

Cognitive apprenticeship and writing-related State anxiety: Metacognitive and self-regulatory support in argumentative writing

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Corresponding Author

Georgia Theocharopoulou¹

Ioannis Spantidakis²

Eleni Vassilaki³

Smaragda Papadopoulou⁴

^{1,2,3}Department of Primary Education, School of Education, University of Crete, Gallos Campus, 74100 Rethymno, Crete, Greece.

¹Email: theogeorgia@gmail.com

²Email: ispantid@uoc.gr

³Email: vasilaki@uoc.gr

⁴Department of Early Childhood Care and Education, International Hellenic University, P.O. Box 141, 57400 Sindos, Thessaloniki, Greece.

⁴Email: smpapado@gmail.com

ABSTRACT

This paper presents findings from a broader educational study investigating the implementation and outcomes of an instructional intervention based on the Cognitive Apprenticeship model. The intervention was designed to support the development of students' metacognitive and self-regulatory skills through written discourse instruction in General Upper Secondary Education. The study adopted a quasi-experimental action research design and involved an integrated instructional intervention implemented across all stages of written discourse production. The intervention aimed to foster students' metacognitive and self-regulatory skills by providing a structured and supportive framework for approaching argumentative writing. It was implemented over one school year as part of the Greek Language course. Two first-year upper secondary school classes formed the Experimental Group, while a third class served as the Control Group. Within this broader research framework, the present paper examines the affective dimension of writing by investigating whether the development of students' metacognitive and self-regulatory skills through the Cognitive Apprenticeship intervention was associated with reduced writing-related state anxiety before engaging in writing tasks and a more supportive emotional experience during the writing process. The findings revealed a statistically significant within-group reduction in writing-related state anxiety among students in the Experimental Group, with a moderate effect size. They suggest that the systematic development of metacognitive and self-regulatory skills provided students with a clearer, more structured, and more manageable framework for approaching argumentative writing. Furthermore, the sociocognitive framework of the Cognitive Apprenticeship model appeared to promote dialogue, collaboration, and a more positive emotional experience throughout the writing process.

Keywords: *Argumentative writing, Cognitive apprenticeship, Metacognition, Secondary education, Self-regulation, Writing-related state anxiety.*

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Highlights of this paper

- Cognitive Apprenticeship provided a supportive pedagogical environment for managing writing-related state anxiety among upper secondary students.
- Metacognitive and self-regulatory strategy instruction was associated with reduced writing-related state anxiety.
- Structured and collaborative writing support was associated with greater ease and a more manageable writing experience.

1. INTRODUCTION

Students' engagement with written discourse is shaped not only by cognitive and metacognitive processes but also by affective factors that influence how they approach, experience, and perform writing tasks. Among these factors, writing-related anxiety has been identified as an important variable because it can hinder students' ability to generate ideas, organize their thoughts, and regulate the writing process effectively. Elevated anxiety before or during writing has often been associated with avoidance behaviors, reduced motivation, and limited engagement, thereby negatively affecting both writing performance and students' attitudes toward writing.

Within this context, increasing attention has been directed toward instructional approaches that not only develop students' cognitive and metacognitive skills but also create supportive learning environments capable of mitigating negative emotional responses. Metacognitive knowledge and self-regulation strategies have been shown to enhance students' ability to manage the demands of writing, gain greater control over the writing process, and improve their writing performance (De La Paz, Butler, Levin, & Felton, 2024; Stefaniak, 2013). At the same time, these skills may play an important role in reducing writing-related anxiety by providing learners with structured ways of approaching complex writing tasks and coping with difficulties that arise during the writing process.

The Cognitive Apprenticeship (CA) model offers a particularly relevant framework for writing instruction, as it promotes the development of cognitive and metacognitive knowledge and skills within a sociocognitive learning environment that emphasizes the social dimension of learning. By making expert thinking visible and supporting students through guided practice, feedback, and reflection (Collins, Brown, & Holum, 1991; Collins, Brown, & Newman, 1989), the model facilitates the development of higher-order skills while also creating a collaborative and dialogic learning context. Such a context can support students emotionally by encouraging interaction, collaborative problem-solving, and the gradual development of autonomy, all of which may help reduce anxiety associated with demanding writing tasks such as argumentative writing.

The present study forms part of a broader research project examining the implementation of the CA model in the teaching of argumentative writing in General Upper Secondary Education. Earlier findings from the same project highlighted the model's contribution to the development of students' metacognitive knowledge and self-regulatory

skills (Theocharopoulou, Spantidakis, Vassilaki, & Papadopoulou, 2026). Building on these findings, the current study focuses on the affective dimension of writing by examining whether participation in the same instructional intervention was associated with lower levels of writing-related state anxiety immediately before argumentative writing. In the quantitative component of the study, students' state anxiety was measured immediately before they engaged in argumentative writing. In the qualitative component, students' interview responses were used to explore the sources of their anxiety, how they experienced it, and whether they perceived any changes during the writing process.

Although previous research has examined writing anxiety, metacognitive strategy use, and self-regulated writing, the combined investigation of these dimensions within the CA framework remains limited, particularly in authentic upper secondary school settings. Most existing studies have focused either on individual strategy instruction or on collaborative writing practices, without systematically exploring how the structured stages of CA may simultaneously foster metacognitive awareness, self-regulation, and emotional support during writing. The present study addresses this gap by drawing on data from a year-long instructional intervention in argumentative writing and combining quantitative and qualitative evidence to examine students' writing-related state anxiety and broader emotional experiences during writing. In doing so, it extends the literature by linking the cognitive, metacognitive, self-regulatory, and affective dimensions of writing instruction and foregrounding the role of CA not only in skill development but also in supporting students' emotional engagement with argumentative writing.

2. THEORETICAL BACKGROUND

2.1. Conceptualizing Writing-Related Anxiety

Anxiety is generally understood as a state of worry or fear triggered by a perceived threat (Gao, 2023) and as a subjective feeling of tension and nervousness associated with the activation of the autonomic nervous system (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), particularly in situations involving uncertainty. Writing anxiety, also referred to as writing apprehension or writing hesitation, is commonly described as a form of anxiety experienced during writing or when individuals are faced with writing tasks they perceive as demanding or difficult to manage (Izwandi, 2025; Sabti, Hassan, Turki, & Hummadi, 2024). It has also been associated with psychological factors such as self-efficacy and motivation (Cao, Zhong, & Wang, 2025). In addition, this form of anxiety has been linked to avoidance of writing and poorer writing performance, potentially affecting students' ability to initiate, engage in, or complete writing tasks.

2.2. Sources of Writing-Related Anxiety

Research has identified several factors that contribute to writing anxiety, with fear of negative evaluation being among the most prominent. Rezaei and Jafari (2014) found that 83% of students identified negative teacher evaluation as the primary source of anxiety during writing. This finding suggests that students may approach writing mainly as a means of obtaining a good grade and passing a course rather than as an opportunity to express their ideas. In a more recent study, Fitriani (2022) similarly identified instructor evaluation and negative peer comments as key sources of anxiety in scientific writing. Such evaluative conditions may increase students' concerns about others' judgments and make writing feel like a form of exposure, particularly when their work is presented to classmates or their teacher. Related research has also suggested that classroom climate, peer interaction, and the student-teacher relationship may intensify these feelings and should therefore be considered by instructors (Izwandi, 2025; Sabti et al., 2024).

Another important dimension involves low self-esteem and limited self-confidence (Jin, de Bot, & Keijzer, 2015). Low self-esteem may heighten students' sensitivity to others' judgments and external expectations (Papi & Khajavy, 2023), while limited confidence in writing, particularly in L2 contexts, has also been associated with heightened anxiety. This lack of confidence may limit students' active engagement in writing and hinder the development of self-regulatory skills, such as goal setting, monitoring, self-evaluation, and flexible strategy use (Sabti et al., 2024).

Cognitive and linguistic limitations are also important sources of anxiety, especially in L2 writing contexts. Limited topic knowledge may make writing more stressful (Zhang, 2011), while fear of linguistic errors is common when students lack sufficient vocabulary, spelling, grammar, and syntactic knowledge or struggle to formulate and develop ideas (Horwitz, Horwitz, & Cope, 1986; Rezaei & Jafari, 2014). Similar difficulties arise in academic writing, where demands related to appropriate tone and style may further increase students' unease (Nurkamto, Prihandoko, Putro, & Purwati, 2024).

Time constraints, particularly during written examinations, have also been recognized as factors that exacerbate anxiety (Kusumaningputri, Ningsih, & Wisasongko, 2018). Jawas (2019) found that essay writing under classroom time pressure increased students' nervousness, leading them to work in pairs or small groups to generate ideas and organize their essays. High expectations, perfectionism (Sabti, Md Rashid, Nimehchisalem, & Darmi, 2019), and limited writing practice (Rezaei & Jafari, 2014) have also been identified as additional sources of difficulty.

2.3. Effects of Writing-Related Anxiety on Writing Engagement and Performance

Writing anxiety may initially manifest in a range of physical, emotional, and behavioral symptoms. Kurniasih (2018) found that students who experience fear, nervousness, and anxiety while writing often have difficulty regulating their emotions, which may adversely affect their writing performance. These responses may also be reflected in students' body language, allowing teachers to identify signs of discomfort through their posture, behavior, and facial expressions indicative of fear, surprise, or shyness. This form of anxiety may also be accompanied by physiological reactions, including excessive sweating, an increased heart rate, rapid breathing, trembling, and headaches (Kusumaningputri et al., 2018).

Such nervousness can impair concentration (Izwandi, 2025), a finding consistent with Processing Efficiency Theory (Eysenck & Calvo, 1992). According to this theory, anxiety affects cognitive performance by placing additional demands on limited cognitive resources. Worry, a central component of anxiety, is activated under stressful conditions and is associated with reduced processing efficiency and, in some cases, diminished performance effectiveness. In writing tasks, anxiety-related thoughts may interfere with working memory by reducing its capacity to manage multiple task demands simultaneously. This account is supported by Mavridaki and Vassilaki's (2013) study of primary school students, which found a significant positive correlation between anxiety and cognitive interference. In other words, as students' anxiety levels increase, both task-relevant and task-irrelevant thoughts become more intrusive during task completion.

At the same time, worry may increase individuals' motivation to reduce their discomfort, prompting them to invest greater effort in the task. This additional effort may involve the use of compensatory strategies. However, when such strategies are unavailable, insufficient, or ineffective, performance may be adversely affected. Heightened anxiety is particularly disruptive in tasks that place substantial demands on working memory because anxiety-related thoughts compete with the cognitive resources required to process, organize, and store information. Consequently, individuals may need to devote additional effort to suppressing intrusive thoughts, further limiting the resources available for successful task completion. Overall, considerable evidence suggests that writing-related anxiety is

associated with poorer performance across a range of writing tasks (Tsiriotakis, Vassilaki, Spantidakis, & Stavrou, 2017).

These patterns are further supported by Sabti et al. (2019), who reported that higher levels of writing-related apprehension are associated with poorer writing performance. Although highly anxious students may devote considerable effort to preparation, their written performance does not always reflect this investment. Such students often struggle to organize their ideas effectively, use a sufficiently broad vocabulary, and produce longer, more fully developed paragraphs. Their texts may also contain more frequent grammatical and rhetorical errors and exhibit limited lexical diversity. Taken together, these difficulties suggest that this affective state may interfere with the cognitive and linguistic processes involved in writing, thereby reducing the quality of students' written work and potentially affecting their academic achievement (Ekmekçi, 2018; Pekrun & Stephens, 2012).

Writing-related emotional distress is also associated with reduced motivation, avoidance behaviors, and low self-confidence (Cheng, 2002; Izwandi, 2025; Khan, Shah, & Tahir, 2024; Lin, 2025). To alleviate these negative emotions, students may postpone writing tasks, lower their expectations, or avoid participating in writing activities altogether (C. Zhang & Zhang, 2022). Nevertheless, this emotional response is not invariably detrimental. Under certain conditions, anxiety may be experienced as eustress, reflecting an optimal level of arousal, and may have adaptive consequences for students' self-regulatory engagement in writing (Paul, Lin, Ha, Chen, & Newell, 2021). Thus, when experienced as manageable rather than overwhelming, such arousal may support students' engagement and performance.

2.4. Instructional Support for Writing-Related Anxiety

Various instructional approaches have been proposed to address anxiety associated with writing, with collaboration and peer support consistently identified as particularly effective. Jawas (2019) examined the factors contributing to students' discomfort during written composition and the strategies they used to manage it. The findings indicated that writing essays under classroom time constraints was the primary source of stress. To cope, students frequently worked in pairs or small groups, particularly when generating ideas and organizing their essays. Other helpful strategies included developing background knowledge about the topic, discussing difficulties with peers, taking short breaks, and consciously attempting to remain focused and calm.

This emphasis on collaboration is also supported by Wu and Gu (2011), who investigated its role in reducing students' concerns during the writing process. By integrating collaborative learning into English writing instruction, the researchers compared learners' emotional responses before and after the intervention. The results revealed significant reductions in somatic, evaluation-related, and overall writing anxiety. Participants also reported that reading classmates' texts, exchanging feedback, and participating in group discussions helped them identify weaknesses in their own writing, supported mutual learning, and alleviated negative emotional responses.

At the secondary school level, Ao (2019) found that peer scaffolding reduced students' unease about writing in English classes. Similarly, Rahimi and Fathi (2022) showed that wiki-based collaborative writing enabled more proficient learners to support less proficient peers by providing outlines, suggestions, and feedback, thereby reducing emotional barriers to writing and increasing satisfaction. These results suggest that such benefits may arise because, without discussion and dialogue about written work, learners may develop a form of "blindness" to weaknesses in their own texts. Participation in a writing community, peer interaction, and the exchange of ideas can therefore help students identify and address difficulties, refine their writing strategies, and receive continuous support throughout the writing process (Fajaryani et al., 2021).

Another important factor in reducing anxiety during writing is the use of metacognitive strategies, which enable students to monitor and regulate their thinking throughout the composition process. As central components of metacognition, these strategies involve higher-order skills that support self-regulated learning and effective engagement with writing tasks (Teng, 2020). This is particularly important because writing requires the coordination of multiple cognitive processes and representations, while limitations in working memory may constrain the development of writing skills. In this context, the development of metacognitive skills may help executive attention coordinate these processes more effectively (Tsiriotakis et al., 2017). Consistent with this view, Reeves (1997), in an earlier study of students at Chandler-Gilbert Community College, found that outlining, brainstorming, and learning writing strategies helped either reduce learners' writing-related concerns or channel them productively, rather than allowing them to interfere with the writing process.

Further evidence suggests that self-regulation may foster more positive attitudes toward writing and help students manage negative emotions by enhancing their writing ability and the quality of their written work. Türkben (2021) found that self-regulation in writing strengthened students' self-efficacy and positively influenced their attitudes, indicating that self-regulatory strategies can play an important role in reducing task-related emotional difficulties. Earlier research by Yalçın and Karadeniz (2016) similarly showed that self-regulation skills were positively associated with writing performance and the production of higher-quality texts, providing further evidence for the broader benefits of self-regulation in writing.

Recent studies likewise show that stronger self-regulation and more frequent use of metacognitive and writing strategies are associated with lower levels of writing-related anxiety, improved writing skills, and greater self-confidence (Bal, Uyumaz, & Maden, 2025; Bryce, Faheem, Ali, & Shina, 2023; Gao, 2023). Fan and Wang (2024) also found that the factors contributing to successful writing performance are closely interrelated, suggesting that greater strategy use and lower levels of anxiety are associated with better writing outcomes. These findings underscore the value of self-regulatory and metacognitive processes in writing development and performance. Relevant strategies include teacher guidance, clarification and feedback, task division, goal setting, brainstorming, outlining, drafting and effective time planning. Collectively, these practices may help students feel calmer, more confident, and more at ease during written composition (Izwandi, 2025).

Although metacognitive strategies can help students manage the demands of writing more effectively, they may not be sufficient on their own. Teacher support also appears crucial. Golda (2017), for example, suggested that teachers should act as consultants or mentors who help students manage writing-related stress, overcome obstacles, and reflect on their difficulties. In this context, teacher–student collaboration may further reduce anxiety by strengthening communication, encouraging reflection, and creating a supportive environment for revision and error correction (Barton & Collins, 1997). Such an environment enables students to identify and correct errors without fear of criticism or negative evaluation. Teacher support, peer interaction, and opportunities for writing practice can also help students address writing-related challenges and develop their written work (Izwandi, 2025; van der Rijst, Lamers, & Admiraal, 2023).

2.5. The Cognitive Apprenticeship Model as a Framework for Supporting Students in Managing Writing-Related Anxiety

The Cognitive Apprenticeship (CA) model provides an instructional framework for the explicit teaching of concepts, procedures, strategies, and metacognitive skills in complex tasks such as argumentative writing. These tasks require the coordination of planning, idea generation, organization, drafting, and revision. Originally introduced by Collins et al. (1989), the model comprises six core components: modeling, coaching, scaffolding, articulation, reflection, and exploration. Subsequent adaptations (Vassarmidou & Spantidakis, 2015) incorporated an initial phase

focused on learners' prior knowledge resulting in a seven-stage instructional sequence. The following paragraphs briefly outline these stages and explain how each may support students' engagement with demanding writing tasks while helping them manage writing-related anxiety.

The elicitation of prior knowledge activates learners' existing understanding of a topic, helps identify gaps in that understanding, and facilitates the construction of new conceptual connections. During modeling, an expert demonstrates the target task while making visible the cognitive, heuristic, and self-regulatory processes that would otherwise remain implicit in expert performance (Collins et al., 1989). Through both behavioral and cognitive modeling (Dennen, 2004), learners can observe not only the strategies used by the teacher but also the reasoning underlying their use.

During the coaching phase, learners engage in similar tasks with guidance designed to help them approximate expert performance (Collins et al., 1989). This assistance is provided through targeted instruction and timely feedback, thereby promoting meaningful learning (Akhavan & Walsh, 2020). During scaffolding, students work on tasks of increasing complexity, with instructional support adjusted to their developing competence. Such assistance enables them to move beyond their current level of performance toward the Zone of Proximal Development (Kellogg, 2008; Stefaniak, 2013). As their proficiency increases, support is gradually withdrawn (Camacho et al., 2023; Dennen & Burner, 2007), fostering autonomy and self-regulated learning.

The articulation phase encourages learners to verbalize their knowledge, reasoning, and strategic choices (Collins et al., 1989). Through discussion and explanation, students make their thinking explicit, thereby strengthening their metacognitive awareness and use of regulatory strategies (Kirschner & Hendrick, 2020). During reflection, learners evaluate their own performance and that of others by comparing their work with expert and peer models. This process enables them to identify strengths and weaknesses, develop strategic awareness, and enhance self-regulation (Stefaniak, 2013). Finally, exploration involves the independent application of knowledge and strategies in new contexts. At this phase, learners are encouraged to set meaningful goals, investigate topics of personal interest, and adapt strategies to different situations, thereby supporting the transfer of learning (Blake, Cottle, Gallagher, & MacArthur, 2024). Exploration also promotes the personalized application of knowledge, as students learn to adapt what they have learned to their own writing challenges and developmental needs. Table 1 summarizes the roles of the teacher and students across the seven phases of the Cognitive Apprenticeship model.

Table 1. Teacher and student roles across the phases of the cognitive apprenticeship model.

Phases of the CA model	Role of the teacher	Role of the student
1. Activation of prior knowledge	Activates students' existing knowledge and identifies their needs related to the use of writing strategies.	Recall relevant prior knowledge and identify difficulties in applying writing strategies.
2. Modeling	Demonstrates the target writing strategy through explicit explanation and think-aloud procedures.	Observe how the strategy is applied and attend to the reasoning behind each step.
3. Coaching	Guides students' initial practice, provides feedback, and poses supportive questions.	Apply the strategy with guidance, revise their work, and respond to feedback.
4. Scaffolding	Provides structured support and gradually reduces assistance as students' competence develops.	Assume increasing responsibility for using the strategy independently.
5. Articulation	Encourages students to explain their choices, procedures, and reasoning.	Verbalize and justify how they applied the strategy.
6. Reflection	Supports comparisons among students' own work, their peers' work, and effective models.	Reflect on the effectiveness of their strategy use and identify areas for improvement.
7. Exploration	Encourages the transfer of the strategy to new writing tasks and contexts.	Adapt acquired knowledge and strategies to their individual needs and apply them independently across different writing situations.

Beyond its cognitive and metacognitive focus, CA may also help address the emotional dimension of writing, particularly writing-related anxiety. The phases of modeling, coaching, and scaffolding make writing strategies explicit by demonstrating their use, guiding students' practice, and supporting learners throughout the writing process. As teacher assistance is gradually withdrawn, students undertake increasingly independent writing tasks through targeted individual and collaborative activities, thereby developing self-regulation and autonomy. In this way, CA may reduce writing-related anxiety by transforming writing from an implicit, uncertain, and potentially overwhelming activity into a guided, observable, and progressively manageable process. By making the writing process visible and systematically structuring it, CA provides learners with a predictable framework for approaching written tasks. This reduction in uncertainty and ambiguity may alleviate emotional tension and increase students' sense of control and confidence as writers.

The collaborative learning environment promoted by CA may also support the affective dimensions of writing. During articulation, students exchange views, discuss the strategies introduced, and observe how their classmates approach writing tasks. Exposure to alternative ideas and effective peer strategies may reduce feelings of isolation and uncertainty (Cobourne & Shellenbarger, 2019). Collaboration can occur across all stages of the model, while peer evaluation during reflection helps learners assess their progress in relation to others. Interaction with peers may therefore normalize writing difficulties, promote shared problem-solving, and strengthen students' confidence in their ability to improve.

Finally, addressing anxiety in writing contexts requires learners to become aware of this emotional response and identify its underlying causes (Cobourne & Shellenbarger, 2019). Within CA, reflection and exploration provide opportunities to reconsider previous writing experiences and examine current difficulties encountered during the writing process. Through this process, students can identify not only textual errors and omissions but also the sources of fear, emotional discomfort, and tension that arise during composition. By making these experiences open to discussion within a supportive learning environment, CA may support emotional regulation, reduce avoidance, and help learners approach writing with greater confidence. In this respect, the model is consistent with Papadopolou-

Mantadaki's (2019) emphasis on the need to learn to communicate pain, which, in the present context, may be understood as expressing and sharing emotional discomfort, anxiety, and inner tension.

3. THE PRESENT STUDY

The present paper forms part of a broader research project reported by Theocharopoulou et al. (2026), which investigated the implementation of the Cognitive Apprenticeship (CA) model in authentic classroom practice. The broader study focused on the explicit instruction of metacognitive and self-regulatory skills in argumentative writing through the seven-stage instructional sequence of the CA model. Specifically, the intervention used the CA framework to support students in developing metacognitive awareness, strategic control, and self-regulatory abilities across all stages of the argumentative writing process, including planning, drafting, monitoring, revising, and evaluating their written texts.

A quasi-experimental action research design was employed. The instructional intervention was implemented over one school year in two first-year upper secondary school classes, which constituted the Experimental Group. To support triangulation and enhance validity, a third class from the same year level was included as the Control Group. Instruction in the Experimental Group was delivered by the teacher-researcher and was systematically structured according to the CA model, incorporating all seven phases described above: activation of prior knowledge, modeling, coaching, scaffolding, articulation, reflection, and exploration. Through this sequence, students were gradually supported in acquiring and transferring metacognitive and self-regulatory strategies during argumentative writing. By contrast, the Control Group followed the conventional approach to writing instruction typically used in Greek upper secondary education.

This design enabled a comparison between two instructional approaches within a quasi-experimental framework while preserving authentic classroom conditions. Throughout the school year, all groups followed the national curriculum for the first-year Greek Language course in upper secondary education and completed the same writing assignments according to the same assessment schedule. These conditions ensured a broadly comparable instructional context across the groups. Although the single-school sample limits the generalizability of the findings, the ecological validity of the design strengthens their relevance to real classroom practice. Contextual comparability was further supported by the fact that all three classes belonged to the same school, thereby reducing variation related to institutional context, teaching culture, and material or technological infrastructure. All ethical requirements for the broader study were met: the study was approved by the Ethics Committee of the University of Crete, formal permission was obtained from the school principal in accordance with institutional procedures and national regulations, and written informed consent for the students' participation was obtained from all parents or legal guardians. All stages of the study complied fully with the Greek legal framework governing research involving minors.

A detailed description of the instructional intervention, including its theoretical rationale, instructional sequence, metacognitive skills, self-regulatory strategies, classroom procedures, and implementation stages, is provided in Theocharopoulou et al. (2026). Findings from the broader analysis indicated that the systematic application of the CA model was associated with significant improvements in students' metacognitive awareness and self-regulatory abilities in written discourse.

Building on the same research design and intervention, the present paper examines the affective dimension of students' engagement with argumentative writing. Quantitatively, it investigates whether participation in a CA-based instructional intervention designed to foster metacognitive and self-regulatory skills across the stages of argumentative writing was associated with changes in students' writing-related state anxiety immediately before

engaging in argumentative writing. Qualitatively, interview data are used to contextualize these findings by exploring students' perceived sources of apprehension in relation to argumentative writing and text evaluation. The analysis also examines the factors students identified as intensifying or alleviating anxiety during the writing task and their perceived changes in anxiety and comfort following the intervention.

3.1. Research Questions

This study examines whether the teaching of metacognitive and self-regulatory skills through the CA model was associated with changes in students' writing-related state anxiety immediately before engaging in argumentative writing. In addition, it explores students' perceived sources of anxiety and their reported changes in emotional experience during argumentative writing.

3.2. Research Sample

The study involved 59 first-year upper secondary school students—31 boys and 28 girls—from three intact classes at the same public school. Two classes, with a total of 38 students, formed the Experimental Group, while the remaining class, with 21 students, constituted the Control Group. Intact classes were used to preserve the natural classroom context, avoid disruption to the school's organizational structure, and maintain the ecological validity of the study.

All participants were approximately 16 years old and had already received instruction in argumentative discourse during lower secondary education. At the upper secondary level, however, argumentative writing is addressed in greater depth, as students are expected to engage with broader social, economic, political, and global issues. These demands require more advanced reasoning, perspective-taking, and the ability to synthesize arguments in rhetorically appropriate ways.

3.3. Research Instruments

3.3.1. State-Trait Anxiety Inventory (STAI)

The Y-1 and Y-2 forms of the State-Trait Anxiety Inventory (Spielberger et al., 1983), translated and standardized for use in Greek by Fountoulakis et al. (2006), were administered to assess students' state anxiety immediately before argumentative writing and their trait anxiety, respectively. Form Y-1 assesses transient anxiety at the time of administration, whereas Form Y-2 measures trait anxiety as a relatively stable personality characteristic. Scores on the State Anxiety scale range from 20 to 80.

The STAI demonstrated strong internal consistency in the present sample. For Form Y-1, Cronbach's α was 0.945 at pre-test and .940 at post-test. For Form Y-2, the corresponding values were 0.883 and 0.924, respectively.

3.3.2. Semi-Structured Interviews

Semi-structured interviews were conducted to investigate students' perceptions and experiences of anxiety associated with argumentative writing. Students were interviewed before and after the instructional intervention. This qualitative approach can illuminate the structure and texture of lived experience and provide access to complex subjective processes that cannot be adequately captured through quantitative instruments alone (Creswell, 2007; Denzin & Lincoln, 2018). The method also offers flexibility by allowing additional issues to be explored as they arise during the interview (Karatsareas, 2022).

3.4. Validity and Reliability

Several procedures were followed to strengthen the validity and reliability of the study. First, the quantitative component was based on the State-Trait Anxiety Inventory (STAI), a widely used instrument with well-established psychometric properties for assessing state and trait anxiety. The standardized Greek version of the STAI was used in the present study. As reported above, the instrument demonstrated strong internal consistency in the present sample, with Cronbach's α values ranging from .883 to .945 across the two forms and measurement points.

All questionnaires were administered under standardized conditions, using the same procedures and instructions for all participants. This helped reduce potential sources of measurement error and ensured consistency in data collection across the Experimental and Control Groups. Prior to the main study, the questionnaire was pilot-tested with 20 first-year upper secondary school students from the same school who did not participate in the main study. The pilot administration aimed to assess the clarity and comprehensibility of the questionnaire items, identify potential ambiguities, and minimize the risk of misinterpretation by participants.

The qualitative component was strengthened through the use of a common semi-structured interview protocol. This ensured that the same core questions were addressed with all participants, while the semi-structured format allowed students to elaborate on their personal experiences and perceptions. The interview responses were analyzed using thematic analysis. They were read repeatedly to gain an overall understanding of the data, and meaningful units relevant to the research questions were identified and coded. The initial codes were then refined and organized into broader themes related to sources of anxiety associated with argumentative writing, evaluation-related concerns, and perceived changes following the intervention.

Methodological triangulation was achieved by combining quantitative data from the STAI with qualitative data from the semi-structured interviews. This integration enabled the findings to be examined from complementary perspectives and provided a more comprehensive understanding of students' writing-related state anxiety before and after the intervention. In addition, the use of pre- and post-intervention measurements, together with the inclusion of a Control Group, strengthened the credibility of the findings by allowing changes over time to be interpreted in relation to both the Experimental and Control Groups.

Finally, the systematic implementation of the instructional intervention over an extended period, together with clearly defined research procedures and the consistent collection and analysis of quantitative and qualitative data, contributed to the dependability and methodological robustness of the study.

4. RESULTS

4.1. State-Trait Anxiety Inventory, Form Y-1

The results for STAI Form Y-1 are presented below. This form assesses students' state anxiety at the time of administration and was administered immediately before they began writing their argumentative essays.

Table 2. Pre-test and post-test STAI-Y1 scores and within-group comparisons for the experimental and control groups.

STAI-Y1	Pre-test	Post-test	N	T-test		WILCOXON	
	Mean (SD)	Mean (SD)		t	Sig(2-tailed) p	Test Statistic	Asymptotic Sig (2-sided)
Experimental group	49.24 (13.777)	42.84 (12.361)	38	3.963	<0.001	115.000	0.001
Control group	42.95 (10.938)	41.43 (12.851)	21	0.858	0.401	54.500	0.297

Table 2 presents the means and standard deviations of students' STAI-Y1 scores in the Experimental and Control Groups at pre-test and post-test, together with the results of the within-group pre-post comparisons. These comparisons were conducted separately for each group using paired-samples *t*-tests. In addition, given the relatively small sample sizes and the possibility of deviations from normality, Wilcoxon signed-rank tests were performed as a nonparametric robustness check.

In the Experimental Group, students' mean STAI-Y1 score decreased from 49.24 (SD = 13.777) at pre-test to 42.84 (SD = 12.361) at post-test. The paired-samples *t*-test indicated that this within-group change was statistically significant, $t(37) = 3.963$, $p < 0.001$. The Wilcoxon signed-rank test yielded the same conclusion, with a test statistic of 115.000 and $p = 0.001$, providing convergent evidence from a nonparametric analysis.

In the Control Group, students' mean STAI-Y1 score decreased slightly from 42.95 (SD = 10.938) at pre-test to 41.43 (SD = 12.851) at post-test. However, this within-group change was not statistically significant according to either the paired-samples *t*-test, $t(20) = 0.858$, $p = 0.401$, or the Wilcoxon signed-rank test, with a test statistic of 54.500 and $p = 0.297$.

Table 3. Within-group changes, between-group difference in change scores, and effect sizes for STAI-Y1.

Comparison	Mean change	Effect size index	Value	Interpretation
Experimental Group: pre-test to post-test	6.40	Cohen's d_z	0.643	Moderate
Control Group: pre-test to post-test	1.52	Cohen's d_z	0.187	Small
Experimental vs Control: difference in change scores	4.88	Cohen's d for independent change scores	0.52	Moderate

Note: For the within-group pre-test-post-test comparisons, Cohen's d_z was calculated as $t/\sqrt{n}$. The between-group effect size is reported as Cohen's d for the difference between the independent change scores.

Table 3 summarizes the magnitude of change in STAI-Y1 scores from pre-test to post-test. Mean change was calculated by subtracting the post-test score from the pre-test score; therefore, higher positive values indicate greater reductions in state anxiety from pre-test to post-test.

The Experimental Group showed a mean reduction of 6.40 points, corresponding to a moderate within-group effect size, Cohen's $d_z = 0.643$. The Control Group showed a smaller mean reduction of 1.52 points, corresponding to a small within-group effect size, Cohen's $d_z = 0.187$. The between-group difference in change scores was 4.88 points, corresponding to a moderate effect size, Cohen's $d = 0.52$.

Table 4. Item-level descriptive statistics and within-group pre-post comparisons for STAI-Y1 scores in the experimental group.

STAI-Y1 Experimental group	Pre-test	Post-test	T-test			WILCOXON	
	Mean (SD)	Mean (SD)	n	t	Sig(2- tailed) p	Test Statistic	Asymptotic Sig (2-sided)
*Statement 1 (I feel calm)	2.47 (0.979)	2.11 (0.924)	38	3.183	0.003	13.000	0.005
*Statement 2 (I feel secure)	2.24 (1.076)	1.95 (0.804)	38	1.867	0.070	51.500	0.068
Statement 3 (I am tense)	2.71 (0.956)	2.26 (0.891)	38	2.743	0.009	75.000	0.012
Statement 4 (I feel strained)	2.24 (1.051)	1.92 (0.912)	38	2.086	0.044	59.500	0.040
*Statement 5 (I feel at ease)	2.58 (0.976)	2.29 (0.984)	38	2.324	0.026	45.500	0.029
Statement 6 (I feel upset)	2.08 (1.050)	1.84 (0.945)	38	1.598	0.118	49.000	0.095
Statement 7 (I am presently worrying over possible misfortunes)	2.79 (1.044)	2.34 (0.909)	38	2.673	0.011	30.500	0.014
*Statement 8 (I feel satisfied)	2.71 (0.802)	2.24 (0.786)	38	3.389	0.002	19.500	0.003
Statement 9 (I feel frightened)	1.82 (1.087)	1.50 (0.862)	38	2.154	0.038	14.000	0.023
*Statement 10 (I feel comfortable)	2.61 (0.916)	2.37 (0.913)	38	1.713	0.095	42.000	0.084
*Statement 11 (I feel self-confident)	2.45 (0.891)	2.05 (0.733)	38	2.956	0.005	50.000	0.007
Statement 12 (I feel nervous)	2.50 (1.109)	2.00 (0.986)	38	2.910	0.006	71.500	0.010
Statement 13 (I am jittery)	1.63 (0.998)	1.37 (0.883)	38	1.959	0.058	24.000	0.058
Statement 14 (I feel indecisive)	2.55 (1.083)	2.61 (1.054)	38	-0.321	0.750	128.000	0.643
*Statement 15 (I am relaxed)	2.92 (0.941)	2.45 (0.950)	38	2.982	0.005	30.000	0.006
*Statement 16 (I feel content)	2.79 (0.963)	2.37 (0.852)	38	3.141	0.003	52.500	0.005
Statement 17 (I am worried)	2.53 (1.084)	2.21 (0.875)	38	2.313	0.026	37.500	0.027
Statement 18 (I feel confused)	1.97 (0.944)	2.03 (0.944)	38	-0.361	0.720	125.500	0.707
*Statement 19 (I feel steady)	2.61 (0.887)	2.29 (0.927)	38	1.781	0.083	61.500	0.090
*Statement 20 (I feel pleasant)	3.05 (0.957)	2.66 (0.909)	38	2.431	0.020	59.000	0.022

Note: * indicates positively worded STAI-Y1 items reverse-scored so that higher scores indicate greater state anxiety.

Table 4 presents exploratory item-level analyses of STAI-Y1 scores for the Experimental Group. Positively worded STAI-Y1 items marked with an asterisk were reverse-scored before analysis, so that higher scores consistently indicated higher levels of state anxiety. The item-level analyses are reported for exploratory purposes and interpreted descriptively as complementary evidence to the total STAI-Y1 score. Wilcoxon signed-rank tests were also conducted as nonparametric sensitivity analyses.

Lower post-test mean scores were observed in 18 of the 20 items. Both the paired-samples *t*-tests and the Wilcoxon signed-rank tests indicated statistically significant pre-post differences in 13 items, whereas no statistically significant change was identified in the remaining seven items. Taken together, these item-level findings are broadly

consistent with the decrease observed in the total STAI-Y1 score. Nevertheless, because the item-level analyses involved multiple unadjusted comparisons, they should be interpreted cautiously and not independently of the overall scale score.

Table 5. Item-level descriptive statistics and within-group pre-post comparisons for STAI-Y1 scores in the control group.

STAI-Y1 Control group	Pre-test	Post-test	T-test			WILCOXON	
	Mean (SD)	Mean (SD)	n	t	Sig(2- tailed) p	Test Statistic	Asymptotic Sig (2-sided)
*Statement 1 (I feel calm)	2.29 (0.784)	1.95 (0.865)	21	2.092	0.049	10.000	0.052
*Statement 2 (I feel secure)	1.81 (0.750)	1.90 (0.944)	21	-0.491	0.629	32.000	0.627
Statement 3 (I am tense)	2.05 (1.244)	2.24 (0.944)	21	-1.073	0.296	44.000	0.285
Statement 4 (I feel strained)	1.57 (0.746)	1.81 (0.928)	21	-1.156	0.261	44.000	0.285
*Statement 5 (I feel at ease)	2.24 (0.831)	1.95 (1.024)	21	1.671	0.110	16.500	0.109
Statement 6 (I feel upset)	1.81 (0.981)	1.71 (0.902)	21	0.357	0.724	28.500	0.676
Statement 7 (I am presently worrying over possible misfortunes)	2.33 (1.197)	2.05 (1.024)	21	0.946	0.355	25.500	0.281
*Statement 8 (I feel satisfied)	2.67 (1.017)	2.43 (0.746)	21	0.960	0.348	17.000	0.272
Statement 9 (I feel frightened)	1.38 (0.805)	1.48 (0.814)	21	-1.000	0.329	7.500	0.317
*Statement 10 (I feel comfortable)	2.10 (0.889)	2.00 (1.000)	21	0.400	0.693	14.500	0.608
*Statement 11 (I feel self-confident)	2.57 (0.926)	2.38 (1.071)	21	0.890	0.384	24.000	0.197
Statement 12 (I feel nervous)	2.10 (1.044)	2.10 (1.091)	21	0.000	1.000	10.500	1.000
Statement 13 (I am jittery)	1.24 (0.539)	1.24 (0.700)	21	0.000	1.000	10.500	1.000
Statement 14 (I feel indecisive)	2.52 (1.167)	2.05 (0.921)	21	1.805	0.086	18.500	0.096
*Statement 15 (I am relaxed)	2.43 (1.076)	2.24 (1.179)	21	1.164	0.258	5.000	0.234
*Statement 16 (I feel content)	2.57 (0.978)	2.62 (0.973)	21	-0.224	0.825	48.000	0.851
Statement 17 (I am worried)	2.10 (1.179)	2.14 (1.153)	21	-0.237	0.815	20.000	0.773
Statement 18 (I feel confused)	1.86 (1.062)	1.90 (0.831)	21	-0.271	0.789	15.500	0.792
*Statement 19 (I feel steady)	2.62 (1.024)	2.48 (0.814)	21	0.826	0.419	35.000	0.405
*Statement 20 (I feel pleasant)	2.71 (1.007)	2.76 (1.136)	21	-0.271	0.789	30.000	0.782

Note: * indicates positively worded STAI-Y1 items reverse-scored so that higher scores indicate greater state anxiety.

Table 5 presents the corresponding exploratory item-level analyses of STAI-Y1 scores for the Control Group, following the same scoring and analytical procedures described for Table 4. Accordingly, positively worded items marked with an asterisk were reverse-scored so that higher scores consistently indicated higher levels of state anxiety. Wilcoxon signed-rank tests were also conducted as nonparametric sensitivity analyses.

Overall, the Control Group showed a mixed and less consistent pattern of change across individual STAI-Y1 items. Post-test mean scores were lower for 10 items, higher for eight items, and unchanged for two items. The paired-samples t -test indicated a statistically significant pre-post difference only for Item 1, $t(20) = 2.092$, $p = .049$. However, the corresponding Wilcoxon signed-rank test was not statistically significant, $p = .052$, and none of the other Wilcoxon tests reached statistical significance. Given the exploratory nature of the item-level analyses, the number of comparisons conducted, and the lack of confirmation from the nonparametric test, the isolated result for Item 1 should be interpreted cautiously. This overall pattern is consistent with the total-score analysis, in which the Control Group showed only a small and statistically nonsignificant change in state anxiety over time.

4.2. State-Trait Anxiety Inventory, Form Y-2

The results for STAI Form Y-2 are presented below. This form assesses trait anxiety as a relatively stable personality characteristic and was included in the analysis to examine whether students' broader anxiety disposition remained stable over time.

Table 6. Pre-test and post-test STAI-Y2 scores and within-group comparisons for the experimental and control groups.

STAI-Y2	Pre-test	Post-test	N	T-test		WILCOXON		Effect size	
	Mean (SD)	Mean (SD)		t	Sig(2-tailed) p	Test Statistic	Asymptotic Sig (2-sided)	Cohen's d_z	Effect size
Experimental Group	44.03 (10.055)	44.11 (12.121)	38	-0.082	0.935	345.500	0.844	-0.0133	Negligible
Control Group	40.48 (7.865)	40.76 (8.689)	21	-0.237	0.815	54.500	0.297	-0.0517	Negligible

Table 6 presents the pre-test and post-test STAI-Y2 scores for the Experimental and Control Groups, together with the results of the within-group pre-post comparisons. Paired-samples t -tests were used to examine changes over time within each group, while Wilcoxon signed-rank tests were conducted as nonparametric sensitivity analyses. Cohen's d_z indicates the magnitude of the within-group pre-post change and was calculated as $t/\sqrt{n}$. Because the direction of change was defined as pre-test minus post-test, negative values indicate a slight increase from pre-test to post-test.

Trait anxiety scores remained relatively stable in both groups, with only negligible changes over time. In the Experimental Group, the mean STAI-Y2 score increased marginally from 44.03 (SD = 10.055) at pre-test to 44.11 (SD = 12.121) at post-test. This change was not statistically significant, $t(37) = -0.082$, $p = 0.935$, and the effect size was negligible, Cohen's $d_z = -0.013$. The Wilcoxon signed-rank test similarly indicated no statistically significant change, with a test statistic of 345.500 and $p = 0.844$.

A similar pattern was observed in the Control Group, where the mean STAI-Y2 score increased slightly from 40.48 (SD = 7.865) at pre-test to 40.76 (SD = 8.689) at post-test. This change was also not statistically significant, $t(20) = -0.237$, $p = 0.815$, with a negligible effect size, Cohen's $d_z = -0.052$. The Wilcoxon signed-rank test also indicated no statistically significant change, with a test statistic of 54.500 and $p = 0.297$.

Overall, the STAI-Y2 findings are consistent with the conceptual distinction between state and trait anxiety. Whereas the Experimental Group showed a statistically significant reduction in STAI-Y1 scores, trait anxiety scores remained stable in both groups over the same period. This pattern supports the interpretation that the observed reduction concerned state anxiety associated with the argumentative writing task rather than a broader change in students' trait anxiety.

4.3. Interview Findings

The interviews explored participants' experiences of anxiety in writing contexts, with particular emphasis on their subjective perceptions of argumentative writing and the factors they perceived as intensifying or alleviating such feelings during the task.

Question 1- Pre-intervention: Sources of Apprehension During Argumentative Writing

Participants were asked to identify the aspects of argumentative writing that caused them apprehension before the intervention. The findings indicated that these feelings were mainly associated with difficulties encountered during the early stages of the writing process. The most frequently reported source was difficulty generating ideas, which was mentioned 18 times. Time constraints were also a prominent source of unease, with 15 mentions. Less frequently reported sources included understanding the topic, with seven mentions, as well as formulating and organizing ideas and meeting word-limit requirements, with six mentions each. Other factors included concerns about grades, with five mentions, and fear of making errors, with four mentions. In addition, six participants stated that they did not experience apprehension during writing. Illustrative responses included the following:

Participant 1: "In general, I am quite anxious, especially before writing, about whether I will understand the topic, generate ideas, and express them correctly."

Participant 2: "I experience stress and anxiety, particularly when I have to write a long text within a limited time and lack sufficient information."

Participant 3: "I experience a moderate level of anxiety, mainly about whether ideas will come to me, how to structure them, and whether, if I fail to do so, I will receive a low grade."

Question 2- Pre-intervention: Sources of Apprehension During Text Evaluation

Participants were asked to indicate which aspects of the evaluation process—teacher feedback, peer feedback, or grades—they perceived as sources of apprehension before the intervention. The findings indicated that grades were the most frequently reported source, with 23 mentions. Teacher feedback followed, with 16 mentions, whereas peer feedback was mentioned less frequently, with eight mentions. Illustrative responses included the following:

Participant 1: "Peer feedback does not make me anxious; however, the teacher's feedback does, both in terms of what the teacher will say and the grade I will receive."

Participant 2: "The teacher's feedback makes me slightly anxious, the grade makes me quite anxious, and peer feedback makes me almost not anxious at all."

Participant 3: "The grade makes me anxious, but the teacher's feedback does not make me as anxious, as I see it as a way to identify my mistakes and improve. Peer feedback is similar; it can also help me."

Question 3- Post-intervention: Changes in Anxiety and Comfort During Argumentative Writing

Participants were asked whether the level of anxiety or comfort they experienced during argumentative writing had changed since the beginning of the school year. The findings indicated an overall tendency toward reduced anxiety and greater comfort. Of the 38 participants, 26 reported feeling more at ease. Ten participants stated that they had not experienced apprehension either at the beginning of the school year or after the intervention, while two reported no change. No participant reported increased discomfort.

The 26 participants who reported feeling more at ease were subsequently asked to identify the factors to which they attributed this change. Their responses most frequently referred to the teaching of writing techniques, with 16 mentions. Increased familiarity with the stages of the writing process followed, with eight mentions. In addition, five participants referred to greater confidence in their writing. Illustrative responses included the following:

Participant 1: "I think my anxiety is lower now because I know how to write more fully developed arguments and produce a more organized essay."

Participant 2: "I do not feel anxious now; I feel less anxious than at the beginning of the year. With the strategies and techniques I have learned, I now know how to work."

Participant 3: "I think I feel less anxious, especially when ideas come to me more easily. Writing somewhat better has reduced my anxiety, and the writing strategies have helped me."

Question 4—Post-intervention: Sources of Apprehension During Text Evaluation

Participants were asked to indicate which aspects of the evaluation process—teacher feedback, peer feedback, or grades—they perceived as sources of apprehension following the instructional intervention. The findings indicated that grades remained the most frequently reported source, with 13 mentions. Peer feedback was the second most frequently mentioned source, with 12 mentions, whereas teacher feedback accounted for six mentions. Illustrative responses included the following:

Participant 1: "Peer feedback does not make me anxious, and neither does the teacher's feedback. The grade makes me somewhat anxious, as I would like it to be satisfactory."

Participant 2: "The teacher's feedback and the grade make me anxious, and peer feedback makes me very anxious."

Participant 3: "Peer feedback makes me anxious; the teacher's feedback does not make me as anxious because what you tell me is for my benefit. The grade does not make me anxious; I prefer to improve rather than receive a high grade."

5. DISCUSSION

The findings indicate a moderate reduction in writing-related state anxiety among students in the Experimental Group following the instructional intervention, whereas the Control Group showed only a small, statistically nonsignificant decrease. In this study, writing-related state anxiety refers to students' state anxiety as assessed by the STAI-Y1 immediately before they engaged in argumentative writing. The decline in mean STAI-Y1 scores in the Experimental Group from pre- to post-intervention is consistent with a more favorable emotional experience in this specific writing context. This pattern aligns with existing research suggesting that the systematic teaching of metacognitive and self-regulatory strategies may reduce task-related apprehension by strengthening students' sense of control, preparedness, and security during writing (Bryce et al., 2023; Reeves, 1997; Shen, Ismail, Jeyaraj, & Teng, 2024). Moreover, the exploratory item-level analyses showed reductions across multiple indicators of state anxiety, providing complementary support for the view that students' emotional experience during the writing task improved following the intervention.

By contrast, trait anxiety, as measured by the STAI-Y2, did not change significantly in either the Experimental or the Control Group. This result is consistent with the well-established distinction between state and trait anxiety and suggests that the intervention was more closely associated with context-specific emotional responses to argumentative writing than with stable personality characteristics.

The qualitative data provide further insight into these results by illustrating the factors that shaped students' apprehension before and after the intervention. Prior to the intervention, students identified difficulty generating ideas as a major source of emotional discomfort during argumentative writing, consistent with Zhang (2011). Time constraints were another prominent source of unease, in line with Kusumaningputri et al. (2018). Both factors may heighten uncertainty and reflect limited procedural knowledge or difficulty strategically organizing the writing process. The initial findings also showed that students' unease was associated with understanding the topic, formulating and organizing ideas, meeting word-limit requirements, concerns about grades, and fear of making errors. These results suggest that, before the intervention, students' negative emotional responses centered on both the cognitive demands of the task and the evaluative consequences of their writing performance.

Following the intervention, most students reported feeling less anxious and attributed this change mainly to the explicit teaching of writing strategies, greater familiarity with the stages of the writing process, and increased confidence in their written work. These factors may support the development of self-efficacy (Bal et al., 2025; Türkben, 2021), which plays an important role in shaping students' emotional responses to writing tasks. The fact that no participant reported increased discomfort further suggests that, within the context of the present study, structured and strategy-oriented writing instruction contributed positively to students' emotional engagement with the task.

The findings concerning the evaluation of written discourse are also noteworthy. Prior to the intervention, grades were the most prominent source of apprehension, followed by teacher feedback, whereas peer feedback appeared to carry comparatively less evaluative weight. This pattern suggests that, at the beginning of the study, students' emotional responses were strongly shaped by formal and authority-based forms of assessment, particularly those associated with grades and teacher judgment.

Following the intervention, grades remained the most frequently reported source of apprehension, highlighting the continuing influence of quantitative assessment on students' emotional experience. However, the qualitative findings also indicated a shift in the relative prominence of the emotionally demanding aspects of evaluation. References to apprehension about teacher feedback decreased, whereas peer feedback became a more frequently reported source of discomfort. The reduced unease associated with teacher feedback may be related to students' increased familiarity with the evaluation process and their experience of more supportive and formative feedback practices (Golda, 2017). In this context, teacher feedback appeared to be perceived less as a purely judgmental act and more as a means of identifying weaknesses and supporting improvement.

A particularly meaningful pattern was the greater prominence of peer feedback as a reported source of discomfort following the intervention. This shift should not necessarily be interpreted as a negative effect of peer evaluation; rather, it may indicate a change in students' perceptions of their classmates' role in the writing process. Before the intervention, peer feedback appeared to carry relatively limited evaluative weight. Following sustained collaboration, articulation, reflection, and peer assessment within the CA framework, however, classmates' responses may have become more meaningful and emotionally salient. The peer group may thus have developed from a relatively peripheral classroom presence into a more consequential community of readers whose views influenced students' perceptions of their own writing. The greater prominence of peer-feedback-related apprehension may therefore reflect the emergence of a more authentic sense of audience, as argumentative writing came to be experienced not only as a teacher-assessed activity but also as a socially situated practice shaped through interaction, dialogue, and participation in a community (Collins et al., 1991; Collins et al., 1989; Rahimi & Fathi, 2022; Starke-Meyerring, 2011).

From this perspective, the pattern represents an ambivalent but theoretically meaningful outcome. On the one hand, students came to recognize their classmates as legitimate interlocutors, co-readers, and evaluators of their written work; on the other hand, this recognition increased the social visibility of writing and may have intensified students' sense of exposure within the group. This pattern can be understood through the concepts of social-evaluative threat and fear of negative evaluation, as feedback from classmates whose opinions had become important could activate concerns about competence, self-presentation, and one's position within the classroom community (Downing, Cooper, Cala, Gin, & Brownell, 2020; Park et al., 2023). Thus, this result does not contradict the reduction in writing-related state anxiety observed in the Experimental Group. Rather, it suggests that the intervention may have reduced anxiety associated with task management and teacher feedback while making peer judgment more salient as the peer audience acquired greater credibility. This interpretation highlights the dual role of peer feedback as both a metacognitive resource and a socially evaluative event, requiring careful pedagogical mediation and the cultivation of feedback literacy and psychological safety (Wei & Liu, 2024; Xue, Yang, Du, & Liu, 2023).

6. LIMITATIONS OF THE STUDY

Despite its contributions, the present study should be considered in light of several methodological limitations. First, it involved a relatively small sample of 59 students from three intact classes in a single public upper secondary school. Although this design preserved the authenticity of the classroom context and strengthened the ecological validity of the study, the small sample and single-school setting limit the generalizability of the findings. The results may also have been shaped by institutional, pedagogical, and classroom-specific factors, including school culture, student composition, and teacher–student relationships. Further research is therefore needed to examine the applicability of the findings across different educational settings.

In addition, the quasi-experimental action research design did not involve random assignment to the Experimental and Control Groups. This is a common constraint in school-based research, where existing classroom structures must be preserved. Nevertheless, the inclusion of a Control Group, the use of pre- and post-intervention measurements, and the integration of quantitative and qualitative data through methodological triangulation strengthened the credibility and methodological robustness of the study.

Another methodological consideration concerns the teacher’s dual role as both instructor and researcher. This dual role enabled close monitoring of the instructional process and consistent implementation of the CA intervention throughout the school year. However, it may also have introduced researcher influence into classroom interactions, students’ responses, or the interpretation of the data. To mitigate this risk, all prescribed ethical and methodological procedures were followed, and a clear distinction between the pedagogical and research roles was maintained as far as possible, particularly during data collection and analysis.

Future research could build on the present findings by involving larger and more diverse samples, multiple schools and teachers, and longitudinal research designs. Such studies could examine whether the observed reduction in writing-related state anxiety is sustained over time and whether similar patterns emerge across different writing genres, educational levels, and sociocultural contexts.

7. CONCLUSION

Taken together, the findings of the present study indicate a moderate reduction in writing-related state anxiety in the Experimental Group, compared with only a small and statistically nonsignificant reduction in the Control Group. This pattern may be understood in relation to students’ increased cognitive and metacognitive control over the writing process. The structured and explicit nature of the instructional intervention may have increased predictability, reduced uncertainty, and strengthened students’ sense of agency, thereby supporting a more positive emotional experience during writing. In this sense, students’ emotional responses to writing were not merely affective reactions but appeared to be closely linked to perceived control, strategic awareness, and self-efficacy.

From a theoretical perspective, the study contributes to the literature by highlighting the interdependence of the cognitive, metacognitive, and affective dimensions of writing. It provides empirical support for the view that instructional approaches targeting higher-order cognitive and metacognitive processes may also be associated with learners’ emotional engagement. In particular, the findings underscore the potential of the CA model to function not only as a framework for skill development but also as a means of supporting emotional regulation in writing contexts.

From a pedagogical perspective, the findings emphasize the importance of explicitly teaching metacognitive and self-regulatory strategies as part of writing instruction. In classroom practice, this involves helping students understand how to plan, monitor, revise, and evaluate their written work while also providing opportunities for collaboration and dialogue. At the same time, the findings highlight the need for the careful implementation of peer evaluation practices. Gradual familiarization, clear criteria, and appropriate emotional and procedural support are

necessary to enable peer feedback to function not only as a cognitively beneficial practice but also as an emotionally sustainable learning experience.

REFERENCES

- Akhavan, N., & Walsh, N. (2020). Cognitive apprenticeship learning approach in k-8 writing instruction: A case study. *Journal of Education and Learning*, 9(3), 123-142. <https://doi.org/10.5539/jel.v9n3p123>
- Ao, J. (2019). *An empirical study on the influence of peer scaffolding on the English writing anxiety of second-year high school students*. Master's Thesis, Yunnan Normal University.
- Bal, M., Uyumaz, G., & Maden, B. (2025). Examining the mediating role of metacognitive writing strategies in the relationship between self-regulated writing skills and writing anxiety among middle school students. *British Educational Research Journal*, 51(6), 2964-2988. <https://doi.org/10.1002/berj.4212>
- Barton, J., & Collins, A. (1997). *Starting out: Designing your portfolio*. In J. Barton & A. Collins (Eds.), *Portfolio assessment: A handbook for educators*. pp. 1-10. White Plains, NY: Dale Seymour Publications.
- Blake, M. F., Cottle, K., Gallagher, C., & MacArthur, C. A. (2024). Supporting metacognition in writing strategy instruction: Effective learning strategies for the first-year student and beyond. *Journal of the National Organization for Student Success*, 1(2), 43-59. <https://doi.org/10.61617/jnoss.30>
- Bryce, J., Faheem, S., Ali, A., & Shina, A. (2023). Writing strategies used by secondary school students in the Maldives: A combination of EMI and L2 experiences. *Issues in Educational Research*, 33(4), 1308-1323.
- Camacho, A., Alves, R. A., Silva, M., Ferreira, P., Correia, N., & Daniel, J. R. (2023). The impact of combining SRSD instruction with a brief growth mindset intervention on sixth graders' writing motivation and performance. *Contemporary Educational Psychology*, 72, 102127. <https://doi.org/10.1016/j.cedpsych.2022.102127>
- Cao, S., Zhong, L., & Wang, C. (2025). The impact of student writing assessment literacy on psychological factors: An ordinal logistic regression analysis. *arXiv preprint arXiv:2502.00004*. <https://doi.org/10.48550/arXiv.2502.00004>
- Cheng, Y.-s. (2002). Factors associated with foreign language writing anxiety. *Foreign Language Annals*, 35(6), 647-656. <https://doi.org/10.1111/j.1944-9720.2002.tb01903.x>
- Cobourne, K., & Shellenbarger, T. (2019). Taming the writing demons: Overcoming writing apprehension. *Nurse Author & Editor*, 29(1), 1-8. <https://doi.org/10.1111/j.1750-4910.2019.tb00035.x>
- Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator*, 15(3), 38-46.
- Collins, A., Brown, J. S., & Newman, S. E. (1989). *Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics*. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser*. pp. 453-494. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. (2nd ed.). Thousand Oaks, CA: SAGE Publications.
- De La Paz, S., Butler, C., Levin, D. M., & Felton, M. K. (2024). Effects of a cognitive apprenticeship on transfer of argumentative writing in middle school science. *Learning Disability Quarterly*, 47(2), 70-83. <https://doi.org/10.1177/07319487221119365>
- Dennen, V. P. (2004). *Cognitive apprenticeship in educational practice: Research on scaffolding, modeling, mentoring, and coaching as instructional strategies*. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology*. pp. 813-828. Mahwah, NJ: Lawrence Erlbaum Associates.
- Dennen, V. P., & Burner, K. J. (2007). *The cognitive apprenticeship model in educational practice*. In J. M. Spector, M. D. Merrill, J. van Merriënboer, & M. P. Driscoll (Eds.), *Handbook of research on educational communications and technology*. pp. 425-439. Mahwah, NJ: Lawrence Erlbaum Associates.

- Denzin, N. K., & Lincoln, Y. S. (2018). *The SAGE handbook of qualitative research*. (5th ed.). Thousand Oaks, CA: SAGE Publications.
- Downing, V. R., Cooper, K. M., Cala, J. M., Gin, L. E., & Brownell, S. E. (2020). Fear of negative evaluation and student anxiety in community college active-learning science courses. *CBE—Life Sciences Education*, 19(2), ar20. <https://doi.org/10.1187/cbe.19-09-0186>
- Ekmekçi, E. (2018). Exploring Turkish EFL students' writing anxiety. *The Reading Matrix: An International Online Journal*, 18(1), 158-175.
- Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition & emotion*, 6(6), 409-434. <https://doi.org/10.1080/02699939208409696>
- Fajaryani, N., Mukminin, A., Hidayat, M., Muhaimin, M., Haryanto, E., Nazurty, N., Marzulina, L., Harto, K., & Habibi, A. (2021). Cultural capital and argumentative writing in English: Challenges and strategies used by EFL student teachers. *The Qualitative Report*, 26(10), 3029-3045. <https://doi.org/10.46743/2160-3715/2021.4784>
- Fan, C., & Wang, J. (2024). Configurational impact of self-regulated writing strategy, writing anxiety, and perceived writing difficulty on EFL writing performance: An fsQCA approach. *Scientific Reports*, 14(1), 11125. <https://doi.org/10.1038/s41598-024-61537-x>
- Fitriani, N. (2022). EFL students' perceptions of the causes of scientific writing anxiety. *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, 10(1), 287-299. <https://doi.org/10.24256/ideas.v10i1.2637>
- Fountoulakis, K. N., Papadopoulou, M., Kleanthous, S., Papadopoulou, A., Bizeli, V., Nimatoudis, I., Iacovides, A., & Kaprinis, G. S. (2006). Reliability and psychometric properties of the Greek translation of the State-Trait Anxiety Inventory form Y: Preliminary data. *Annals of General Psychiatry*, 5, 2. <https://doi.org/10.1186/1744-859X-5-2>
- Gao, L. (2023). The relationship between writing anxiety and writing strategies among Chinese college students. *Journal of Education and Educational Research*, 4(2), 130-134. <https://doi.org/10.54097/jeer.v4i2.10840>
- Golda, T. L. (2017). Strategies for coping with writing anxiety: An experimental study. *TJELLS | The Journal for English Language and Literary Studies*, 7(1), 1-7. <https://doi.org/10.66503/tjells/vol.7.issue.1.2>
- Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern language journal*, 70(2), 125-132. <https://doi.org/10.1111/j.1540-4781.1986.tb05256.x>
- Izwandi, A. A. (2025). Undergraduate students' perceptions of writing anxiety in English academic writing in Taiwan. *International Journal of Innovation and Education Research*, 4(1), 23-34. <https://doi.org/10.333369/ijier.v3i2.41924>
- Jawas, U. (2019). Writing anxiety among Indonesian EFL students: Factors and strategies. *International Journal of Instruction*, 12(4), 733-746. <https://doi.org/10.29333/iji.2019.12447a>
- Jin, Y., de Bot, K., & Keijzer, M. (2015). Factors associated with foreign language anxiety: A study of Chinese university learners of Japanese and English. *Dutch Journal of Applied Linguistics*, 4(1), 67-85. <https://doi.org/10.1075/dujal.4.1.07jin>
- Karatsareas, P. (2022). *Semi-structured interviews*. In R. Kircher & L. Zipp (Eds.), *Research methods in language attitudes*. pp. 99-113. Cambridge: Cambridge University Press. <https://doi.org/10.1017/9781108867788.010>.
- Kellogg, R. T. (2008). Training writing skills: A cognitive developmental perspective. *Journal of Writing Research*, 1(1), 1-26. <https://doi.org/10.17239/jowr-2008.01.01.1>
- Khan, S., Shah, S. A., & Tahir, T. (2024). Effects of writing self-regulation and writing anxiety on english writing motivation of secondary school students. *Journal of Educational Research and Social Sciences Review*, 4(2), 56-65. <https://ojs.jerssr.org.pk/index.php/jerssr/article/view/262>
- Kirschner, P. A., & Hendrick, C. (2020). Cognitive apprenticeship revisited: Shining a light on the processes of thinking to understand learning. *American Educator*, 44(3), 37-40, 50. <https://eric.ed.gov/?id=EJ1272730>

- Kurniasih, K. (2018). Writing anxiety in relation to high performing students' English compositions. *BRIGHT: A Journal of English Language Teaching, Linguistics and Literature*, 1(1), 1-8. <https://jurnal.stkippgritulungagung.ac.id/index.php/bright/article/view/243>
- Kusumaningputri, R., Ningsih, T. A., & Wisasongko, W. (2018). Second language writing anxiety of Indonesian EFL students. *Lingua Cultura*, 12(4), 357-362. <https://doi.org/10.21512/lc.v12i4.4268>
- Lin, X. (2025). Causes and alleviation strategies of foreign language writing anxiety. *Journal of Education, Humanities and Social Sciences*, 49, 1-7. <https://doi.org/10.54097/7ym5fg31>
- Mavridaki, K., & Vassilaki, E. (2013). *The bibliotherapy approach to coping with anxiety and cognitive interference*. In G. Spantidakis & E. Michailidi (Eds.), *Concerns and prospects for language learning and teaching: Festschrift in honor of Professor Michalis Vamvoukas*. Athens, Greece: Pedio.
- Nurkamto, J., Prihandoko, L. A., Putro, N. H. P. S., & Purwati, O. (2024). Academic writing apprehension in higher education: A systematic review. *Studies in English Language and Education*, 11(1), 247-266. <https://doi.org/10.24815/siele.v11i1.28928>
- Papadopoulou-Mantadaki, S. (2019). *The language of pain and its metaphors from childhood to adulthood*. Athens, Greece: Armos.
- Papi, M., & Khajavy, H. (2023). Second language anxiety: Construct, effects, and sources. *Annual Review of Applied Linguistics*, 43, 127-139. <https://doi.org/10.1017/S0267190523000028>
- Park, L. E., Naidu, E., Lemay, E. P., Canning, E. A., Ward, D. E., Panlilio, Z., & Vessels, V. (2023). *Social evaluative threat across individual, relational, and collective selves*. In B. Gawronski (Ed.), *Advances in experimental social psychology*. Vol. 68, pp. 139-222. Cambridge, MA: Academic Press. <https://doi.org/10.1016/bs.aesp.2023.03.001>
- Paul, N., Lin, T.-J., Ha, S. Y., Chen, J., & Newell, G. E. (2021). The role of achievement goal orientations in the relationships between high school students' anxiety, self-efficacy, and perceived use of revision strategies in argumentative writing. *Journal of Writing Research*, 12(3), 657-684. <https://doi.org/10.17239/jowr-2021.12.03.05>
- Pekrun, R., & Stephens, E. J. (2012). *Academic emotions*. In K. R. Harris, S. Graham, T. Urdan, J. M. Royer, & M. Zeidner (Eds.), *APA educational psychology handbook: Vol. 2. Individual differences and cultural and contextual factors*. pp. 3-31. Washington, DC: American Psychological Association. <https://doi.org/10.1037/13274-001>
- Rahimi, M., & Fathi, J. (2022). Exploring the impact of wiki-mediated collaborative writing on EFL students' writing performance, writing self-regulation, and writing self-efficacy: a mixed methods study. *Computer Assisted Language Learning*, 35(9), 2627-2674. <https://doi.org/10.1080/09588221.2021.1888753>
- Reeves, L. L. (1997). Minimizing writing apprehension in the learner-centered classroom. *The English Journal*, 86(6), 38-45. <https://doi.org/10.2307/820367>
- Rezaei, M., & Jafari, M. (2014). Investigating the levels, types, and causes of writing anxiety among Iranian EFL students: A mixed method design. *Procedia-Social and Behavioral Sciences*, 98, 1545-1554. <https://doi.org/10.1016/j.sbspro.2014.03.577>
- Sabti, A. A., Hassan, A. Y., Turki, H. Y., & Hummadi, A. S. (2024). A study of the causes and the effect of writing anxiety components on Iraqi EFL students' attitudes. *SAGE Open*, 14(4), 21582440241286392. <https://doi.org/10.1177/21582440241286392>
- Sabti, A. A., Md Rashid, S., Nimehchisalem, V., & Darmi, R. (2019). The impact of writing anxiety, writing achievement motivation, and writing self-efficacy on writing performance: A correlational study of Iraqi tertiary EFL learners. *SAGE Open*, 9(4), 2158244019894289. <https://doi.org/10.1177/2158244019894289>
- Shen, X., Ismail, L., Jeyaraj, J. J., & Teng, M. F. (2024). Metacognitive strategies, writing self-efficacy and writing anxiety in different learning modes: A two-wave longitudinal model. *System*, 126, 103485. <https://doi.org/10.1016/j.system.2024.103485>

- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the state-trait anxiety inventory: (Form Y)*. Palo Alto, CA: Consulting Psychologists Press.
- Starke-Meyerring, D. (2011). *The paradox of writing in doctoral education: Student experiences*. In L. McAlpine & C. Amundsen (Eds.), *Doctoral education: Research-based strategies for doctoral students, supervisors and administrators*. pp. 75–95. Dordrecht, Netherlands: Springer.
- Stefaniak, J. E. (2013). *The use of cognitive apprenticeships to teach learner-centered instructional strategies in an undergraduate learning environment* (Publication No. 798). Doctoral Dissertation, Wayne State University. Wayne State University Dissertations.
- Teng, F. (2020). The role of metacognitive knowledge and regulation in mediating university EFL learners' writing performance. *Innovation in Language Learning and Teaching*, 14(5), 436–450. <https://doi.org/10.1080/17501229.2019.1615493>
- Theocharopoulou, G., Spantidakis, I., Vassilaki, E., & Papadopoulou, S. (2026). Cognitive apprenticeship in secondary writing instruction: Fostering metacognition and self-regulation. *Studies in Linguistics and Literature*, 10(1), 65–94. <https://doi.org/10.22158/sll.v10n1p65>
- Tsiriatakis, I. K., Vassilaki, E., Spantidakis, I., & Stavrou, N. A. (2017). The examination of the effects of writing strategy-based procedural facilitative environments on students' English foreign language writing anxiety levels. *Frontiers in Psychology*, 7, 2074. <https://doi.org/10.3389/fpsyg.2016.02074>
- Türkben, T. (2021). The effect of self-regulated strategy education on the writing skills of middle school students. *International Journal of Education and Literacy Studies*, 9(2), 52–65. <https://doi.org/10.7575/aiac.ijels.v.9n.2p.52>
- van der Rijst, R. M., Lamers, A. M., & Admiraal, W. F. (2023). Addressing student challenges in transnational education in Oman: the importance of student interaction with teaching staff and peers. *Compare: A Journal of Comparative and International Education*, 53(7), 1189–1205. <https://doi.org/10.1080/03057925.2021.2017768>
- Vassarmidou, D., & Spantidakis, I. (2015). *Teaching and learning of written discourse*. Athens, Greece: Gutenberg.
- Wei, Y., & Liu, D. (2024). Incorporating peer feedback in academic writing: A systematic review of benefits and challenges. *Frontiers in Psychology*, 15, 1506725. <https://doi.org/10.3389/fpsyg.2024.1506725>
- Wu, Y. H., & Gu, W. X. (2011). An empirical study on cooperative learning reducing English writing anxiety among non-English majors. *Foreign Languages and Their Teaching*, 6, 51–55.
- Xue, S., Yang, Y., Du, J., & Liu, F. (2023). Multi-layered e-feedback anxiety: An action research study among Chinese learners using peer feedback activities in an academic writing course. *Frontiers in Psychology*, 14, 1062517. <https://doi.org/10.3389/fpsyg.2023.1062517>
- Yalçın, A., & Karadeniz, A. (2016). Relationship between the writing quality and self-regulation skills of secondary education students. *The Turkish Online Journal of Educational Technology, Special Issue for INTE 2016*, 345–354.
- Zhang, C., & Zhang, W. (2022). The impact of academic procrastination on second language writing: the mediating role of L2 writing anxiety. *Frontiers in Psychology*, 13, 851120. <https://doi.org/10.3389/fpsyg.2022.851120>
- Zhang, H. (2011). *A study on ESL writing anxiety among Chinese English majors: Causes, effects and coping strategies for ESL writing anxiety*. Master's Thesis, Kristianstad University. DiVA. <https://urn.kb.se/resolve?urn=urn:nbn:se:hkr:diva-8247>