymized, and only anonymized data will be reported in research findings. No identifying information will be shared with others.

The Researcher's Name and Surname
Özlem Demir

I agree to participate in this research study. I have read and understood the purpose of the study, and I understand that my participation is voluntary.

The Participant's Name and Surname:

Date:

Signature:

Appendix 2. Peer-Review Observation Form

Peer-Review Observation Form

Writer's Name: _____

Evaluator's Name: _____

Date: _____

Please use this form to evaluate both the first and revised drafts of your peer's argumentative essay. For each logical fallacy listed below, examine the drafts and indicate whether they are present (Yes/No). In the final column, indicate whether the issue (if any) was addressed in the revision. If you observe any other type of fallacy not listed below, include it in the "Other" section.

Classification of Logical Fallacies	**Present in First Draft (Yes/No)**	**Present in Final Draft (Yes/No)**	**Addressed in Revision? (Yes/No)**
Fallacies of Relevance			
Ad Hominem			
Red Herring			
Appeal to Emotion			
Straw Man			
Bandwagon Appeal			
Fallacies of Presumption			

Hasty Generalization			
False Cause			
False Dilemma			
Slippery Slope			
Begging the Question / Circular Reasoning			
Fallacies of Ambiguity			
Equivocation			
Oversimplification			
Faulty Analogy			
Other (specify): _____			
Other (specify): _____			

Additional Comments / Observations:

Appendix 3. Focus Group Interview Questions

1. How do you think the lessons about logical fallacies helped you in your writing?
2. How did giving and receiving peer feedback affect your writing process?
3. What was the most difficult part of identifying or correcting fallacies in your essays?
4. How would you describe your overall experience with the 7-week writing process?

Appendix 4. Themes, Categories and Codes of Focus Group Interview

Thematic Content Analysis Table

Theme	Category	Codes	Students' Quotes
Enhanced Argumentation and Critical Thinking through Fallacy Instruction	*Increased Awareness of Faulty Reasoning*	Noticing fallacies; Spotting flawed logic; Avoiding Ad Hominem; Being more critical of reasoning	"I became more critical of my own arguments and eliminated weak points." "Understanding common fallacies has made my essays more persuasive and logically coherent."
	Improved Logical Structure in Essays	Better organization; Coherent arguments; Stronger claims; Less unsupported ideas	"By the end, my arguments were more structured, and evidence based." "I learned to catch subtle issues like unwarranted assumptions."
	Confidence in Writing through Fallacy Knowledge	Feeling more persuasive; Writing with certainty; Logical flow improved; Confidence in arguments	"Understanding fallacies gave me confidence in the soundness of my writing." "It also gave me more confidence in the soundness of my arguments."
	Pedagogical Transfer to Future Teaching	I can teach this too; Useful for my students; Critical thinking as a teaching goal	"Recognizing faulty arguments is a skill I can pass on to my students." "As a future teacher, I can also pass these skills on to my students."

Theme	Category	Codes	Students' Quotes
Challenges and Growth in Applying Fallacy Knowledge	*Difficulty detecting fallacies in own writing*	Hard to see my own mistakes; Blind spots; I thought it was fine; Needed peer's input	"It's one thing to spot a fallacy in a textbook, another in your own draft." "I often had to take a step back or get a peer's input to notice my flawed logic."
	Emotional Resistance in Revision	Defensive at first; Uncomfortable with feedback; Hard to accept flaw; Felt embarrassed	"When peers pointed out a fallacy, I felt defensive at first."
	Cognitive Demand in Correcting Fallacies	Time-consuming revision; Needed to restructure; Had to find new evidence; Challenging to integrate correction	"Fixing a fallacy meant restructuring parts of my essay, which was time-consuming." "It was time-consuming but necessary for clarity."
	Evolving from Conceptual to Practical Mastery	Theory vs practice; Still confused with terms; Fallacies are subtle; Took practice to see them clearly	"I confused fallacy types at first, but practice helped me understand them." "With practice, I could spot and correct them more easily."
Reciprocal Learning Benefits of Peer Feedback	*Self-Awareness*	Noticed issues in others first; Helped me reflect; Applied checklist to my own draft	"I discovered issues in my own writing after reviewing my peer's draft." "I applied the same checklist to improve my draft."
	Clarity and Coherence	Peer showed me unclear example; I didn't realize that part was weak; Feedback made me revise better	"A peer showed me where my example didn't clearly link to the thesis."

Theme	Category	Codes	Students' Quotes
	Reflection and Revision	Made me rethink argument; Prompted deeper revision; Realized how to improve flow	"Feedback made me rethink and refine my draft more thoroughly." "It turned revision into a more thoughtful process."
	Transfer of Feedback Skills to Teaching Identity	Gave me teaching ideas; This is a good method for classrooms; Peer review is useful pedagogy	"Peer review gave me a method I can use when I become a teacher." "It showed me how structured feedback promotes learning."
Emotional and Social Dynamics of Peer Review	*Initial Anxiety and Skepticism*	Nervous about critique; Didn't trust peers at first; Afraid to be judged; Not sure if it would help	"I was nervous about critiquing others and hearing critique on my writing." "At first, I didn't think it would help much."
	Increased Trust in the Peer Process	Peers gave good insights; Checklist made it fair; It worked better than I thought	"I didn't expect peer review to be this helpful, but it really was." "Peers gave me insights I hadn't considered."
	Developing Openness to Critique	Learned to accept suggestions; Not everything is personal; Chose what to revise based on logic	"I learned to accept suggestions and not take feedback personally." "It helped me grow as a writer."
	Feeling Supported and Part of a Learning Community	Feedback was not isolating; Writing became collaborative; Felt helped and helpful; We learned together	"Writing became more collaborative, and I felt supported by my peers."



GAZİLİ OLMAK AYRICALIKTIR…