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Effects of English-Chinese Code-Switching on Writing Anxiety in Chinese as a Second Language Learners

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ABSTRACT

This study investigates the effect of English-Chinese code-switching (CS) on writing anxiety and writing performance in learners of Chinese as a second language (CSL), using a quasi-experimental design. A total of 178 beginner-level CSL learners were purposively selected based on their course materials and class hours, with 67 assigned to the control group and 111 to the experimental group. Over a period of approximately four months, the experimental group was encouraged to apply CS in their writing exercises, while the control group was required to write exclusively in Chinese. Writing anxiety was assessed using a standardized second language writing anxiety questionnaire, and writing performance was measured through a short self-introduction task. The results revealed that the experimental group experienced a significant reduction in writing anxiety, whereas the control group showed an increase in anxiety over time. In addition, the writing performance of the experimental group was significantly higher than that of the control group. These findings suggest that CS can effectively reduce CSL writing anxiety and enhance writing performance in beginner CSL learners. The results provide empirical support for integrating CS strategies in second language writing instruction, especially for learners who may struggle with linguistic confidence and emotional barriers in the early stages of acquisition.

Keywords: Chinese as a Second Language; Chinese Writing; Code-Switching; Writing Anxiety

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ARTICLE INFO

Received: 14 April 2025 | Revised: 13 May 2025 | Accepted: 18 May 2025 | Published Online: 6 June 2025
DOI: https://doi.org/10.30564/fls.v7i6.9511

CITATION

ZHAO, Y., CHEW, F.P., YAP, T.T., 2025. Effects of English-Chinese code-switching on writing anxiety in Chinese as a second language learners. Forum for Linguistic Studies. 7(6): 554–567. DOI: https://doi.org/10.30564/fls.v7i6.9511

1. Introduction

The number of international students choosing to study in China has been increasing [1-3]. This increase has highlighted language barriers that many of these students face, drawing attention to teachers on the challenges students encounter [4-6]. As a typical logographic writing system, Chinese differs fundamentally in both linguistic structure and script from the phonographic systems used by most Western languages. These two types of language systems belong to entirely different linguistic traditions, with significant differences not only in the correspondence between sounds and written forms but also in the cognitive processes and learning paths they require. Such systemic differences often lead to the phenomenon where learners can speak but struggle to write Chinese, a situation that is particularly pronounced during the initial stages of learning Chinese as a Second Language (CSL). For Chinese beginners, it is common to acquire basic oral communication skills through listening and speaking practice, while facing considerable difficulties and anxiety in writing due to the lack of phoneme-to-grapheme correspondence and the inherent complexity of Chinese character structures.

Among the four core language skills—listening, speaking, reading, and writing—writing is considered a productive skill and is often seen as one of the most challenging to acquire [7]. Chinese language learners, in particular, frequently experience anxiety around writing [8,9]. Many students leave large blank spaces or make numerous mistakes in writing exams, which could result in lower evaluations [10,11]. Errors in writing are often seen as nearly intolerable, reflecting a Chinese teaching philosophy that emphasizes perfection [12,13]. This can lead to anxiety and nervousness during classroom writing assessments [14]. Whether students feel confident and motivated to attend writing classes, especially when their language proficiency is limited, remains a critical issue [15]. To improve students' writing quality, various instructional approaches have been proposed [16-18]. Nevertheless, writing anxiety remains prevalent [19], and methods to alleviate this anxiety require further research.

CS emerges from the interaction of languages [20-22]. Across the globe, many individuals communicate in two or more languages rather than using only one. Wherever they may be, speakers are often required to choose a particular language code, and they commonly alternate between or blend multiple codes, sometimes within the same short sentence. This phenomenon is referred to as CS. Learners of a second language (L2) also experience challenges related to language contact [23,24]. Over time, scholars' perspectives on the role of CS in language teaching have evolved, shifting from a largely negative view [25-27] to a more favorable acceptance [28,29].

Recent research has increasingly indicated that CS can significantly benefit L2 learners [30,31]. Research on how to use CS and its effects remain limited, with most studies focusing on the positive impact of CS on classroom atmosphere, teacher-student relationships [32-34]. From the perspective of the four major language skills, although research on the application of CS in L2 writing is still lacking, some studies have already explored its use in spoken classes [35-37], reading classes [38,39], and listening classes [40,41]. These studies suggest promising possibilities for integrating CS into L2 writing instruction.

Krashen's (1982) [42]Affective Filter Hypothesis explains the connection between emotional factors and second language acquisition (SLA). During the process of SLA, emotions act as a filter on language input, affecting how much learners can take in and process, much like a sieve. Only when this emotional "filter" allows language input to pass through can it reach the acquisition mechanisms in the brain, where it is absorbed and internalized. According to Krashen's [42] (1982) Affective Filter Hypothesis, language anxiety is not solely triggered by the difficulty of language input but also reflects learners' emotional experiences within the classroom environment. A positive and supportive classroom atmosphere can help students build confidence, reduce anxiety, and consequently lower the affective filter, thereby enhancing the efficiency of SLA. In the context of L2 writing, factors such as the teacher's acceptance of students' expressions, the manner of providing feedback, and the creation of a tolerant environment toward errors may all influence students' levels of writing anxiety. Therefore, when exploring ways to alleviate L2 writing anxiety, it is important to consider not only instructional strategies but also emotional support and the quality of teacher-student interaction.

This hypothesis [42] provides a theoretical foundation for this study, supporting the importance of reducing

writing anxiety. This research attempts to introduce English-Chinese CS as a means to activate learners' existing linguistic resources, providing support during the ideation and writing processes in Chinese, and thereby reducing anxiety associated with Chinese writing tasks. By minimizing the interference of the affective filter, language input can be more readily received and internalized, ultimately facilitating the development of Chinese writing proficiency. More importantly, with the aid of a familiar language, learners are likely to engage more actively in writing activities, become more aware of their linguistic deficiencies, and seek improvement, thus fostering a more autonomous and effective SLA process.

2. Literature Review

2.1. Code-Switching

In academic research, the term "Code" [43] often describes a symbolic system used by individuals for communication, including language, dialect, register, or specialized jargon. Sociolinguists regard any form of language or its variants as a code. This can refer broadly to any symbol system used for communication, including secret symbols unique to an individual. "Code-Switching" is generally thought to have been first formally introduced in Hans Vogt's 1954 monograph Language Contact. The study of CS structural types is a complex area within CS research, involving aspects of language such as form, structure, grammar, and pronunciation.

CS is now widely observed across various modern communicative contexts, drawing attention from multiple related fields. Linguists in traditional linguistics, neurolinguistics, and psycholinguistics have sought to classify the structural types of CS [44-46]. CS has also gained considerable focus in classroom instruction. Since the 1980s, interest has grown in using CS as a distinctive pedagogical tool in foreign language education [47].

Empirical findings on CS in classroom settings, however, remain contentious. Some studies argued that CS negatively impacts L2 learning and should be minimized in L2 classrooms to provide learners with a target language environment [48-50]. More recent research, however, suggested that CS can have substantial benefits for L2 learners [31], particularly in teaching English as a second language (ESL) [51]. According to Nordin et al. (2013) [33], using learners' L1 in L2 instruction can help reduce anxiety related to the L2, foster a supportive affective environment, and ease nervousness. Consequently, Malik (2014) encouraged teachers to incorporate CS more frequently in classroom settings.

In the field of CSL, there is recognition of the significant role of CS. However, the majority of research remains limited and generally conservative in perspective. Even when studies indicate that CS could help L2 learning [52], caution was often emphasized. For example, Chen (2021) [28]demonstrated that CS in Teaching Chinese to Speakers of Other Languages classes can foster a more positive learning atmosphere, but also noted the risk of learner dependency on teachers and potential neglect of Chinese language practice. Overall, few studies view CS as a learning tool for L2 learners or systematically explore its impact on CSL learning.

2.2. L2 Writing Anxiety

Anxiety plays a crucial role in Krashen's (1982) [42] Affective Filter Hypothesis within his theory of SLA. In 1982, Krashen elaborated on this hypothesis, suggesting that an affective filter can hinder language learners from receiving comprehensible input, thereby underscoring the impact of emotional factors on SLA. In the field of L2 writing, the presence of writing anxiety not only leads Chinese language learners to avoid writing tasks and hinders the authentic demonstration of their language abilities, but also tends to intensify when they encounter difficulties due to limited language proficiency. This heightened anxiety can further reinforce avoidance behaviors, creating a negative cycle. At the same time, learners are less likely to become aware of their linguistic shortcomings through writing and to actively seek improvement strategies, which significantly hampers the development of their Chinese writing skills.

According to the Affective Filter Hypothesis [42], writing anxiety is one of the key emotional factors that hinder the efficiency of SLA. When learners experience tension or unease during the writing process, these negative emotions act as a "filter" that blocks L2 input from being effectively absorbed and processed by the brain's language acquisition mechanisms, thereby undermining learning

outcomes. Therefore, effectively reducing such emotional barriers is crucial to improving the quality of L2 writing instruction in Chinese. This study proposes the moderate use of English-Chinese CS as a pedagogical intervention aimed at alleviating learners' anxiety during writing tasks, enhancing comprehension, and thus weakening the impact of the affective filter. Furthermore, through CS in writing, learners are encouraged to actively identify areas for improvement, which promotes more effective language input absorption and continuous development of writing proficiency.

The concept of L2 anxiety was first introduced by Horwitz et al. [53], who developed the Foreign Language Classroom Anxiety Scale (FLCAS). Research utilizing this scale has shown that L2 classroom anxiety is common and negatively affects L2 performance [54-57].

Since writing in an L2 generally involves higher anxiety levels than writing in one's native language, and learners often hold negative perceptions of L2 writing [42], research on L2 writing anxiety has received increasing attention. Most studies on L2 writing anxiety have focused on ESL [58-62], although recent years have seen a growing interest in CSL writing anxiety [11,19]. However, little research has explored the use of CS as a strategy to alleviate CSL writing anxiety [63,64].

Accordingly, this study aims to find answers to the following questions:

1. Is there any significant difference in the pre-test of Chinese writing anxiety between the control and experimental group?

2. Is there any significant difference in the pre-test of Chinese writing performance between the control and experimental group?

3. Is there any significant difference in the control group between the pre and post-test of Chinese writing anxiety?

4. Is there any significant difference in the control group between the pre and post-test of Chinese writing performance?

5. Is there any significant difference in the experimental group between the pre and post-test of Chinese writing anxiety?

6. Is there any significant difference in the experimental group between the pre and post-test of Chinese writing performance?

7. Is there any significant difference in the post-test of Chinese writing anxiety between the control and experimental group?

8. Is there any significant difference in the post-test of Chinese writing performance between the control and experimental group?

Then, eight alternative hypotheses were based on the questions.

1. Ha1: There is a significant difference in the pre-test of Chinese writing anxiety between the control and experimental group.

2. Ha2: There is a significant difference in the pre-test of Chinese writing performance between the control and experimental group.

3. Ha3: There is a significant difference in the control group between the pre- and post-test of Chinese writing anxiety.

4. Ha4: There is a significant difference in the control group between the pre- and post-test of Chinese writing performance.

5. Ha5: There is a significant difference in the experimental group between the pre- and post-test of Chinese writing anxiety.

6. Ha6: There is a significant difference in the experimental group between the pre- and post-test of Chinese writing performance.

7. Ha7: There is a significant difference in the post-test of Chinese writing anxiety between the control and experimental group.

8. Ha8: There is a significant difference in the post-test of Chinese writing performance between the control and experimental group.

3. Methodology

3.1. Research Design

The study employed a quasi-experimental design, utilizing pre-test and post-test assessments with control and experimental groups. A quasi-experimental approach involves a structured study that incorporates planned modifications to process elements and observes their effects [65]. The experiment included four classes—two experimental groups and two control groups—with each class comprising undergraduate students from diverse

majors and nationalities. This research is grounded in the Affective Filter Hypothesis [42], which posits that writing anxiety functions as an "affective filter" that hinders the absorption of language input and, consequently, affects writing performance. Guided by this theoretical framework, the research will compare the differences between an experimental group (using CS) and a control group (not using CS) in terms of writing anxiety and writing performance. The aim is to examine whether CS can help reduce writing anxiety and thereby enhance writing outcomes. Through this design, the research aims to determine whether CS can serve as an effective pedagogical intervention to alleviate emotional barriers and facilitate SLA writing.

3.2. Participants

The participants in this study were Chinese language learners from two universities in Xi'an, China, referred to as University X and University N. There are many universities in Xi'an, China, but this study focuses more on the Chinese education for degree students rather than non-degree students. Moreover, the Chinese textbooks and the semester's class schedule at University X and University N are the same, so these two universities were ultimately selected. University X has only two degree classes, with a total of 80 students. In contrast, University N has four classes, but the smallest two classes together total 102 students. Therefore, the total number of participants in this study was 182. Based on the boxplots and unreliable responses, a total of 178 students (112 males and 66 females) were ultimately selected, meeting the study requirements. These included two experimental groups and two control groups. University X had one control group and one experimental group, while University N also had one control group and one experimental group. The students in both groups were aged between 17 and 28, all of whom were undergraduates with no prior experience in the Chinese language. As part of their degree requirements, all participants were required to pass the Hanyu Shuiping Kaoshi (the Chinese Proficiency Test, HSK) Level 4 exam before graduation, making the Chinese course a mandatory component of their studies.

3.3. Instruments of Study

The instrument developed by Cheng [66] (2004) was used to measure writing anxiety among CSL learners in this study, as it was chosen because Cheng's [66] focus on L2 learners' language anxiety closely aligns with the research. Cheng's [66] study categorized writing anxiety into three components: the Somatic Anxiety subscale, the Avoidance Behavior subscale, and the Cognitive Anxiety subscale. However, while Cheng's instrument measures writing anxiety in English as an L2, this study centers on CSL writing anxiety. Consequently, Cheng's original English items were adapted to Chinese; for instance, the item "While writing in English, I'm not nervous at all" was modified to "While writing in Chinese, I'm not nervous at all." After a pilot study and tests of validity and factor loading, a 5-point Likert scale with 22 items was finalized in Cheng[66].

This study uses the self-introduction assignment from Unit 2 of Zhao & Zhu [67] (2003) as an instrument to measure writing performance. The participants in this study are Chinese language beginners who have just arrived in China from different countries and have joined a new class where neither the teacher nor the students are familiar with each other, making this theme particularly suitable for the participants in this study. The writing textbook by Zhao & Zhu [67] (2003) is published by Beijing Language and Culture University Press, a national first-tier publishing press. The international Chinese language textbook publishing section of this press is its most distinctive and strong area, ensuring high reliability.

3.4. Validity and Reliability of the Instrument

To evaluate the content validity in this study, the questionnaire was reviewed by four experts. One expert suggested that, for students whose first language is not English, the vocabulary should not be too challenging. As a result, the term "composition" was revised to "writing" in the questionnaire to align with this expert's advice. In the assessment of construct validity, Item 10 was found to load on multiple factors, leading to its removal. Ultimately, 21 items were retained in the questionnaire for this study.

The reliability of the instrument was also tested. The questionnaire was distributed to 55 respondents who were not part of the study but shared similar learning backgrounds and requirements. However, only 53 valid

responses were collected, as two responses were deemed invalid. The Cronbach's alpha for the instrument was 0.852, indicating a satisfactory level of reliability above the widely accepted threshold of 0.65 [65]. The final questionnaire consisted of 21 items divided into three subscales: Somatic Anxiety (7 items), Avoidance Behavior (7 items), and Cognitive Anxiety (8 items).

Additionally, the questionnaire included a demographic section, which collected students' numbers, gender, and major to track their performance across pre- and post-tests. Student ID numbers were used to match pre- and post-test responses. The respondents in this study were beginner-level Mandarin learners, confirmed through a placement test conducted by the institution upon admission. A five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = normal, 4 = agree, 5 = strongly agree) was used for the writing anxiety section of the questionnaire.

3.5. Research Procedure

This experiment lasted for one semester, totaling 14 weeks. Both the experimental group and the control group were required to complete four writing tests, with an average interval of three weeks between each test. Each test lasted 10 minutes, and students were asked to submit their work immediately after the timed session. The writing topic was chosen from the second unit of Chinese Writing Tutorial [67], published by Beijing Language and Culture University Press. This publisher specializes in international Chinese language textbooks, with over 3,700 publications used worldwide. Over 90% of universities in China that enroll international students use textbooks from this publisher, indicating the high validity of Zhao & Zhu's [67] (2003) Chinese writing materials.

The first unit of this textbook,"Listening and Writing," focuses on writing down sentences heard, with an emphasis on Chinese punctuation. Starting from the second unit, the exercises encourage independent expression, with "Self-Introduction" as the topic. Consequently, self-introduction was used as the writing topic for both the experimental and control groups throughout the four writing sessions.

However, the writing requirements differed between groups. The experimental group was allowed to use English-Chinese CS in their writing, while the control group was restricted to using only Chinese, without pinyin. In the final writing test, only Chinese was required for both groups.

After completing the first and last writing tests, students were instructed to immediately fill out a writing anxiety questionnaire to capture their genuine anxiety levels during the writing training. During the writing sessions, students were not allowed to use mobile phones, refer to books, or ask questions of teachers or peers, in order to accurately assess their actual writing ability.

Each test would be graded by a senior professional HSK examiner, who would assign a score. The examiner would evaluate according to the HSK writing score criteria (**Table 1**). The writing section of HSK is graded into four different levels, with a maximum score of 30 for each essay. The four grading levels,from low to high are: 0 points, low-level score (1-10 points), mid-level score (11-20 points), and high-level score (21-30 points). Each stroke mistake results in a deduction of 0.5 points, with no repeated deductions for the same mistakes. To facilitate statistical analysis and result presentation, this study standardized the 30-point scores to a 5-point scale, maintaining the original data's relative order and distribution.

Table 1. The details about the HSK writing score criteria.

Score	Scoring Criteria
0 points	Blank
Low Level (1-10 points)	Content has little relevance to the topic; lacks coherence, contains grammar errors; numerous Chinese character typographical errors.
Mid-Level (11-20 points)	Content generally aligns with the topic, coherent and logical, with some grammar errors; content mostly aligns with the topic, coherent and logical, with a few Chinese character typographical errors; content mostly aligns with the topic, coherent and logical, but lacks sufficient length.
High Level (21-30 points)	Rich content, logical structure, coherent expression, no grammar errors, and no Chinese character typographical error.

3.6. Data Analysis

According to the research questions and hypotheses, this study aims to compare whether there are significant differences between two independent samples (independent samples t-test). It also requires comparing the pre-test and post-test results of the same sample to determine significance (paired samples t-test). Therefore, Statistical Package for the Social Sciences (SPSS) software was utilized for data analysis in this study.

Before conducting the t-tests, normality tests and homogeneity of variance tests were performed on the experimental data. The results indicated that the writing performance scores of both the control and experimental groups followed a normal distribution. Specifically, the skewness of the pre-test was 0.684, and the kurtosis was -0.466; for the post-test, the skewness was 0.142, and the kurtosis was -0.911. All skewness values were less than 1. Generally, skewness greater than 1 suggests significant deviation from a normal distribution, indicating non-normality [68]. Therefore, it can be concluded that the pre-test and post-test data in this study are suitable for parametric testing.

In the test of homogeneity of variances, the results showed homogeneity ($p = 0.880 > 0.05$), further validating the appropriateness of using parametric tests in this study.

4. Findings

The independent samples t-test was used to examine the significance of the pre-tests for writing anxiety and writing performance between the experimental group and the control group. The t-test results are presented in **Tables 2** and **3**.

Table 2. The control and experimental group's writing anxiety in the pre-test.

	Control		Experiment		*t*	*p*
	M	SD	M	SD		
writing anxiety	3.62	0.66	3.63	0.71	-0.05	0.96

Table 3. The control and experimental group's writing performance in the pre-test.

	Control		Experiment		*t*	*p*
	M	SD	M	SD		
writing performance	0.06	0.24	0.02	0.13	1.49	0.14

Table 2 indicates that there is no significant difference in writing anxiety ($t = -0.052$, $p = 0.958$) between the control group and the experimental group. Therefore, the Ha1 was rejected.

In terms of writing performance, the mean score of the experimental group ($M = 0.059$, $SD = 0.239$) is slightly higher than the control group ($M = 0.018$, $SD = 0.133$), but no significant difference is shown in writing performance between the two groups ($t = 1.494$, $p = 0.137$). Hence, the Ha2 was rejected.

After the semester of Chinese writing practice, a paired sample t-test was conducted to examine the changes in writing anxiety and writing performance between the experimental group and the control group. The data for the control group is presented in **Tables 4** and **5**.

Table 4. Writing anxiety of the control group in the pre-test and post-test.

	Pre-Test		Post-Test		*t*	*p*	d
	M	SD	M	SD			
writing anxiety	3.62	0.66	4.68	0.35	-9.99	0.00*	0.87

Note: * $p < 0.05$; d = Cohen's d.

Table 5. Writing performance of the control group in the pre-test and post-test.

	Pre-Test		Post-Test		*t*	*p*	d
	M	**SD**	**M**	**SD**			
writing performance	0.06	0.24	0.52	0.59	-7.12	0.00*	0.53

Note: * $p < 0.05$; d = Cohen's d.

As shown in **Tables 4** and **5**, the control group exhibited different levels of writing anxiety in the pre-test and post-test, with post-test writing anxiety (M = 4.618) significantly higher than pre-test writing anxiety (M = 3.623, p = 0.000). The effect size (d = 0.867 > 0.8) falls within the category of a large effect, indicating a significant difference between pre-test and post-test writing anxiety. The use of Chinese-only writing practice had a notable impact on increasing writing anxiety.

At the same time, there was a significant difference in writing performance between the control group's post-test and pre-test (t = -7.123, p = 0.000), with a middle effect size (d = 0.532 > 0.5). This suggests that writing in Chinese significantly improved their Chinese writing performance.

Overall, the results indicate that students in the control group experienced a significant improvement in Chinese writing performance after a semester of Chinese-only writing practice, but their levels of writing anxiety also increased. Therefore, Ha3 and Ha4 are accepted. This suggests that while requiring students to write in Chinese can significantly enhance their writing performance, it may also lead to an increase in writing anxiety. In fact, a moderate increase in writing anxiety could, to some extent, contribute to better writing performance. For beginner Chinese learners, writing practice—even with traditional training methods—can improve writing performance.

However, it is important to note that while students' Chinese writing anxiety significantly increased along with improved writing performance, this might not ensure that students will maintain sustained interest in writing Chinese. These findings highlight the need for a balanced approach, as traditional writing methods may have unintended side effects. There is a clear need to explore alternative methods to minimize anxiety while continuing to improve writing performance.

According to **Table 6**, after a semester of writing practice using CS, the post-test writing anxiety of the experimental group (M = 1.29) was significantly lower than their pre-test writing anxiety (M = 3.629, t = -31.058, p = 0.000), and the effect of CS on the experimental group's writing anxiety was moderate (d = 0.793 > 0.5). This indicates that CS can effectively reduce students' writing anxiety, showing a positive development in their writing anxiety situation during Chinese writing.

Table 6. Writing anxiety of the experimental group in the pre-test and post-test.

	Pre-Test		Post-Test		*t*	*p*	d
	M	**SD**	**M**	**SD**			
writing anxiety	3.63	0.71	1.29	0.30	31.06	0.00*	0.79

Note: * $p < 0.05$; d = Cohen's d.

According to **Table 7**, the mean difference in writing performance between the experimental group's pre-test (M = 0.018) and post-test (M = 1.054) showed a significant difference (t = -18.607, p = 0.000), which was greater than the mean difference observed in the control group and had a moderate effect size (d = 0.587 > 0.5), larger than that of the control group. This suggests that CS has a stronger impact on writing performance. Additionally, compared to the control group, the experimental group had a smaller standard deviation in the post-test (SD = 0.553), indicating that CS's effect on improving Chinese writing performance is more consistent across learners.

Table 7. Writing performance of the experimental group in the pre-test and post-test.

	Pre-Test		Post-Test		*t*	*p*	d
	M	SD	M	SD			
writing performance	0.02	0.13	1.05	0.55	-18.61	0.00*	0.59

Note: * $p < 0.05$; d = Cohen's d.

Therefore, Ha5 and Ha6 are accepted. While there was a significant difference in writing anxiety between the pre- and post-test in the control group (as noted in Ha3), the change occurred in the opposite direction: in Ha3, writing anxiety increased, while in Ha5, writing anxiety decreased. At the same time, writing performance showed significant improvement. This suggests that CS not only alleviates writing anxiety but also enhances writing performance. Compared to traditional writing methods, CS achieves this goal while decreasing writing anxiety.

According to **Table 8**, there is a significant difference in post-test writing anxiety between the control group (M = 4.681) and the experimental group (M = 1.290; p = 0.000). The effect size is small, with d = 0.320, which is greater than 0.2 but less than 0.5. As mentioned earlier, the control group showed higher post-test writing anxiety compared to their pre-test, while the experimental group's post-test writing anxiety was lower than their pre-test. This indicates that using CS for writing can significantly reduce writing anxiety and is beneficial for learners. Therefore, CS appears to be a more effective writing training approach than traditional methods, as it helps alleviate writing anxiety, which may encourage students to maintain their interest in Chinese writing.

Table 8. Writing anxiety of the control and experimental group in the post-test.

	Control		Experiment		*t*	*p*	d
	M	SD	M	SD			
writing anxiety	4.68	0.35	1.29	0.30	68.54	0.00*	0.32

Note: * $p < 0.05$; d = Cohen's d.

According to Table 9, there is a significant difference in writing performance between the control group (M = 0.522) and the experimental group (M = 1.054; p = 0.000). This suggests that the experimental group, which had lower writing anxiety, achieved better writing performance, while the control group, which experienced increased anxiety, performed poorly. The effect size for the post-test between the control and experimental groups is d = 0.566, which is greater than 0.5 and falls within the moderate effect size range. This confirms that CS has an impact on writing performance. Therefore, Ha7 and Ha8 are accepted.

Table 9. Writing performance of the control and experimental group in the post-test.

	Control		Experiment		*t*	*p*	d
	M	SD	M	SD			
writing performance	0.52	0.59	1.05	0.55	-6.07	0.00*	0.57

Note: * $p < 0.05$; d = Cohen's d.

Overall, both approaches can significantly improve writing performance, but at different costs. Traditional writing methods tend to increase writing anxiety, while the CS approach helps reduce it. Writing anxiety should not be considered a necessary factor for improving writing performance, as it has long been overlooked. From both the perspectives of writing anxiety and writing performance, the CS approach proves to be superior to the traditional one.

5. Discussion and Conclusion

This study explores the writing anxiety and performance of beginner Chinese learners in Xi'an after a semester of Chinese language study, specifically under the writing demands of CS. An independent samples t-test revealed no significant differences in pre-test writing anxiety (Ha1) and performance between the control group and the experimental group, indicating that the Chinese proficiency and levels of writing anxiety were similar for both groups (Ha2). After a semester of writing training, both groups exhibited significant changes in writing anxiety, but in opposite directions: the control group showed a significant increase in writing anxiety (Ha3), while the experimental group demonstrated a significant decrease (Ha5). In terms of writing performance, the control group (Ha4) and experimental group (Ha6) significantly improved, with the experimental regroup showing a greater increase (Ha6). An independent samples t-test comparing post-test writing anxiety and performance between the two groups indicated significant differences, suggesting that CS can serve as an effective means to decrease writing anxiety (Ha7) and enhance students' Chinese writing performance (Ha8).

Ou and Zeng [69] (2017) and Chen [28] (2021) highlighted CS's potential to reduce classroom anxiety and foster a more relaxed learning environment, aligning with the current findings, supporting Ha3, Ha5, and Ha7. However, unlike Chen's [28] descriptive analysis, this study employs an experimental design, providing robust empirical evidence to substantiate these claims. Archila et al. [70] (2021) and Chen [28] (2021), while affirming the effectiveness of CS, emphasized the importance of extensive time and practice in research, which was achieved in this study.

Shafi et al. [71] (2020) pointed out that CS can enhance students' L2 performance, regardless of their proficiency level. CS helps learners better understand the content and aids in passing exams, which supports Ha4, Ha6, and Ha8. However, Shafi et al. [71] (2020) employed a qualitative research method, interviewing both teachers and students, which is a common approach in other CS study [72]. In contrast, this study provides data support for the positive effects of CS on L2 learning. Furthermore, while the mentioned studies focused on English as the target language, this study investigates Chinese as the target language. Although Chinese, as a logographic language, is more challenging to write compared to phonetic languages, CS has still shown positive effects on Chinese writing, thus expanding the application of CS.

The conclusions of Aparece and Bacasmot [73] (2023) are contrary to those of the present study, as they do not view the use of CS in L2 learning as beneficial. Aparece and Bacasmot [73] (2023) applied CS to English learners with a certain foundation, in contrast to the Chinese beginners in this study, and found that higher anxiety led to more frequent use of CS, as well as more L2 learning problems. Therefore, responses at different L2 proficiency levels may lead to opposing results, and a negative attitude towards CS should be adopted, which contrasts with the findings of this study. Similar findings were supported by Kumar et al. [74] (2021), who noted that, although CS played multiple roles and fostered an active atmosphere in primary education with lower L2 proficiency, teachers expressed concerns about the unhealthy language that CS might generate. Overall, the differences in the study populations may account for the contrasting conclusions.

For Chinese learners, even though most Chinese courses lack training in Chinese writing skills, students should recognize that Chinese writing is important for their Chinese proficiency. This study confirms that students' low anxiety level is key to improving Chinese writing performance. As students, they may also use CS in other areas, such as reading or speaking.

For Chinese teachers, CS is seen as an effective method for alleviating writing anxiety. When assigning writing tasks, teachers can innovatively adjust the writing requirements by allowing students to use CS languages in their writing. Teachers also need to realize that writing anxiety is intimately related to writing performance. Therefore, in addition to using CS, teachers can adopt other strategies to reduce writing anxiety, such as peer review or providing model examples, and minimize potential factors that lead to writing anxiety as much as possible.

This study has its limitations. Firstly, the effectiveness of CS may be influenced by various factors, including the nature of the L2, such as structural differences between phonographic and logographic writing systems, as well as learners' proficiency levels. Therefore, while this research provides empirical support for the use of CS in writing with logographic languages, its effectiveness in writing in other languages remains to be further examined. Future

research could conduct broader comparative studies across different L2 learner groups to more comprehensively assess the applicability and limitations of CS. Secondly, it focuses exclusively on English-Chinese CS among beginner learners, which limits its generalizability to other learner groups or language pairings. Future research could explore the impact of CS on intermediate and advanced CSL learners or investigate other language combinations, such as Spanish-Chinese or Malay-Chinese, which will be realized by bilingual Chinese teachers. Additionally, while this study centers on writing anxiety, further research could examine other emotional and motivational factors, such as self-efficacy or resilience, to provide a more comprehensive understanding of CS in L2 learning.

Author Contributions

Conceptualization, Y.Z., F.P.C. and T.T.Y.; methodology, Y.Z.; software, Y.Z.; validation, Y.Z.; formal analysis, Y.Z.; investigation, Y.Z.; resources, Y.Z.; data curation, Y.Z.; writing—original draft preparation, Y.Z.; writing—review and editing, Y.Z., F.P.C. and T.T.Y.; visualization, Y.Z., F.P.C. and T.T.Y.; supervision, F.P.C. and T.T.Y.; project administration, F.P.C. and T.T.Y.. All authors have read and agreed to the published version of the manuscript.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The study data were collected from all participants. The data that support the findings of this study are available from the author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

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